The Noises of Venice

An Exploration of Noise in a Historic City

AN INTERACTIVE QUALIFYING PROJECT
WORCESTER POLYTECHNIC INSTITUTE

Submitted to:
Project Advisor: Frederick Bianchi, WPI Professor
Project Co-Advisor: Fabio Carrera, WPI Professor

Submitted by:
Elliott Calamari
Neil Pomerleau
Robert Puishys
Wesley Ripley

Date: December 16, 2011

ve11-noise@wpi.edu

WPI

VeniceNoise.org

Acknowledgements

Professor Fabio Carrera, for his brainstorming and guidance throughout A and B term

Professor Frederick Bianchi, for his expertise on sound and his timely feedback on the paper

Dan Foley, for his assistance with the algorithm and his knowledge of recording analysis

Angelo Scarpa, for verifying the accuracy of our application using ARPAV's sophisticated equipment

Alberto Gallo, for securing our housing in Venice and bringing us to our apartment

Abstract

The goal of this project was to create a system for citizens to report noise problems in the historically quiet city of Venice, thus enabling government officials to identify key issues and laying the foundations for a new era of digital citizenship. We created a smartphone application that records and uploads noise samples to our website at VeniceNoise.org, which then analyzes and interactively displays each sample. In the process of developing the application and website, we created a new and highly efficient means of data collection that will streamline future field research. After verifying the accuracy of these tools with ARPAV, we investigated a large area of Venice by collecting over 1,000 recordings. These recordings created a greater understanding of the noise situation in Venice.

Executive Summary

The city of Venice is one of the most beautiful and historic places in the world. Its appearance has remained relatively unchanged since the days of the Venetian Republic, making it a drawing point for millions of tourists each year. In recent years, concern about noise in the city has been steadily rising. While Venice is a historically quiet place, it is the nature of the city itself that is causing noise levels to rise. The old brick and stone buildings require constant, and often loud, construction and maintenance. In addition, canals flow throughout the city making boats an integral means of transportation. While the noises produced by these sources are generally accepted, many locals have expressed displeasure towards tourist-related noise, but they have no way of reporting quantifiable data on these noise levels. Our project set out to solve this issue by creating a smartphone application that can record noise samples and quantify decibel levels. In the process, we collected extensive noise samples, assessed the noise situation in Venice, and identified the major noise producers in the city. To visualize these samples, we created a website that allows citizens to access all of the submitted data.

With the smartphone application, we collected over 1,000 noise samples. Each submission from the application includes not only a recording, but also a description of the noise source, GPS coordinates, the time and date, and a photograph. The user also has the ability to submit immediately or queue the file so that it can be uploaded at a later time. The microphone recordings were translated into a decibel scale through an empirically derived algorithm, which was later validated with the assistance of ARPAV (the regional environmental agency) and proven to be accurate to within 3%. This app is now available for download on the Android Market in both English and Italian.

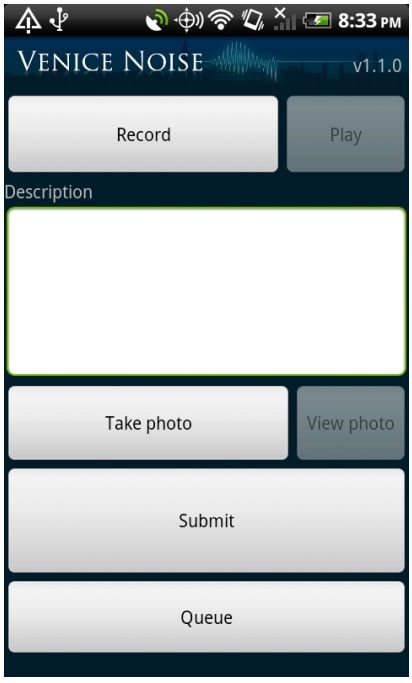


Figure 1: The Submit Screen of the Smartphone Application

Samples from the application are sent to our website at www.venicenoise.org, which displays an interactive map of noise samples throughout the city. Users can zoom in on the map and click on individual data points to see all of the information corresponding to this point, listen to the submitted sample, view the image associated with the noise source, and see whether the sample exceeds zoning thresholds.

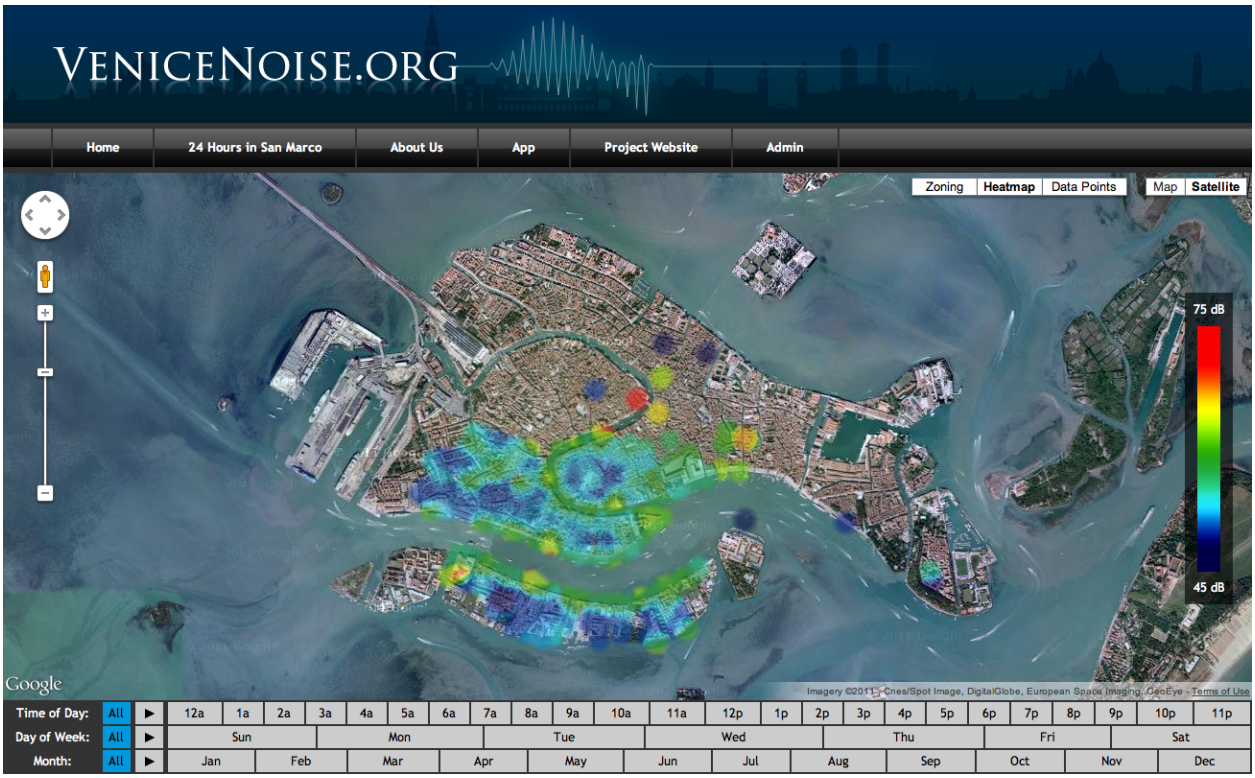


Figure 2: The VeniceNoise.org Homepage

Below the map, the website also provides animation tools that let users see how noise levels evolve over the course of a day, week, or even year. Further down, there are a number of data filters that allow users to find exactly what they are looking for, quickly and easily. The site also displays each submission in an interactive data table. Together, the website and the application comprise a powerful and versatile data collection and management system.

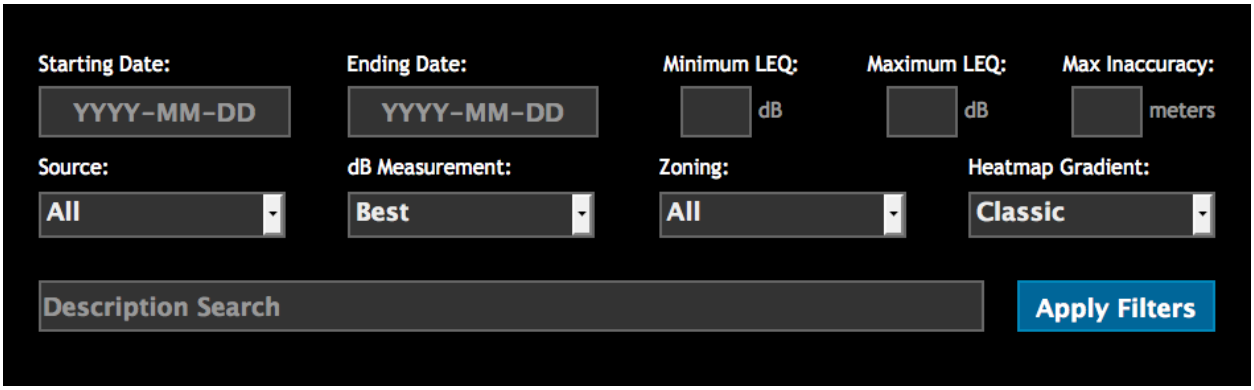


Figure 3: The Data Filter Tools

The samples we collected with our smartphone app were designed to cover as much area as possible, as well as every weekday at a specific location, and a full 24-hours at one location. We covered two *sestieri* – Dorsoduro and San Marco – and the island of Giudecca, collecting hundreds of samples at random times. In addition, we spent a week recording samples in Saint Mark's Square every weekday, at the same time. Finally, we focused on Saint Mark's Square for a whole day, collecting samples every half hour. We compared all of our samples with the "noise zoning" maps that specify the maximum allowable decibel levels in each part of the city.

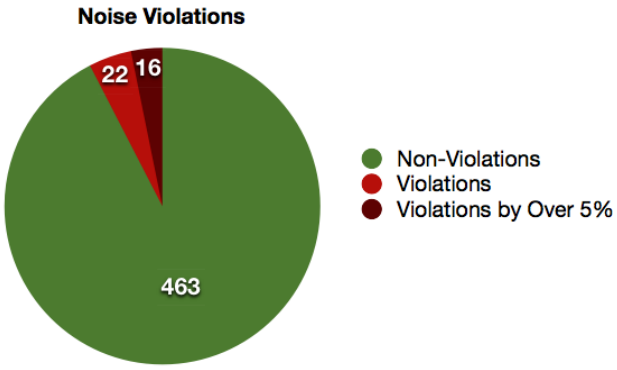


Figure 4: Noise Levels Above and Below Allowable Level

Our wide-area results in Dorsoduro, San Marco, and Giudecca showed that only 38 points (3.2%) exceeded the allowable limits, with less than half of those points exceeding by a 5% error margin, while 463 samples remained under these limits. Our weekday results from Saint Mark's Square found Thursday to be the loudest day of the week. This particular Thursday was a warm and beautiful day that marked an Italian holiday, so most citizens had the day off from work. By contrast, Friday was much quieter, but it had inclement weather. These findings show that noise levels fluctuate erratically in the city from day to day, and therefore it is difficult to regulate or predict noise levels. During our 24 hours in Saint Mark's Square, we observed noise levels increasing during the day and decreasing during the night. Since the zoning laws are designed to accommodate for this, the levels in the square only exceeded the allowable limit once.

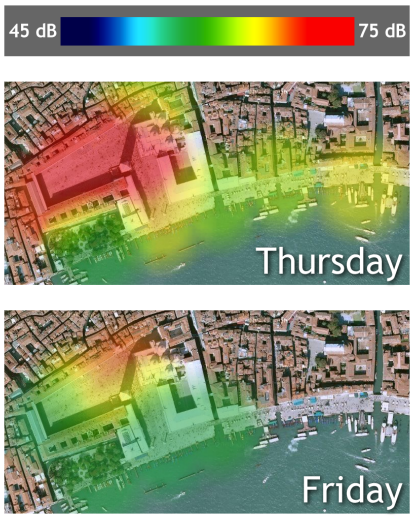


Figure 5: Thursday vs. Friday in St. Mark's Square

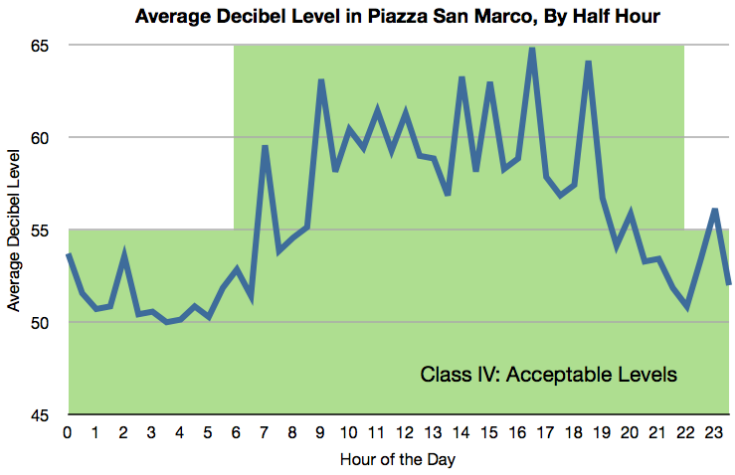


Figure 6: 24 Hours in St. Mark's Square

Together, boats, people, and construction account for 97% of samples that were found to be above the allowable limit. This led us to conclude that these three sources comprise most of the noise in Venice, each for a different reason. Boats produced noise levels close to the allowable limits, and they were the second most frequent noise source recorded (26%). Construction was the least frequent source of noise (11%), but it produced the loudest levels, even above 80 dB. People, on the other hand, produced the lowest decibel levels on average, but they were the most frequent (42%). Since boats are an integral form of transportation, construction is vital to maintaining the aging city, and people did not produce excessive noise levels, we concluded that there was no major noise issue in Venice during our study.

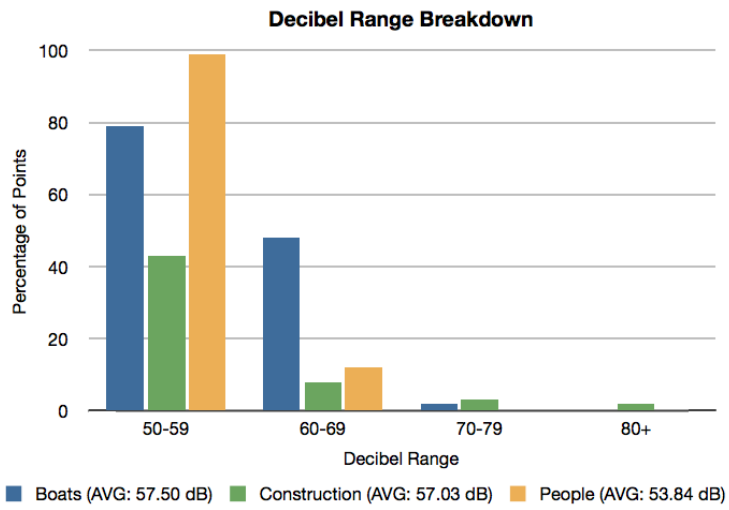


Figure 7: Decibel Range Breakdown for Major Sources of Noise

To get an even clearer picture of the noise situation in Venice, a future project could explore other areas of the island in further detail. Our tools weren't completed when cruise ships were still visiting Venice in late October and early November, so the cruise ship docks are a logical next step. They could also perform a 24-hour study in Santa Margherita similar to our own in St. Mark's Square. With boats being a significant source of noise, the Grand Canal would also be an area of interest. Finally, a future project should continue to explore tourist attractions, such as the Rialto Bridge.

Figure 8: Areas of Interest for Future Projects

The success of the smartphone application led us to conclude that it should be applied to additional types of projects in the future. In conjunction with the website, the application could automatically and accurately record locations and other data relevant to the project. We believe that the application we created is reliable, versatile, and powerful enough to be applied to a number of projects for years to come.

Table of Contents

List of Figures

1 Introduction

With the rise of human populations and the expansion of technology, noise has gradually become a part of everyday life. High noise levels have been proven to have harmful effects on human health. The World Health Organization claims that mere traffic noise is harming the health of almost every third person in Europe, and that "one in five Europeans is regularly exposed to sound levels at night that could significantly damage health." [1] In a Canadian study, 8 percent of people over the age of fifteen said they are "very or extremely bothered, disturbed, or annoyed" by noise in general.[2]

Venice has remained relatively quiet in recent years, despite its reputation as a tourist attraction. The restrictions on noise from motorboats and the lack of cars make Venice a place where distant footsteps can still be heard at night. But with growing amounts of tourism, Venice is becoming noisier. Many blame cruise ships for producing excessive noise, while others blame the tourists these cruise ships bring. The stores, restaurants, and cafes that extend into the streets, known as *plateatici*, may also produce problematic noise levels due to the gathering of people in small locations. Venice is also the home to heavy boat traffic. Large ferries move through the canals hourly, and smaller public transportation vessels run 24 hours a day. Areas near the canals are subject to nearly constant but unavoidable noise. Yet another unavoidable source of noise is construction, as the old, stone infrastructure of Venice must be constantly refurbished and maintained. In addition, many of these noise issues are not under the city's jurisdiction and are difficult to address.[3]

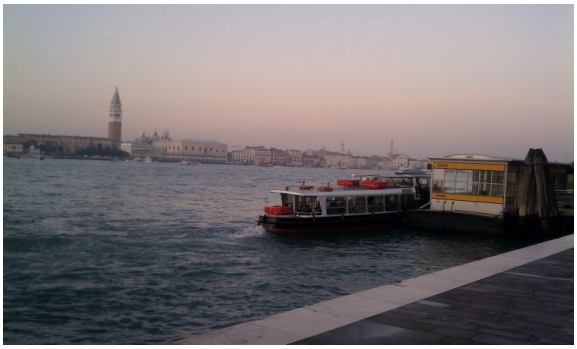


Figure 9: Boat Stops Located Throughout Venice

In the city of Venice, ARPAV the *Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto,* is responsible for designing and enforcing zoning laws. ARPAV, like many government organizations, is under-staffed and under-budgeted. Because of this, they are unable to do extensive fieldwork throughout the city and were forced to base many of the zoning laws on projections from levels in other areas or population density estimates. Currently, there are four major zoning types in Venice. The

[1] World Health Organization, 2011
[2] S. Keith, D. McMurchy and D. Michaud, 2005
[3] Assesore Bettin, 2011, 1.

lowest level is class 1. This zoning is used for hospitals and cemeteries and allows 45 dB. Next, Venice employs class 3 zoning. This zoning is used for the mixed residential and commercial areas, which comprise the majority of Venice. This level allows for 55 dB. Directly above this is level 4, which allows 60 dB. This level is used primarily in major canals as well as in areas of high human traffic, such as Saint Mark's Square. The top level employed in Venice is category 5 zoning. This class is used in predominantly industrial areas, such as the docks on each end of the island, and it allows up to 65 dB.[4] ARPAV is in charge of investigating claims of noise violations, but to do this they must run extensive and long-term studies. This further limits their ability to respond to many complaints, and a number of citizens are unsatisfied as their problems remain uninvestigated.[5]

Since ARPAV made these projections in 2004, time has passed and Venice has changed.[6] As the city continues to evolve, the data that pertains to noise measurements runs the risk of becoming unreliable or out of date. In addition to the lack of dynamic data, the government has no way of knowing which noise sources and locations are of most concern for Venetians; it is difficult for Venetians to submit noise complaints and even more difficult to have their claims acknowledged. There is also no way for the Venetians to easily access, interpret, or visualize any current noise data. In summary, there is a gap between the public opinion of noise and the government agencies intended to regulate it.

Our project was intended to develop a mobile phone application, as well as a corresponding database to generate an interactive map of noise levels in the city. The map displays each noise sample taken, along with a decibel level, a recording of the sound, a description, and a photograph of the noise source. The Android application allows Venetian citizens to record the locations of noise concerns and submit it to our database, which is open to all users. Through our personal fieldwork, we produced a noise map that covers the *sestieri* of Dorsoduro and San Marco, as well as the island of Giudecca. Crowd sourcing should provide additional accuracy to the map and fill in gaps in our data. To investigate the usefulness and accuracy of the smartphone recording quality, we compared measurements from the application with measurements from professional audio recording equipment and a sound pressure meter. The result was an accurate study of noise levels in much of Venice.

Figure 10: Construction produces high Noise Levels

[4] Paoli Barberi, 2005, 2-3.
[5] Ibid.
[6] Ibid.

2 Background

2.1 The Differences between Noise and Sound

Noise is defined, by the Merriam-Webster dictionary, as sound that contains irrelevant or meaningless data along with desired information. Noise is the combination of a number of different sounds and making a distinction between noise and sound is often subjective. The term noise is conventionally used with a negative connotation. For example, a lecture hall filled with 150 talking students would sound like obnoxious noise to the professor, yet the individuals in the room are passing along meaningful information. In the case of the professor, he is taking in too much information to perceive. In addition, he is not interested in the sounds that he is hearing. This leads him to conclude that the sound around him is noise. For the purposes of this paper, noise will be defined as unwanted sound.[7]

Figure 11: The Crowded Classroom Example

2.1.1 Types of Sounds

There are two major types of sounds that make up the sound profile of any area: environmental and human-made sound. Environmental sound is comprised of all sounds created by nature such as wind, waves lapping against canal walls, buzzing insects, and chirping birds. Human sound is created by people and man-made items, such as boat engines, air conditioners, footsteps, and voices. Together, human and environmental sounds create ambient sound, which is defined as the combination of all sounds in an acoustic environment. Ambient sound is what humans perceive and is the type of sound that was recorded in this project.[8]

[7] Canadian Centre for Occupational Health and Safety, 2006

[8] R. Murray Schafer, 1977, 301.

2.2 Properties of Sounds

Sound travels through the air via harmonic pressure variations. Once these variations reach the human ear, we are able to hear them.[9] A sound can be described by its frequency, wavelength, and intensity.

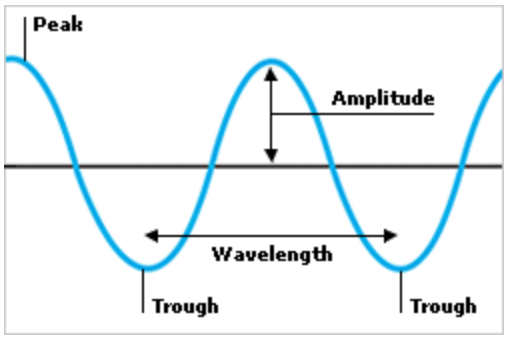


Figure 12: Simple Properties of Sound

2.2.1 Frequency

Frequency is the number of times a wave repeats itself in a second, and it is perceived as pitch.[10] The frequency of a sound is measured in Hertz (Hz), where 1 Hz is one cycle per second. The frequency of the human voice is generally between 50 and 350 Hz[11], and the lower and upper limits of human hearing are 20 and 20,000 Hz, respectively.[12] For comparison, the frequency of middle C on a piano is 513 Hz.[13]

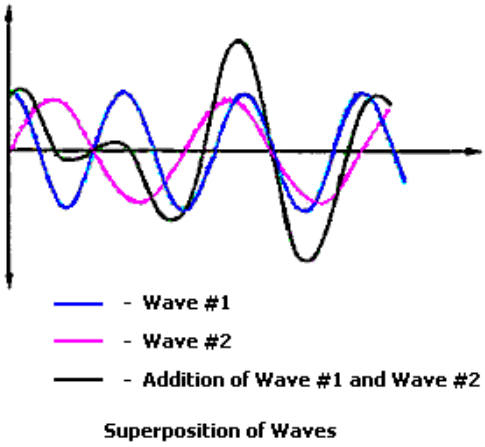


Figure 13: Interaction Between Sound Waves

2.2.2 Wavelength

The wavelength of a sound is closely related to its frequency. The wavelength is the distance between each crest of the wave. Frequency is inversely related to wavelength, so when frequency increases, wavelength decreases. Humans can hear sounds with wavelengths from 50 ft (corresponding to a frequency of 20 Hz) to a quarter of an inch (corresponding to a frequency of 20,000 Hz).[14] To continue with the earlier comparison, the middle C on a piano has a wavelength of 2 ft.[15] Wavelength is an important factor in determining how a sound is affected when it encounters and object. Sounds are not affected very much by objects that are smaller than their wavelengths, making sounds with large wavelengths harder to stop.[16]

---

[9] L. Gray, 2000, 6-S11.
[10] Jay Newman, 2008, 1-273.
[11] David C. Gibbon and Zhu Liu, 2008, 145-175.
[12] Newman, 2008, 1-273.
[13] Gray, 2000, 6-S11.
[14] Ibid.
[15] Ibid.
[16] Ibid.

2.2.2 Intensity

Intensity is the measure of the energy, per unit time, carried by a sound wave, or as it is also referred to, a power of the wave.[17] This is proportional to the square of the amplitude, or height, of the wave. As the wave gets larger, so does its intensity.[18] Intensity is also inversely proportional to the distance of the sound from the source, meaning the farther away from the source, the less intense the sound is.[19] Intensity is closely related to the loudness of a sound but no direct correlation can be made without taking frequency into account.[20] Intensity varies an enormous amount and there are 12 orders of magnitude between the least and most intense sounds humans can hear.[21] Even though loudness increases with intensity, an intensity 10 times more intense is not perceived as 10 times louder.[22] A logarithmic scale compresses the scale to a reasonable length and better approximates how the human ear perceives intensity. This measure is called a decibel.[23]

2.2.3 Decibels

The decibel (dB) is a relative unit that can be used to measure many different types of values.[24] In general, any decibel level, L, is equal to 10 times the log of the quantity, measured over a reference value.[25] For sound, decibels are used to measure sound power, sound intensity, and sound pressure, all of which have some correspondence to perceived loudness.[26] This means that when decibels are used, the type must also be specified. The type of decibel used most when describing noise is Sound Pressure Level (SPL),[27] which measures the pressure exerted by a sound and has a reference pressure of 20 micropascals.[28] This reference pressure was chosen so that a sound with an SPL of zero is at the edge of the human hearing threshold.[29]

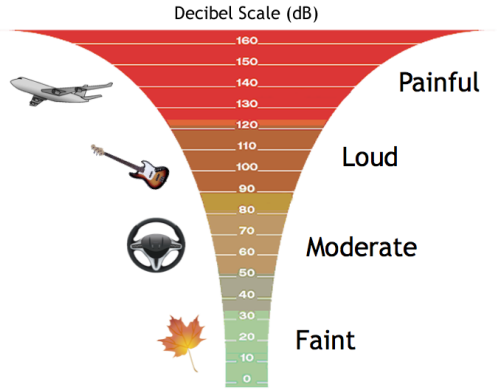


Figure 14: The Decibel Scale

[17] Newman, 2008, 1-273.
[18] Ibid.
[19] Ibid.
[20] Ibid.
[21] Gray, 2000, 6-S11.
[22] Newman, 2008, 1-273.
[23] Ibid.; Gray, 2000, 6-S11.
[24] George Maling Jr., 2007, 961-1017.
[25] Ibid.
[26] E. H. Berger, 2003
[27] Maling Jr., 2007, 961-1017.
[28] Berger, 2003
[29] Ibid.

Even though SPL has a strong relationship to the perceived loudness of a sound, it is still does not take into account how some frequencies are perceived.[30] To take this into account, an SPL must be A-weighted. A-weighting does not count the intensity of every frequency to be the same. Instead, A-weighting uses a scale, known as the equal loudness contour of frequencies, to value louder frequencies more heavily.[31] Because of this, A-weighted SPL is a much better representation of what people hear.

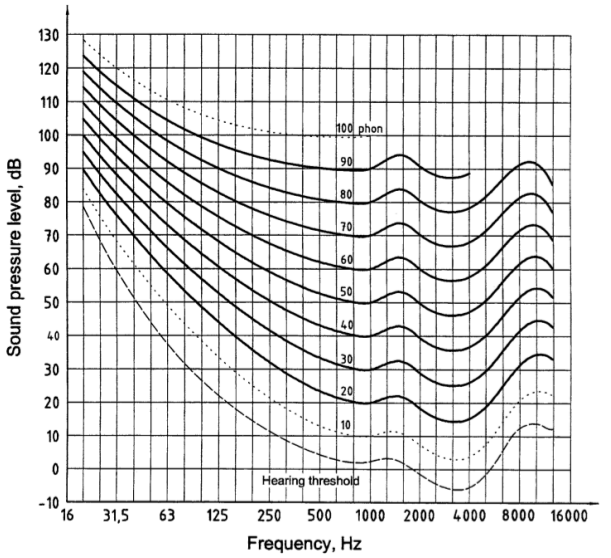


Figure 15: The Equal Loudness Scale

SPL, however, is an instantaneous measure that cannot be used to determine the level of a sound over a period of time. The Equivalent Continuous Sound Pressure Level (L_{eq}) is a measure of sound pressure over time. As the name suggests, it measures the equivalent level over a period of time and represents the decibel average of all the instantaneous level measurements over the time period. This is mathematically expressed as $L_{eq} = 10\log\left(\frac{1}{T}\int_0^T 10^{SPL(t)/10}\right)$.[32] This equation can be just as easily used for A-weighted decibels by replacing the SPL in the equation, with the A-weighted value.[33]

Yet another useful metric for measuring noise is the Sound Exposure Level (SEL), which encapsulates the level of the sound as well as its duration, in a single quantity.[34] This is useful when working with measurements over different periods of time that must be compared. Mathematically, this is done by normalizing the L_{eq} over a reference duration, usually one second. SEL is calculated using the equation $SEL = 10\log\left(\frac{T}{T_o}\right)$. Again, this equation works with A-weighting as well by replacing the L_{eq} in the equation with the A-weighted L_{eq}.[35] For the purposes of this paper, any time a sound level or decibel measurement is given, it is assumed to be an A-weighted L_{eq} unless otherwise stated.

[30] Newman, 2008, 1-273.
[31] Hiroo Yamanaka and others, 2008, 200.
[32] Berger, 2003
[33] Ibid.
[34] Maling Jr., 2007, 961-1017.
[35] Berger, 2003

2.3 The Consequences of Noise

A common psychological response to noise is annoyance, which is defined as "that feeling of being bothered owing to being disturbed".[36] A common cause for this annoyance is disruption of people's train of thought or conversations. Noise is also capable of waking people up. While this may seem trivial, scientific experiments have shown that loud noises in cities can affect health by disturbing sleep and causing sudden reactions to the noise. For these reasons alone, the "Noise and Health Journal" recommends methods for large cities to establish noise abatement policies, such as implementing an overseeing noise team, adding economic benefit to producing less noise, or looking into quieter options when replacing public transit vehicles.[37]

2.3.1 Effects of Noise on Human Productivity

Noise inhibits people's ability to concentrate and therefore lowers their productivity.[38] In a 1997 case study, male subjects between the ages of 18 and 31 were required to complete math problems under both loud and quiet conditions. The study measured each subject's reaction time and ability to solve the problem, and also asked them to gauge the level of effort that was required to complete each problem. It was found that noise lowered the reaction time of subjects up to as much as three seconds per problem. Most subjects also reported that it required a significantly higher amount of effort to solve the problems while they were exposed to noise. It was also found that heart rate increased in subjects when they were required to work in the high noise conditions. Minor rises in blood pressure were also found in the high noise conditions.[39]

Another pair of studies was conducted in Manhattan's Public School 98. This school has a train yard only one street away and the noise from this train yard has shown negative effects on the students' education. In the first of these studies, children on both sides of the building were tested with respect to their reading scores. The children on the side of the building near the railroad tracks had significantly lower results. In fact, by the time of the sixth grade, the children exposed to the noise of the trains were a year behind in reading ability compared to those on the quiet side of the building.[40] In response to this study, the New York Transit Authority installed pads on the tracks to quiet the trains. The Board of Education also installed noise-absorbing measures in the classrooms. In the second study, taken 6 years

[36] K. Karami and S. Frost, 1995, 29-31.
[37] Arline L. Bronzaft, 2010, 1-6.
[38] R. J. Tafalla and G. W. Evans, 1997, 148-155.
[39] Ibid.
[40] McCarthy D. Bronzaft AL, 1976, 517.

later, the children on both sides of the building tested equally, proving that noise levels were the cause of the learning deficiency.[41]

2.3.2 Noise Related Sleep Loss

A major aspect of human health that can be affected by noise is sleep. Humans need a solid night's rest to function at their peak capacity. It has been found that people who are unable to get a good night's sleep rise in the morning feeling groggy and un-refreshed and have serious trouble focusing.[42] It has also been found that tired people are less efficient at work and are more likely to get sick.[43] These symptoms have also been found to have a more severe effect on children. Exhaustion affects attentiveness and ability to focus on schoolwork, which can seriously inhibit a child's ability to learn and develop mentally.[44]

There are numerous stages of sleep that range from very light, almost conscious sleep, to very deep levels of sleep, such as IV-REM. It has been found that noises can lower sleep levels and cause people to wake up.[45] Deep levels of sleep such as IV-REM and III-REM are highly restful, but account for only a small amount of the time spent sleeping. While in these levels, noises around 30-40 dB may not be sufficient to waken people.[46] Levels above 50 dB however are more than capable of waking people from deep REM sleep. If these stages of sleep are constantly interrupted, the amount of rest the subject is able to get is significantly lowered.[47]

2.3.3 Health Effects of Noise

The most common health effect associated with noise is hearing damage. It has been found that there is no risk associated with exposure to noise at levels below 70 dB, the sound level of a car.[48] Other noises, such as a jackhammer or an airplane, generate noise levels significantly above that level, around

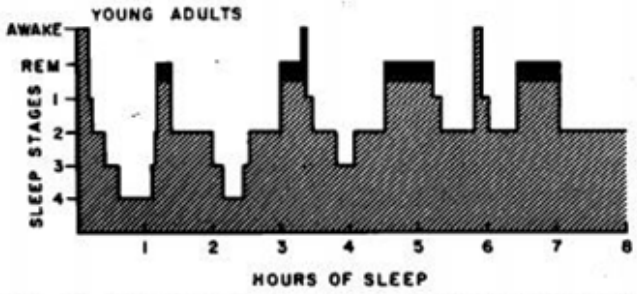


FIG. 16. The nocturnal sleep pattern of young adults is shown. During the later part of the sleep period stage IV is absent and more time is spent in Stage II and in REM. Notice the two brief periods that the sleeper spontaneously awoke. [From Berger (1969) in *Sleep: Physiology and Pathology*, A. Kales, Ed., with the permission of the author, editor, and the J. B. Lippincott Company.]

Figure 16: The Levels of Sleep

[41] AL Bronzaft, 1981, 215.
[42] Alain Muzet, 2007, 135-142.
[43] James D. Miller, 1974, 729.
[44] Ibid.
[45] Muzet, 2007, 135-142.
[46] Ibid.
[47] Miller, 1974, 729.
[48] Michael C. McReynolds, 2005, 73-78.

100 to 120 dB. These levels can prove to be harmful over long periods of time.[49] It has also been found that exposure to common city noises can cause hypertension (high blood pressure) and irregular heart rates. An example of this is a commuter who is surprised by a loud noise. Surprise and adrenaline cause heart rate to rise, increase blood pressure, and tense muscles. While a single instance of such is not necessarily life threatening, a lifetime of incidents would have negative side effects.[50]

Exposure to noise at high levels for an extended period of time can cause detrimental changes in the inner ear and severely inhibit a person's ability to hear.[51] These effects can be temporary and last for hours or days, but they can also last for weeks, months, or even be permanent. It has been found that exposure to extremely high noise levels can damage the cochlea, the mechanism in the inner ear that allows people to hear. Links have also been found between occupational noise exposure and hypertension, angina pectoris, myocardial infarction, and ischemic heart disease.[52]

2.4 The Noise Situation in Venice

Venice is known as *La Serenissima*, a title gained from the tranquil lagoon and quiet streets of the floating city. In recent years though, noise levels in Venice have been increasing. In part, this is due to the increase in tourism of the past decades[53] and its pressure on Venetian establishments such as restaurants and transportation. Construction is also ever-present throughout the city, as old buildings must be constantly maintained. Another noise source is public services such as ferries and *vaporetti* that run throughout most of the day. A number of other noises are connected directly to the city; bells toll throughout the day and waves lap against the walls of canals.

Figure 17: A Venetian *Plateatico*

Plateatici are a vital part of the Venetian culture but may contribute to the increasing noise levels throughout the city. Unlike a normal restaurant, these restaurants do not serve their customers inside, but rather on the street. *Plateatici* do

[49] Bob Weinhold, 2002, A151-A151.
[50] Ibid.
[51] McReynolds, 2005, 73-78.
[52] Weinhold, 2002, A151-A151.
[53] Venice Port Authority, 2010

not have walls to contain their noise, and every patron's voice is able to travel freely into the street. Currently, *plateatici* are zoned on a case-by-case basis. The laws are individually created on an inconsistent basis and often legislation does not address the true noise problems. As tourism peaks in summer, so do the noise levels created by *plateatici*.[54]

Tourism is the main economy in Venice and accounts for the majority of the noise produced in Venice. Both the cruise ships that bring tourists and the thousands of tourists themselves are noise producers. Cruise ship numbers have more than quadrupled since 1997,[55] and the docks where they moor remain outside of the noise jurisdiction of the city. This means that cruise ships are able to produce noise levels in excess of the allowable limit, which can be annoying and disturbing to any resident who lives in the vicinity of the docks.[56] This noise primarily comes from the engines, which remain on at all hours of the day and night in order to drive the generators that provide heat and light to the tourists onboard.

The tourists that populate these cruise ships occupy the streets of Venice throughout the year. Major congregation points, such as St. Mark's Square, can easily achieve noise levels in excess of 70 dB, exceeding the noise zoning restrictions in place for those areas.[57] Smaller areas see the swell in noise levels as well, as the aforementioned *plateatici* are filled and streets become cluttered.

While tourists make the noise levels in the city consistently loud, the ever-present construction creates more sporadic, but more intense, noise pollution. The pounding of hammers and scraping of saws creates some of the loudest sounds in the city. Local Venetians seem to begrudgingly accept it as preserving the beauty of the city, but for outsiders, it can be a great annoyance to have such a din around a place of residence.

Another source of noise is the boats on the canals, especially the *vaporetti*, or public transportation boats that replace the bus system of less aquatic areas. *Vaporetto* stops create a clamor when they are filled with people, and the boats themselves bang against the docks. Apart from the docks, *vaporetto* engines are rather loud in commute along the canals, pushing the 65 dB absolute limit imposed on the canals.[58] Along with the *vaporetti*, the bells that ring out on the hour as

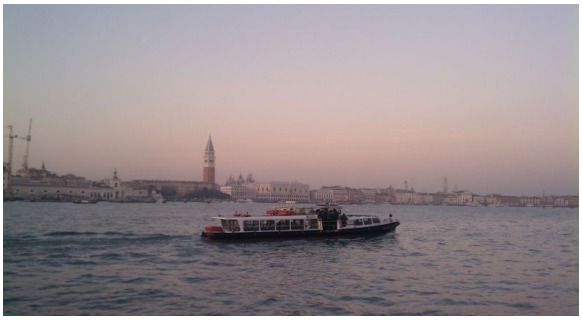


Figure 18: A Venetian *Vaporetto*

[54] Fabio Carrera, Andrea Novello and Alberto Gallo, 2006
[55] Venice Port Authority, 2010
[56] Bettin, 2011, 1.
[57] Barberi, 2005, 2-3.
[58] Ibid.

well as the half hour provide a surprisingly large amount of noise. The *campanile* in St. Mark's Square produces tones that can be heard almost anywhere in the city, nearing 75 dB in the square itself.

2.4.1 Noise Zoning Laws in Venice

Venice is a very quiet place and most of the city is zoned as such, with exceptions being made for canals, which have a higher level of zoning, and the docks, which have still higher noise allowances. Each level of noise zoning has two limits: one for day, used between the hours of 6 AM and 10 PM, and one for night, used between the hours of 10 PM and 6 AM. These limits may be exceeded by up to 5 dB for short periods of time.[59]

The lowest levels of sound in Venice should be found in zone 1, which is reserved for protected areas, such as hospitals, parks, and cemetaries. In Venice, this zoning is used for L'Ospedale, the cemetary at San Michele, and areas of open water. These areas have a decibel limit of 45 dB during the day and 35 dB at night. Bordering areas of zone 1 are thin areas of zone 2, which act as buffer regions to louder areas. Outside of Venice, zone 2 is used for residential areas and maintains a quiet decibel limit of 50 dB during the day and 40 dB during the night.[60]

Most of Venice is classified as zone 3 – mixed commercial and residential areas. These sections are expected to have sound levels below 55 dB during the day and 45 dB at night. The major canals, due to the presence of heavy boat traffic, are classified as zone 4 for "areas of intense human activity." The only area outside of the canals that is zoned this way is St. Mark's Square, which receives a higher classification due to the amount of tourists it attracts. Zone 4 areas have sound limits of 60 dB during the day and 50 dB at night. The loudest part of Venice should be the docks, as they are the only part of the island of Venice that is classified zone 5 – industrial. Class 5 allows for noise levels up to 65 dB during the day and 55 dB at night.[61]

This zoning can lead to noise conflicts along the borders of zones. If a cruise ship is sitting in the docks and making a noise level of 65 dB, there is nothing to stop that noise from carrying over into the city, where noise levels are lower.[62] The stone streets and brick buildings do little to absorb sound, often causing noise to echo down alleyways and making otherwise quiet areas noisy from exterior commotion.

[59] Ibid.
[60] Ibid.
[61] Ibid.
[62] Bettin, 2011, 1.

2.5 Collection and Presentation of Noise

The task of noise collection inverts the typical strategies of sound recording specialists. In many recording scenarios, the aim is to record sound from the subject and minimize ambient, unwanted sound as much as possible. For noise collection, however, ambiguous sounds from unknown sources are valuable since they are, indeed, the target of the recording. The Acoustical Society of America explains that the goal of a good recording is to reproduce the original with high fidelity, and the key components to this reproduction are the recording device, the medium, and the playback device.[63]

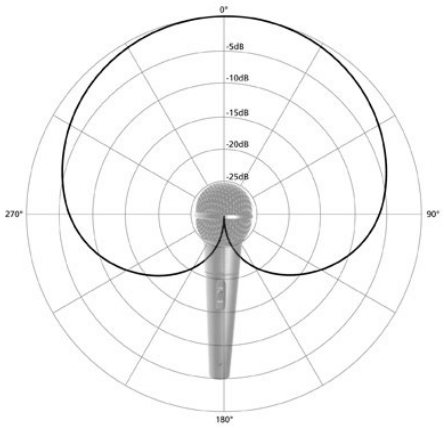


Figure 19: Cardioid Microphone Field of Recording

2.6.1 Recording Devices

Microphones are the go-to recording device, and they come in many varieties such as headset, clip, and handheld microphones. Furthermore, handheld microphones can be omnidirectional or unidirectional (i.e. cardioid). Omnidirectional microphones usually have constant tonal balance, regardless of the distance of the source of the noise. Cardioid microphones, on the other hand, tend to eliminate background noise, and tonal qualities change with distance from the source.[64]

With the rise of cell phones, many people now carry a small microphone right in their pocket, but with the size and convenience of these microphones comes a compromise in quality. Cell phone microphones typically fall very short in terms of quality compared to the professional microphones mentioned previously. In fact, the proximity of the microphone to the cell phone circuitry can lead to audible noise being recorded from demodulated RF signals.[65] Unfortunately, cell phone microphone specifications are very rarely documented since companies to not want consumers of rival companies to know exactly which microphones are used. In general, the unpredictability of cell phone microphones is a concern to be aware of.

[63] R. Lynn, 1942, 331-1.
[64] Eddy B Brixen, 2005, 14.
[65] Adrian Rolufs, 2007, 36.

3 Methodology

This project focused on three major goals:

- Developing a smartphone application to record and submit noise samples
- Developing a website with an interactive noise map of Venice
- Collecting noise data to verify the effectiveness of the application and populate the database

This project was based on the island of Venice and was performed over a 7-week period. This period of time was used to develop and maintain the application and the website, as well as to collect and analyze field data. Time constraints were the limiting factor for the area of study in fieldwork. Data collection was limited to San Marco, Giudecca, and Dorsoduro to ensure that a sufficient amount of data could be collected in the 7-week span. Greater emphasis was put on noise "hot spots" such as St. Mark's Square and along canals. These areas were covered in much greater depth than areas that produced average or below average sound levels.

3.1 Developing a Smartphone Application to Record and Submit Noise Samples

The first goal was to create the smartphone application. The app consists of two parts: the view and the model. The view is the graphical user interface (GUI) that the user directly interacts with. The model is the code that the view calls into to actually do everything the app needs to do. There are many types of "smartphones," so the first step before writing the app was to decide what platform to make it on. Once the platform was decided upon, the app was finally implemented. This was the stage where code was actually written and a workable app took form. Throughout this process the app needed to be tested both by automated unit tests and manual testing in the field.

3.1.1 Designing the Application

Designing the app was one of the most important steps in the development process. The app was designed in a general way and an easily modifiable prototype was produced. Designing a complex prototype would have wasted time early in development and even more time later on in the process. The

same can be said about the user interface of the app. The initial layouts were simple and easy to modify when the need arose.

3.1.1.1 Designing the View

The user interface of the application combines a sleek appearance with an efficient and easy to use layout. The user interface design was created through a series of mockups. A mockup is a picture that represents a snapshot of one state of the user interface. These can be anything from sketches on a napkin to a computer graphic that looks as close to the real thing as possible. All the mockups together completely describe what the user interface should look like at every state.

A number of factors are involved in mockup design and in their transition to the working product. We decided the focus of our mockups by analyzing the possible use cases of our application and following conventional design standards. A use case is a description of a very specific scenario where the product under development is used. For example, one use case for our app was a Venetian who wants to submit a sample for a noise complaint and then view it along with past noise complaints. By optimizing our user interface for what we believed to be the most typical use cases, we ensured it would be easy to use for the majority of our users. It was also important to look at the uncommon use cases as well. It was important to make sure it was not overly difficult for these users to understand our app, while making sure not to sacrifice the accessibility of the average user.

We intended to create an interface that was simple and consistent throughout. The "look and feel" was also made to be consistent throughout the entire application. This not only included how the interface appeared but also how it was navigated and used.

The first mockup that we created was the layout the user sees when they start the app. We wanted our app to immediately look visually appealing to any user and to present an interactive version of our sound level heat map. We also wanted the homepage to be simple and understandable but also to look well refined and thought up. This mockup was designed very early in development so that we would have a lot of time to adapt and test it over the course of the project.

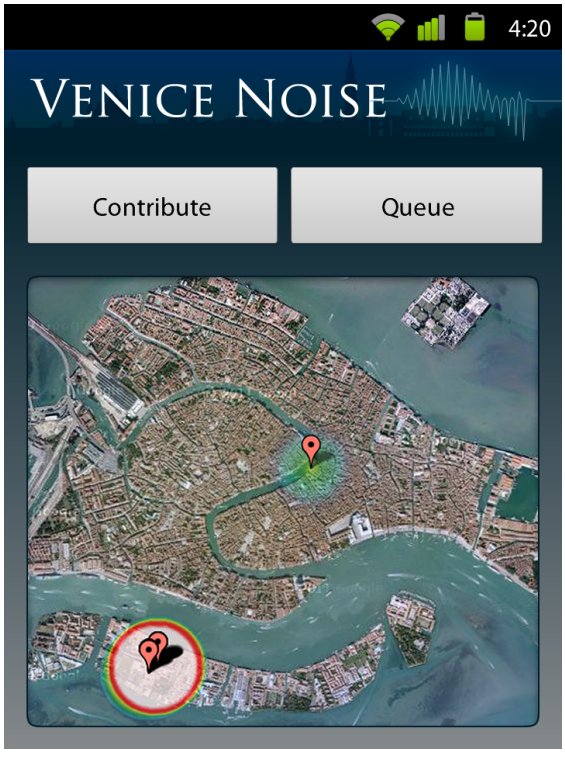


Figure 20: The First Mockup

3.1.2 Choosing a Platform

There were many smartphone platforms to choose from, like iOS, Android, and Blackberry. It was important to think about what we were trying to accomplish with our app and who our audience would be when we chose a platform. It came down to getting our application into the hands of as many Venetians as possible. This meant we had to decide between the two platforms with the most users: iOS and Android. One major difference between these was the process of getting our app on the market so that users could download it. For Apple's iOS, this process involved an expensive developer's license and a very long, strict review process of all submissions. This meant we would have to spend money to develop and deploy our app, and the application could still be rejected in the end. In contrast, Android was open source, cost only a small one-time registration fee to publish, and had virtually no review process. This meant that our app would be cheaper to make and would get onto the market quickly and without issue. This key difference made Android the better choice. Upon further investigation, our initial decision was confirmed. Android included ease of development, made available APIs and tools for development, and supported a wide range of devices. As a result, we chose to use the Android platform for our app.

Figure 21: The Android Logo

3.1.3 Development and Testing

Once the user interface was designed and the platform was chosen, it was possible to begin coding the app. The primary function of this application was to record and playback sound. This was naturally the first function that the application was programmed to perform. The programming process began by creating just a simple app, with only one button, that would record a sound file and then play it back by clicking the same button. This code was efficient but very primitive, and it served as the foundation that the entire app was built around. The final app still has an almost identical feature; however the recording is limited to five seconds to limit the file size of the upload. This five-second sample is also convenient for extracting the L_{eq}; it is short enough that the L_{eq} will still be relatively instantaneous but long enough that anomalies should be filtered out.

Once the application became capable of recording, it became evident that the recordings would need to be uploaded to the database. To do this, the smartphone application was programmed to submit all of the data to a script on the server, which then records the data in the online database. In other words, the

phone sends data to a program in our database that automatically deciphers the information and then processes it into the appropriate data field. The server then responds to the app with either a success or error message. For instance, if there is no audio file, the server will return the message "No Audio File Provided." With this innovation, the phone and the server development inevitably became linked. For each new application capability, the server also required new coding. With this link between the server and the phone in place, we could now implement new submission fields for additional types of data.

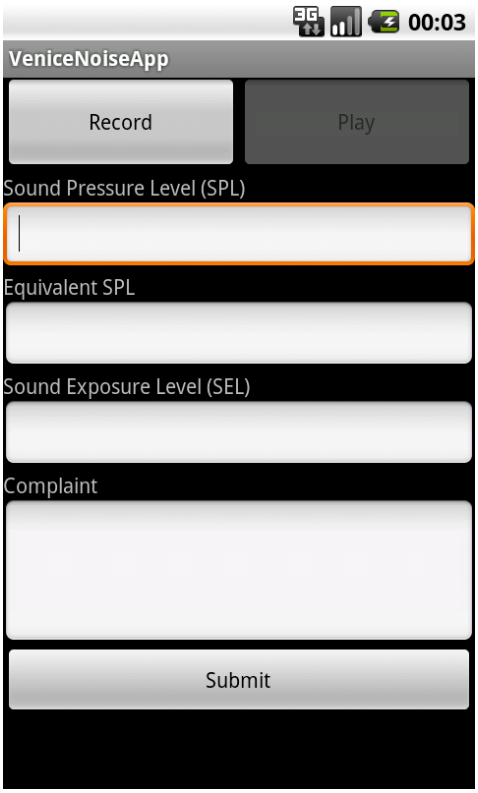


Figure 22: Old Version of the Application With Many Later Removed Fields

One of the most important functions of the application is its GPS capability. Because of its integral nature, we began to focus on this capability very early in the development process. Luckily, Android phones come with provided GPS capabilities that are very accurate and easy to incorporate into to an application's code. The application was programmed to record the GPS data at the time that the recording was taken. Originally, we programmed the app to record the GPS coordinates at the time of upload. We quickly realized however that people could continue to move after recording a sample. This would lead to inaccurate location data. Once we solved the GPS issue, the "hook" between the database and the application was updated and we were able to begin uploading GPS coordinates along with the sound files that we collected. This became an essential organization tool, as the GPS is the most important part of the data that would eventually be used to create the noise map on our site.

Now that we had the GPS, it seemed logical to incorporate additional modifiers into each submission. To further organize our data, we included a field that would automatically record the date and time at which the sample was recorded. When we moved to Italy, we ran into the issue of time zones. To solve this issue we decided to convert the time data into UNIX time. This time scale is absolute and eliminated any issues with incorrectly programmed cell phone clocks. The UNIX time is uploaded to the scripts on the server, which then translates this time into Central European Time, the appropriate time zone for Venice, Italy. This ensured that all samples uploaded were correctly timed and dated.

To make it easier to locate and reference certain noise points, we also included a submission field for a short description of the location and the source of the noise. We included this field not only for the organizational convenience it provided, but also because it added an understandable ID to each point. For example, a point described as "People talking at the Redentore boat stop" provides understandable details that a decibel level or a short recording would lack. Since it is impossible to visualize GPS coordinates in your head, we decided this description field would be much more meaningful to the user than the GPS required by the server.

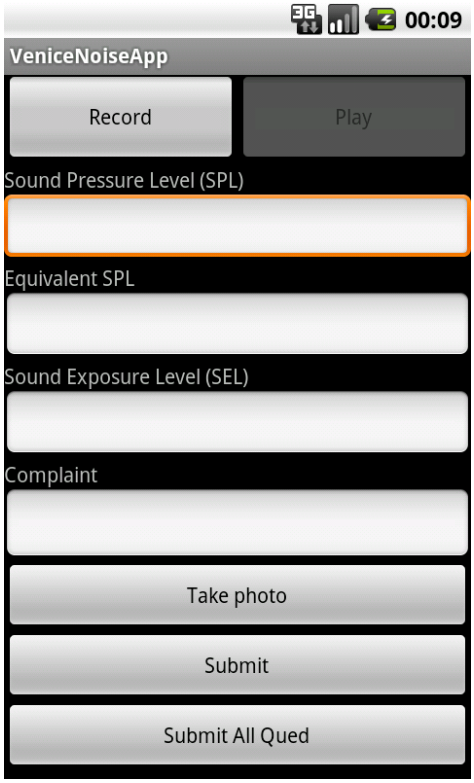


Figure 23: First Version of the App with Photo Capability

To make each data sample even easier to visualize, we made the decision to include an option to take a photograph along with each submission. This added yet another level of comprehensiveness to the database and the application. The actual coding of this was quite simple because of the more than adequate camera provided by the Android phone. This small inclusion was one of the best decisions that we made; they say, "a picture is worth 1,000 words" for a reason. The picture took the app to the next level and made the noise points seem like real things as opposed to arbitrary data. Not to mention, the photos look excellent on the website.

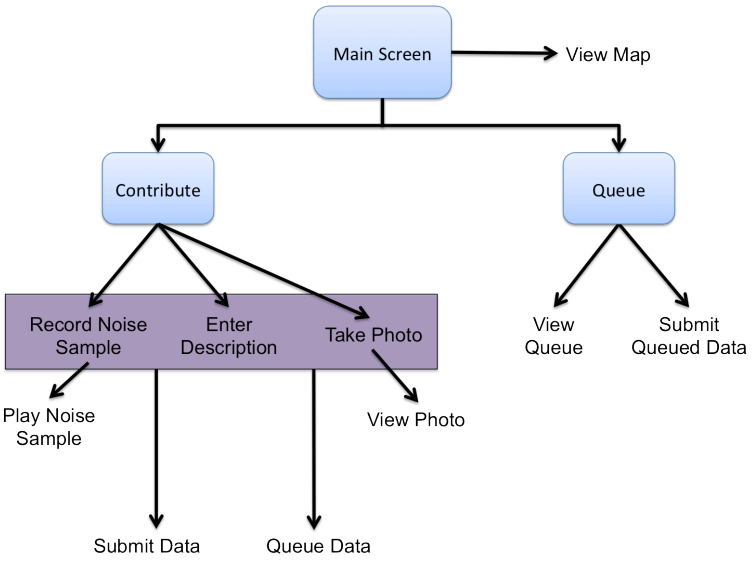


Figure 24: Flowchart Depicting the Final App Capabilities

Now that all of the data fields were programmed and ready for recording, we set out into the field to record our first data. Immediately, we found a problem. Without Wi-Fi, it was impossible to upload the samples to the database, and we had no system for storing files. We solved this by implementing what we called a "queue" system. Our queue would store any files that could not be

uploaded so that they could be sent to the server at a later time. The queue is an easy-to-follow list that contains a picture, timestamp, description and location. When the user is in a location where they have Internet access, they can simply click on their queue and select the option to upload. Since the timestamp and GPS were recorded along with the sound, the delay between data collection and upload has no effect on the data.

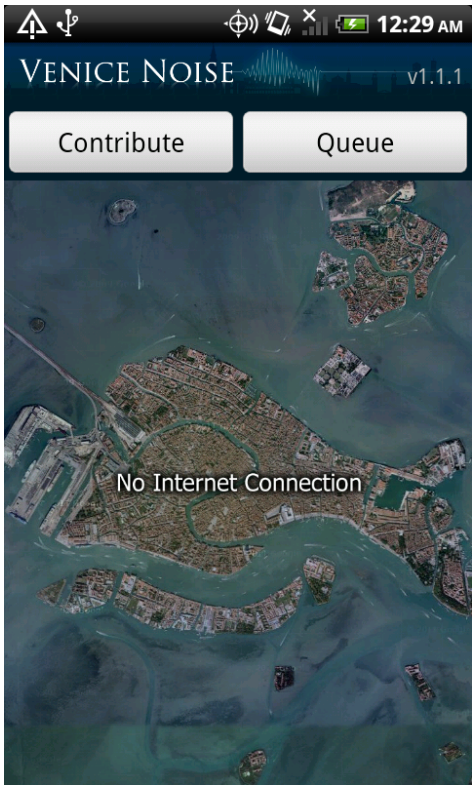


Figure 25: The Homepage with No Internet Connection

Until this point, our application went immediately to the submission form at startup. With the addition of the queue, it became evident that there would need to be a way to for the user to decide whether to upload or to record. We used this as an opportunity to implement a stylized homepage for the application. This homepage matches the theme of the website and the original mockup, and has buttons for both "Contribute" and "Queue." Underneath these buttons, the automatically generated sound level heat map from our website is visible. This heat map comes directly from the website via a tool known as a WebView. This tool allows an Android application to show a portion of a website without opening a browser. This map is dynamic and as data points are added, they will immediately become visible on the application. If the application is turned on without Internet access, a stock view of the map appears with the words "No Internet Connection."

Early in development, we found that other people had downloaded our application and were trying it out by uploading recordings. This was a good sign, but it did cause some confusion and it was affecting our ability to implement code into the heat map on the website. We did not have a solution for this initially, but later in the development process, we implemented code that allowed the server to view our phone differently. The data we submitted was categorized as "field" data while other data was listed as "public" data. We also created the option to put our phone into test mode, which allowed us to submit test data points without it affecting the field data on the website. This made it possible for us to easily keep track of our fieldwork without extraneous data causing confusion.

We had originally planned on analyzing the sound files and extracting a decibel value on the phone. However, we found that this is much more difficult than performing the analysis on the website. We made this decision since we would be able to upload sound files from sources other than the application and still have analysis capability. This decision was also preferable, since if any changes

needed to be applied to our algorithms, we could simply modify the scripts on the site and all of the data would be automatically corrected. The algorithm will be discussed in further detail later in relation to the website.

3.1.4 Localizing the Application

In order to make the application as accessible as possible, it was localized. Localization is the process of adapting the app to be used by people in different regions. In our case, this meant creating versions of the application in both English and Italian. Android provided an easy way to localize the user interface layouts, pictures, and the display text. Each time the app runs, Android intelligently decides which language to use based on the settings of the phone and the available language choices. We provided the application with resources in both English and Italian and packaged them into properly titled folders that Android can recognize. With the folders provided, Android automatically does the rest of the work.

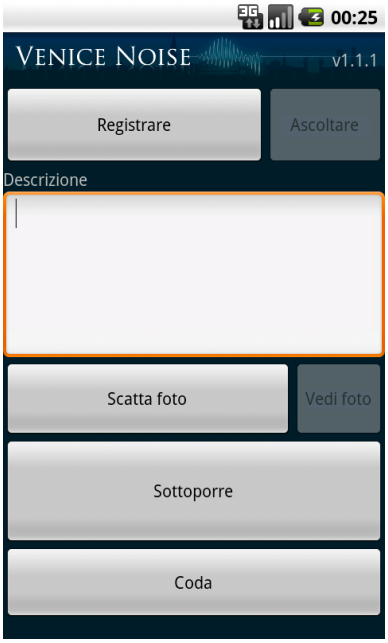


Figure 26: Final Version of the App in Italian

3.1.5 Putting the Application on the Android Marketplace

Once the app was completed, the next step was to get it onto the Android Market. The first step in this process was preparing the app for publication. This required simplifying the code and other files and making sure the application followed the Android Marketplace specifications. To do this, the package name for the application had to be chosen. The package name is a unique identifier for the application and cannot be changed once an app has been released. It was also necessary to specify features required to run the application. This allowed the market to tell which phones your application could be installed on. Finally, the version number of the app had to be set. This allowed the market to distinguish between versions of the app and provide updates when available.

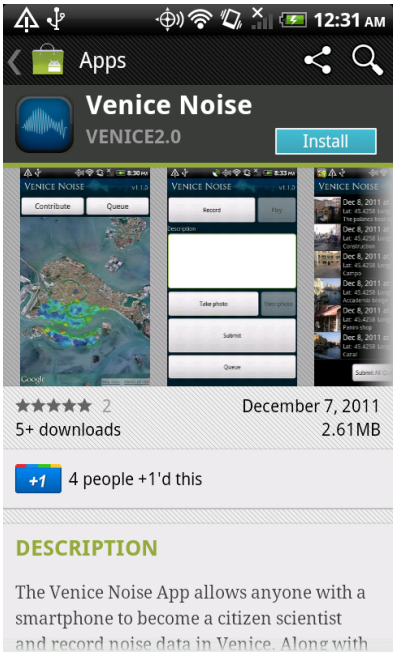


Figure 27: Our App on the Android Market

After the app was prepared and ready for publishing, it needed to be built, or packaged, into a single file. All applications on the Android market need to be built and signed with a secure private key. This key identifies that the application came from the developer and was not forged in any way. A tool was used to generate this key by providing a size, length of validity, organization name, and organization location. The generated key was set to be protected under two passwords. Once the key was obtained, the app was built and signed with only a few clicks.

Once the app was built, the only step remaining was to publish it on the Android Market. This required a developer account, which cost a one-time $25 fee. Once the developer account was purchased, advertising for the application was prepared. This included screenshots, a high-resolution application icon, a title, a description, text describing recent changes, an application type, and an application category. Once all of these requirements were met, it was possible to release the application.

3.2 Developing a Website to Display Collected Data

Even with the Android smartphone application, the collected data was practically useless without a database and website to store and display the information in a visual way. The database needed to have private "hooks" that would allow the smartphone application to connect and add a new row of noise data. The website then needed to be able to pull information from this database, which isn't immediately visible to the public otherwise, and output it to a dynamic "noise map" of Venice. Additionally, we made it possible to run queries on the database to generate graphs of collected data, such as the number of recordings featuring a specific source. A number of data tools were also implemented to make it possible to view the data in different ways. Filters were implemented to make it possible to view data by time of day, day of the week, or decibel level. Filters were also added to make it possible to view field data, test data, and public data. Other touches were included to make the database more user-friendly, such as providing a number of different gradients in which to view the heat map.

3.2.1 Creating a noise database

A very popular database solution on the web is called MySQL. It is an open-source database that runs on the web server and offers tremendous scalability. It is accessible from both the smartphone environment, for data submission, and the web environment, for data presentation. MySQL met our needs and was the obvious choice. Once the application was able to connect to the database, it could run queries to modify the

Figure 28: MySQL, Our Database Solution

database. For instance, an INSERT command added a new row with the provided data, SELECT chose data for presentation with the provided criteria, and DELETE removed entries that match provided criteria. The INSERT command was used mostly by the smartphone application, the SELECT command was used mostly by the website, and the DELETE command was used internally to remove erroneous entries.

MySQL allowed us to add or remove data fields at any time, but there were certain fields that we used as a starting point for the database. The primary field is ID, which uniquely identified data entries and allowed the database to run more efficiently on the server. The ID field was especially crucial for the website, which works by selecting data based on this identifier. Two other obvious fields were Latitude and Longitude, which are provided by the smartphone application via the GPS sensor each time a sample is uploaded. This data is used every time a heat map is generated and allows visitors to see the location from which the noise data was collected and submitted. The database also included a description field that allows the people who collected the data to add a comment about the type of noise, the source, the reason for annoyance, etc. The ID field is numeric, the Latitude and Longitude fields are numeric with decimals (for greater precision of location), and the Description field is text based. Additional fields for the database include the L_{eq}, location accuracy, bearing, and submission type.

3.2.2 Creating a public website to present noise data

Because the database is hidden away on the server, the website needs to pull information from the database and present it to the public. A widely used web programming language is PHP, a recursive acronym that stands for PHP: Hypertext Processor. This coding language has built-in functions that allow the website to run queries on a MySQL database such as ours and output the data to the website code for the visitor's browser to display. Because this code is generated on the server-side, the pages are dynamic and do not depend on the web browser to interact directly with the database in any way. Rather, queries are issued by website page when it is loaded.

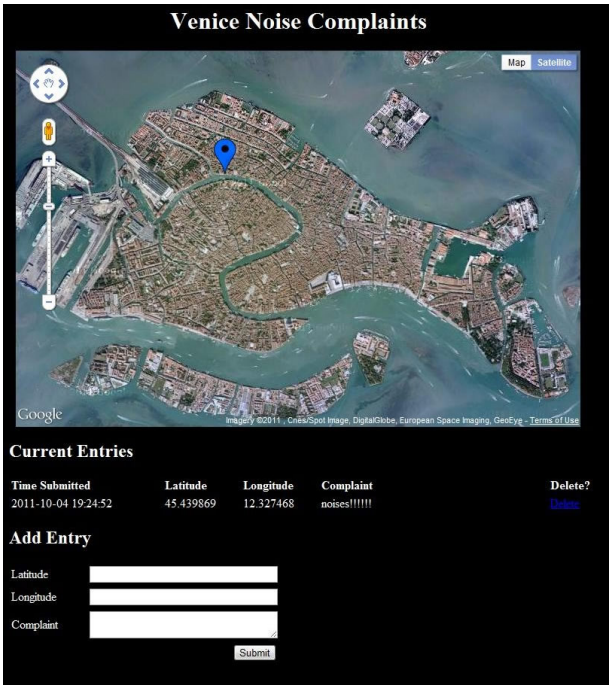


Figure 29: The First Version of the Site

With a connection between the backend and the frontend created, we were now able to work on how the site presented our data. The first decision we had to make about the website was choosing the domain name. We eventually settled on www.venicenoise.org. The link is easy to remember and gives a good idea of what the site is about. The headers of the website were then designed to correspond with the title, showing the name of the site overlaid on a silhouette of Venice. A sound wave was also included in the header and was later stylized to resemble the "fish" shape of Venice.

3.2.3 Generating an Interactive Heat Map

One major goal of the website was to generate a noise level heat map and present it to the viewers. A heat map is a two dimensional map that uses a gradient of colors to represent varying levels of a certain value. In our heat map, the colors change with respect to the noise levels. The website was built around this idea and prominently features a map on the home page. The goal was to make the map the focal point of the site, but also to allow users to select other functions along the top. When this design was initially implemented, the map posed certain issues for navigating the site. The scroll bar on the mouse caused the map to zoom out rather than scroll down the page as intended. This functionality had to be removed so that scrolling would allow users to view the database and filtering tools underneath the map.

Creating the heat map to display on the front page was not as easy as we had originally hoped it would be. The initial plan was to use a service known as GIS Cloud to automatically map our data. This service however could not be incorporated into the site and also lacked the capability to render a heat map based on anything other than frequency of points. The limitations posed by this service were too great which led us to investigate different forms of map generation. A number of different map tools were found online, but none of them had the capability or the accessibility to create a map in the method that we desired. The decision was made that the heat map API would have to be coded from the ground up.

The heat map API run on our server uses a custom PHP code that generates an overlay onto a Google map. This code, however, could not render our map over Google's 45-degree angle aerial imagery mode, so this function had to be disabled. The workings of the map are very complex. The heat map overlay is designed to stretch to correspond with the zoom of the Google map. This makes it possible to zoom in and out on the map without affecting its accuracy. This functionality would become important later, as it became possible to individually view each point.

Rendering the map was performed entirely through custom code. Each time a map is rendered, each decibel value in the database is scaled to a value between 1 and 256, and the latitudes and longitudes are scaled to fit on this image. Each pixel on the map is then also assigned a number value in this range. This number value is determined based on the weighted average decibel level of all data points around it within a certain radius. Points closer to the pixel are treated with stronger weight than more distant points. The system is very complex since it involves a large amount of directionality and each pixel is affected by a number of different data points. To simplify the concept, each point gets a "vote" on what the value of the pixel should be. The "votes" have a higher importance at closer points and as you get further away, the "votes" eventually become weaker until they have no influence at all. The pixel then uses these "votes" to determine its value.

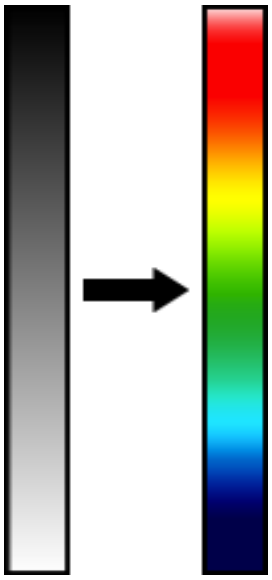


Figure 30: The 256 Color Gradient

Once a number is successfully applied to the pixel, the pixel must be colorized. The initial image is rendered in grayscale. White corresponds to low values while black corresponds to high values. The entire range of shades of gray between black and white has 256 variants. Based on the calculated value for each pixel, the corresponding variant in the grayscale is assigned to each point. Now that each pixel is shaded, a black and white map can be generated. This map however, is not very comprehensive and needs color. To add this color, a color spectrum was created that features 256 colors. Each one of these colors was set to correspond to one of the shades in the grayscale spectrum. Our spectrum has dark blue at the bottom and red at the top. In between, there are shades of light blue, green, yellow, orange and light red. We then developed a custom code that would implement our 256-color gradient, by swapping each shade

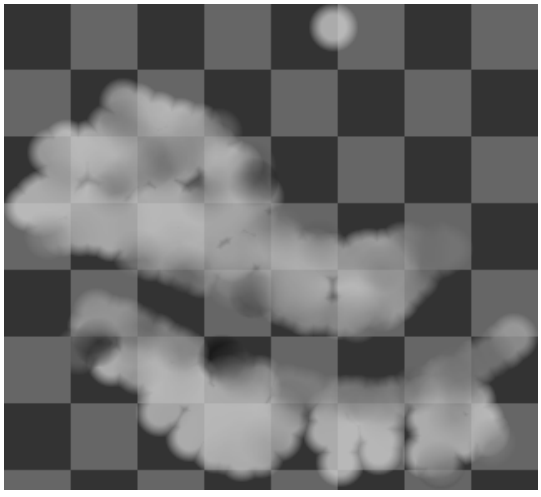


Figure 31: Map Overlay in Grayscale

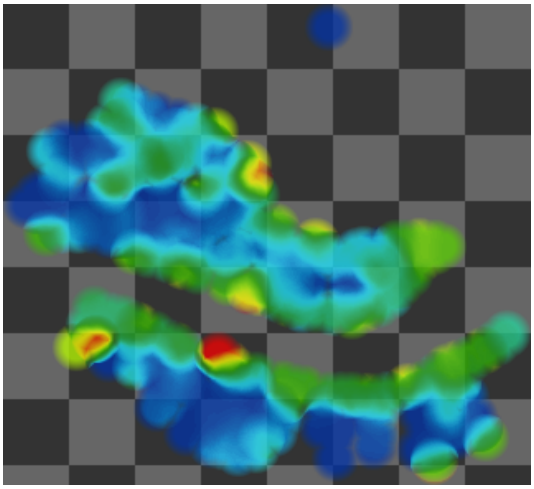


Figure 32: Map Overlay in Color

with its corresponding color on the 256 color gradient. The result is a colored map.

Once the color is implemented, the map is still not complete. The colored overlay is very heavily shaded and obscures the map beneath it. To solve this problem, each pixel is also assigned a confidence value. This value is determined by the pixel's proximity to a data point. Pixels close to a data point have a high confidence and appear dark on the map. As the pixels get further away from any points, they become more transparent and have a lower confidence. Eventually the confidence becomes zero, as the point is too far away to affect the pixel. At this point, the overlay becomes completely transparent. This feature seamlessly connects parts of the map together and eliminates the blotchy feel of a map lacking transparency. It also shows the uncertainty through the lightly shaded colors. Notice how the image on the right does not blend colors, and how the map obscures the checkered pattern behind it.

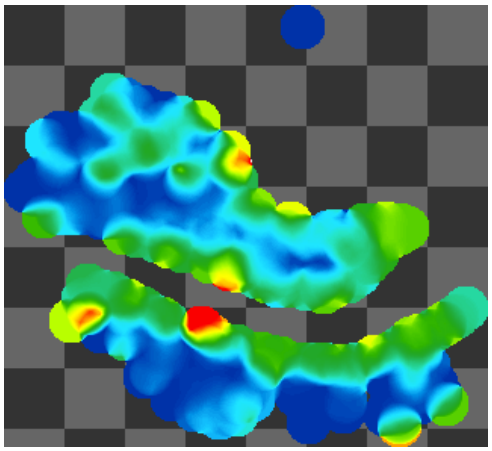


Figure 33: Overlay without Transparency

One of our major goals when developing the heat map was to make it interactive and to show each individual data point on the map. When this feature was initially implemented, it caused the map to appear cluttered, and it was difficult to make out the heat map. To eliminate this problem, the points were designed to appear only when the map is zoomed in. The appearance of these points was custom-designed to appear as purple dots. Purple was chosen since it stood out best on our map. A code was then implemented to place each of these points on the map in their appropriate location.

Figure 34: The Interactive Map Zoomed to show Each Point

With the points in place, the next step was to develop an easy way for each of these points to display their corresponding data. As previously mentioned, each of these points featured a GPS coordinate, a sound recording, a decibel level and a photograph. To make it possible to display these points, code was implemented that caused the points to enlarge when the cursor hovered over them. Further code was then implemented to allow a left click on the mouse to bring up a small "pop up" window that displays the information. This window is designed to show a thumbnail of the photograph on the top right. To the left of this photograph, all of the associated data is listed. To enlarge the photograph the user simply needs to click on it and it enlarges itself in an overlaid window. The goal of this viewing system was to keep the map streamlined and to prevent the opening of new windows or tabs.

With this in place, tools were then implemented to run queries on the data in our database. These make it possible to filter or show only certain types of data. These tools make it possible to filter the data in nearly any way the user desires: time, date, day of the week, maximum or minimum L_{eq}, accuracy, description, source, and zoning. For example, if they are only looking to view loud points, they can use the filter to show only points above a certain decibel level. These tools make the website much more versatile. They also include a number of different gradients that change the colors of the map. Gradients include the default, grayscale, a stoplight colored gradient, and a gradient known as fire that displays everything using different shades of red.

Due to the high volume of calculations that the server has to perform to render the heat map, the server takes about five seconds to render the full heat map. This was not a problem at first, but once data filters were implemented, the load times started to cause problems. To overcome this problem, a caching system was implemented that saves the heat map images to the server. Every time a new heat map is generated, it is saved to the server for faster loading in the future. Each time a new data point is entered, the cache clears and a new heat map is generated when the page is loaded. This new map is then cached, replacing the previous file. There are also system commands that can be used to pre-load the cache with heat maps for every time of day, day of the week, and month of the year. This makes load times nearly instant and significantly improves the functionality of the website.

3.2.4 Implementing a Zoning Map into the Website

Near the end of the project, it became necessary to implement a zoning map into the database so that samples, with dB levels above zoning limits could be easily identified. The first step was to turn the official zoning map of Venice into a bitmap with identical dimensions to the heat map. In this bitmap, each type of zoning is assigned a different color. This made it possible to identify the zoning at each pixel by referencing the pixel's color.

Next, the submission script was modified to calculate whether a submitted point represents a noise violation. Reusing code from the heat map, the database is able to find the pixel associated with each data point on the zoning bitmap. It then checks the pixel's color to determine which zone it represents. The zoning information, in conjunction with a dB level and timestamp, is enough to determine whether the point is above the zoning limit. This information is then stored in a new field in the database, which allows it to be displayed on the heat map. Additionally, database queries can be run to check zoning statistics.

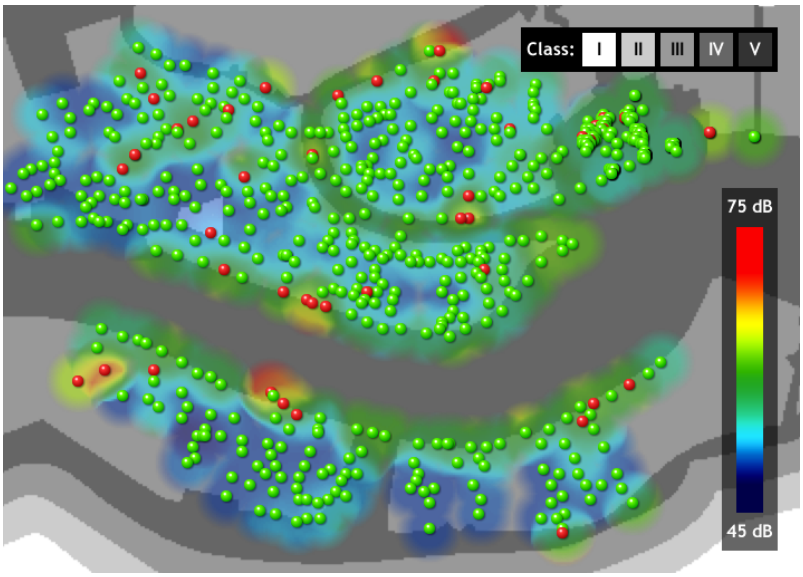


Figure 35: Zoning Map Mode

With a backend in place, a frontend was required for this new information. A new button was added on the map to toggle zoning mode on or off. When zoning mode is on, the zoning map is overlaid on top of Venice. Data points change color based on whether they exceed zoning limits. Points appear green if they represent acceptable noise levels and red if they exceed zoning levels.

3.2.5 Developing an Algorithm to determine Decibel Levels

Originally, the website lacked a way to determine an L_{eq} from the smartphone application recordings. To solve this problem, we developed an algorithm and implemented it on the database server. This algorithm takes in a recorded waveform and returns an L_{eq} value.

To do this, the algorithm treats a WAV file as a set of points, removing the header bytes and acting on the pure data of the set. This data is in the form of 2 byte integers, numbers with a value between -32,168 and 32,167. The standard for a WAV file is 44,100 samples per second, with each sample being a single 2-byte integer. For a five second WAV file, this results in around 220,000 samples. On the disk, this results in a file size of about 400 kB.

Using the thousands of samples in the WAV file, the algorithm finds an average level representative of the sample as a whole. This sample is converted from the integer form to a decibel scale – a type of logarithmic scale representative of sound pressure levels. While this base decibel scale is rather close to our expectations, it tapers off towards the higher and lower end of the scale. To this purpose, points are fed through a 6th order polynomial equation, which evens out the results and increases accuracy to an average error of only 3%.

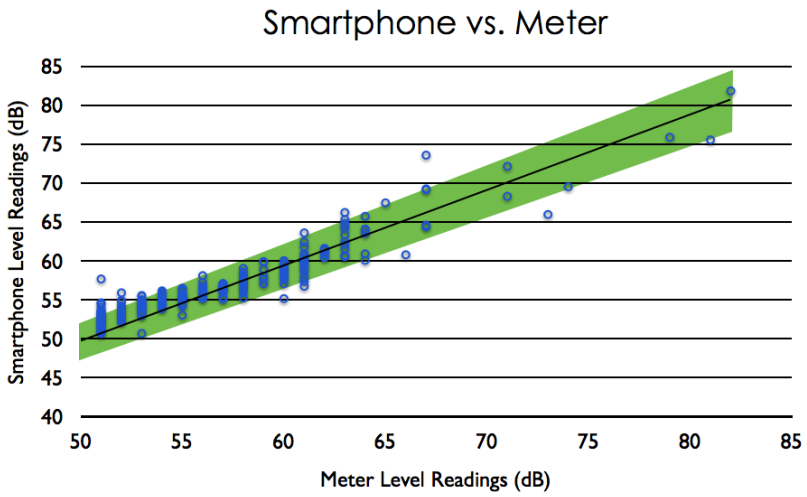


Figure 36: Algorithm vs Sound Pressure Meter

3.3 Collecting Noise Data

Once the smartphone application and the website were developed, it became time for field-testing and data collection. In addition to collecting data with the application, the decision was made to also collect data using a TASCAM DR-40 Linear PCM Recorder. This recorder is an established field-recording tool that is known to have reliable microphones and to take adequate measurements. This recorder was used as a control for our field recording and made it possible to compare the Tascam recordings to the smartphone recordings. In addition, a sound pressure meter was used to get a decibel level each time a data point was taken. This level was submitted to the database under a special sub heading of our master version of the smartphone application. These decibel readings were ultimately used as the basis for developing the algorithm.

Figure 37: The TASCAM DR-40

3.3.1 Collection Methodology

One of the major goals during fieldwork was to keep all of the data organized and to ensure that data would be safe. This caused us to implement a strict collection system that was followed without modification throughout the entire project. Each time a measurement was taken we used both the smartphone and recorder simultaneously. The devices both recorded the same noise, at the same time, from the same location, and in the same orientation. A reading was also taken from the sound pressure meter at the same time. This reading was then submitted to the database along with each recording. The last element of the data collection was the field form, which can be found in **Appendix B**. This form included each measurement taken, listing an absolute location, time, and orientation, as well as information such as a description of the noise we are recording. The field form functioned as a backup and was referenced only when there was a problem with the electronically submitted data. The decision was also made to queue all collected data and submit to the site using the Wi-Fi in our apartment. This was much easier and more reliable than trying to use Wi-Fi in the field.

3.3.2 Field Testing

Smartphone application field-testing was performed on the island of Giudecca, since this was the location of our apartment and we were familiar with navigating the area. The goal of the field-testing was to ensure that the application was recording and queuing files correctly. The testing was also intended to determine the battery life of the phone in the field and to test the accuracy of the GPS. Different orientations of the phone were also experimented with during recordings. We began this field-testing on 11/9 and it continued into the following day. Our conclusions from testing are outlined in the results chapter.

3.3.3 Field Recording and Data Collection

Our field recording can be divided into two major types: breadth and depth. Breadth collection focused on recording a large amount of noise data points to populate the database. Each area was only covered once and time was not taken into account as a factor. Our breadth collection included two *sestieri*: San Marco and Dorsoduro. It also included the island of Giudecca that was covered during testing. Depth recording involved a much smaller area but focused on getting data over a range of different times. Our depth collection consisted of two different elements, both centered in St. Mark's Square. First, samples were taken in the square over the course of 24 hours. Then, to get a basis for comparison, samples were taken on each remaining day of the week.

True field recording and data collection began on November 14 in the *sestiero* of Dorsoduro. With the results of the field-testing in mind, a grid of target points was mapped ahead of time. The map was then used to navigate to each of these points and a recording was taken. This system was very efficient, prevented back tracking, and assured that areas were not missed. Data was collected on both November 16 and 17, and the region was completely covered in three days.

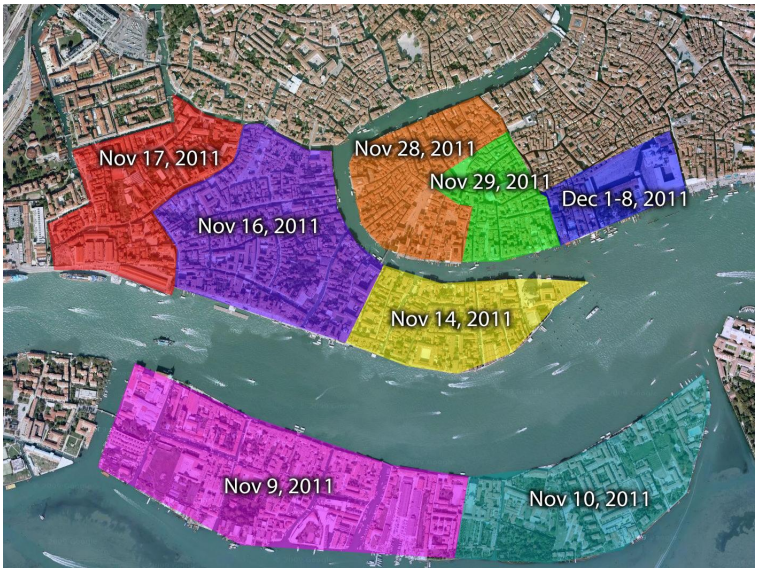


Figure 38: Field Recording Locations Map

The next area covered in breadth was the *sestieri* of San Marco. Collection in this area began on November 28 and continued on November 29 and December 1. Once this entire area had been surveyed, it was possible to move onto collecting more in depth data in the area around the square. This began with 24 hours of recording on December 2 and continued with daily recording on Monday through Thursday of the next week, December 5-8.

Since this part of the data collection was aimed towards gathering depth of data, the procedure was slightly different from the previous data collection. The same route was walked every day at 12PM during the four days of daily recording and every 30-minutes during the 24 hours of recording. The route consisted of seven points in the area of St. Mark's Square and took approximately 8 minutes to walk. The first point was at the western end of the square, opposite the Basilica. The next point was taken halfway between that point and the Basilica. The third point was taken directly in front of the Basilica, while the fourth was taken in front of the Doge's Palace. The fifth, sixth, and seventh points were taken in equally spaced intervals along the waterfront. This data shows a much more accurate picture of the noise situation in this area and indicates trends rather than random single occurrences.

Figure 39: Saint Mark's Square Route

4 Results and Analysis

This project had three major goals. The first was to develop a smartphone application that could be used to collect and submit noise samples to a database. This application was intended to empower Venetians with the ability to submit noise samples to a database that will analyze these files and make them available for public viewing. The second goal of the project was to develop this database as well as a website frontend. This website makes available all of the data that was collected throughout the course of the project. In addition, it provides users with an interactive map that can be used to play sounds, view photographs, and look at decibel measurements. The website also includes comparisons against zoning laws. The third major goal was to collect field data to validate our application and initially populate our database. This data was recorded using a smartphone, uploaded to the database, and used for analysis in the later parts of this section.

4.1 The Smartphone Application

The Smartphone application is now available for download on the Android Market. When updates are released, the application automatically updates before it can be used. The application incorporates all of the originally conceived features and was a vital part of the project. It was used extensively in the field and was the major data collection tool employed in this project. The cellular microphone proved to be capable of capturing acceptable quality recordings, and the app's GPS functioned with an excellent degree of precision. The application eliminated hours of tedious work and made entering data into the website fast and easy. Without this application, it would have been considerably more difficult to gather massive amounts of data and the project may have been impractical.

4.1.1 User Interface

The user interface was intended to be as simple as possible, while still maintaining functionality. The homepage of the application displays a header that reads "Venice Noise" and indicates the version number of the application. Directly under this header, there are two buttons. The left button, labeled "Contribute," brings users to the screen for taking data samples. The right button is labeled "Queue" and brings the user to a list of noise samples that are ready for upload. These buttons, however, are not the focal point of the main view. Directly under these buttons is a large heat map of Venice that covers about 75% of the screen. This map shows the up to date, real-time map that is displayed on the homepage of the

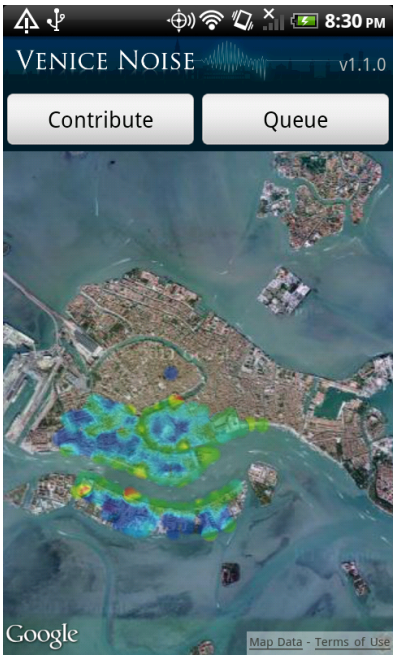


Figure 40: The Main Page

website. The map on the application can be zoomed in and out and can be viewed by users who are hoping to identify their specific uploads on the map. If the user does not have Internet access, a map of Venice is still shown, but the heat map does not render.

Once a user clicks on the contribute button, they are brought to a separate screen that is designed to guide them through the upload process. The Venice Noise header is once again displayed at the top of the application. Directly underneath that is the "Record" button, which extends about two thirds of the way across the application. The button next to it reads "Play," but is grayed out until the user records a sample. When the user clicks the record button it flashes green and then becomes gray to indicate that the application is recording. After five seconds, the recording is complete and the button becomes white again. The "Play" button that was previously grayed out can now be clicked to play the sound that was just recorded.

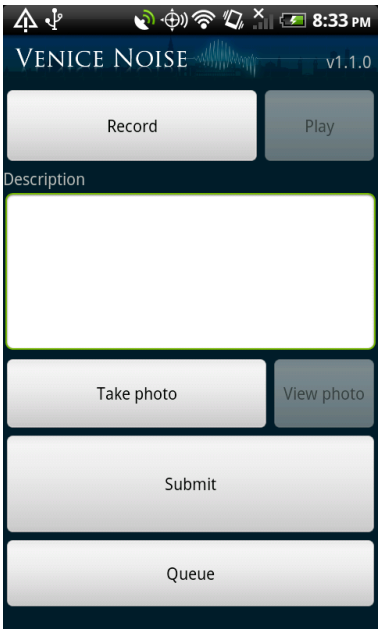


Figure 41: The Contribute Screen

Underneath the Play and Record buttons is the Description field. This field appears as a large white box. Clicking on this button will cause it to blink green and bring up a gray keyboard from the bottom of the screen. This keyboard can be used to type in a description of the sound that was just recorded. The keyboard provides feedback response to the user, meaning it vibrates slightly anytime a button is pressed. Once a description has been entered into the field, the keyboard can be minimized. Depending on the Android model, this is done by using either the back button on the phone, or by clicking on the keyboard logo on the bottom left of the keyboard. The user should not have much trouble discerning which method they must use, since they use these controls whenever they use the phone's keyboard.

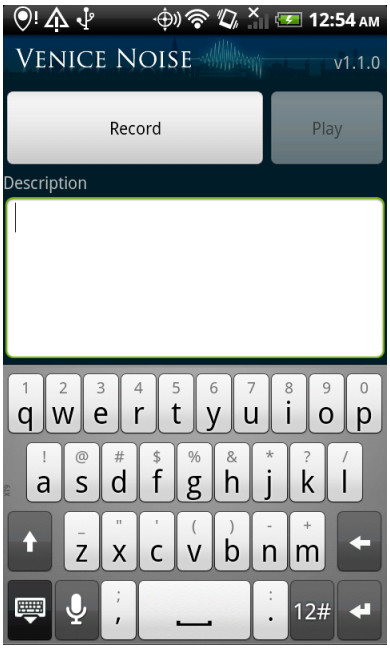


Figure 42: Entering a Description

Below the description field is a row with 2 buttons. These buttons are arranged in an identical manner to the Record and Play buttons and are labeled "Take Photo" and "View Photo." Once again, the view photo option is grayed out until a photo has been taken. When the "Take Photo" button is clicked, the application immediately brings up the application's camera. The photograph is taken by the same method that is normally employed to use the phone's camera. Once the photo has been taken, a bar appears along the bottom of the screen with two buttons that can be clicked. The first is a button that says "Done." This button brings the user back to the submission form. The other button provides the option to retake the photo. After the retake, they will once again be shown the two options and can repeat the process as desired.

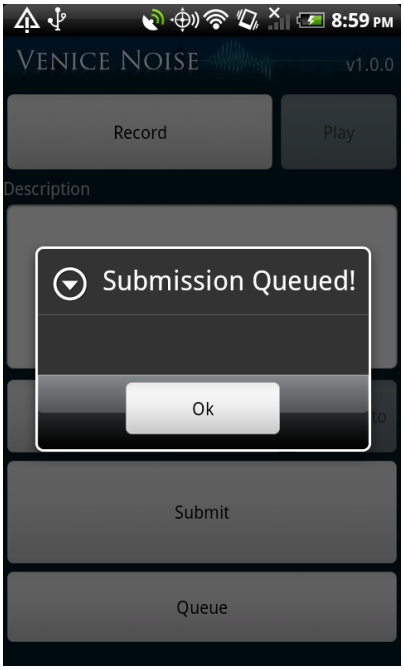


Figure 43: Sending a Submission to the Queue

Once the fields are complete, the user has two options. The first is to submit the data point. The second is to queue the data point. The queue is intended to allow users without Internet access to save their points for later. These points will still have GPS coordinates and time stamps from when they were recorded. If users without Internet access click the submit button, the application will search for Internet access until it is able to upload the file. At any time, the user can abort an upload attempt and return to the form. If the queue option is chosen, then the point is sent to the queue list, which is accessible through the homepage of the application. Once the point has been submitted, the user can either record additional points or return to the home screen, using the back arrow on the Android phone.

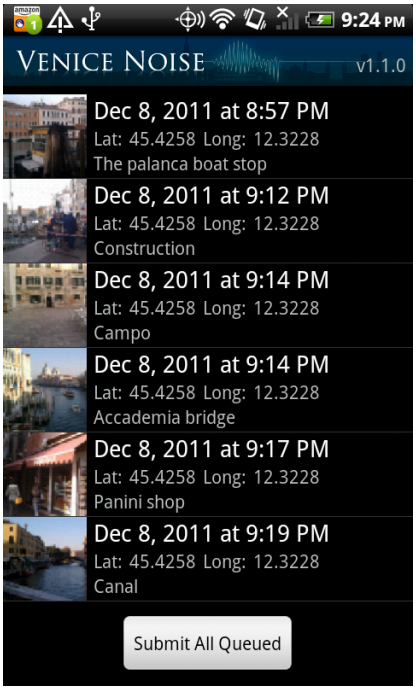


Figure 44: The Queue

If users on the main screen select the "Queue" option, they will immediately be brought to a separate page that displays a list of all the points they have taken. Each point in this list will display the photograph taken, the date and time, the latitude and longitude of the point, and the description of the point. At the bottom of the list is a button that reads "Submit all Queued." As its name entails, this button will submit the data that is stored in the application. The entire process of uploading a point (recording, taking a photo, entering a description) should not take longer than a minute for first time users. Experienced users will be able to complete the whole process easily in less than 20 seconds.

4.1.2 Recording, Photograph and GPS Capabilities

There was much speculation before the beginning of the project as to the quality of the recordings the microphone was capable of taking. This, however, turned out not to be a problem. The microphone is able to take mono recordings at a sampling rate of 44,100 Hz. This is the default setting on the Android phone. The recording is encoded in the form of a 16bit PCM WAV without any file size compression. The time of the recording is also limited by the application to five seconds. This provides the database with a recording that is long enough to analyze, but still short enough to maintain a small file size for upload. The entire audio file at the end of the recording is approximately 400 kB in size.

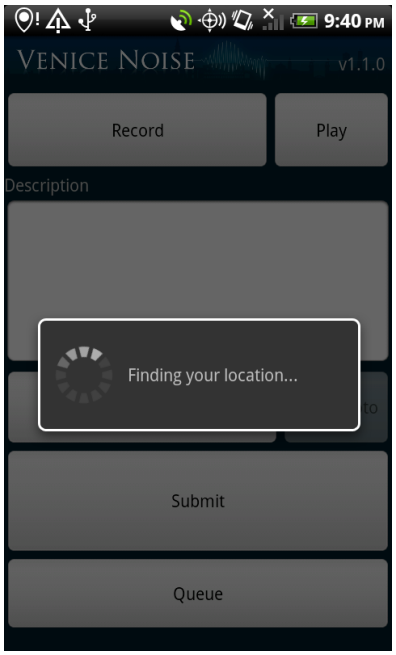


Figure 45: GPS Acquiring Location

There was also some speculation at the beginning of the project that including a photograph in each sample would cause the file size to become too large to upload. This was also not a problem, and full photograph functionality was included in the application. The size of the photo varies slightly depending on the model of Android phone that is being used. The application automatically scales down the photo so that the longest side of the photo is 800 pixels long. The shorter side of the photo scales proportionally depending on the original photograph size. This scaling causes the photo size to be only approximately 100 kB. When combined with the audio file, the final upload is only approximately 500 kB.

The GPS was a third area of concern before the project began. The GPS proved to be accurate throughout the entire field recording process. The GPS was able to locate the phone to within a few meters. Occasionally, buildings affected the accuracy of the GPS and caused some strange data points. For example, points taken along canals sometimes appeared in the canals. This proved to be only a minor problem and the GPS was usually able to acquire a position within 15 seconds.

4.1.3 Downloading the Application

There are multiple methods available for downloading the application onto an Android phone. The first, and simplest, option is to download the application from the Android Market application on the phone. A search for "Venice Noise" locates the application as the first choice on the list. Alternatively, users can visit the Android Market on their


Figure 46: The Venice Noise Logo

computer and download the application. They can then transfer the application onto their Android device. The third and final option is to download the application from www.venicenoise.org. On this site there is a tab labeled “App.” Clicking this tab brings users to a screen that shows a QR code, which can be read by an Android phone and will redirect users to a download option on the Android Market.

4.2 Website and Database

The smartphone was a vital tool for data collection and is critical for allowing users to upload noise data. The application, however, only represents half of the process. The database is responsible for archiving and organizing all the submitted data from the application so that it may be viewed. To make this possible, the database runs in conjunction with a website frontend at www.venicenoise.org. Like the app, this site is easy to use yet very powerful. The site provides users with the ability to view data points and powerful filtering and analysis tools. The website allows users to customize certain display elements to their liking and makes viewing numerous amounts of data simple.

4.2.1 Website User Interface

The user interface of the website was designed to match the interface of the application. The homepage of the site prominently features a heat map that occupies 75% of the screen space. Above the map is a header similar to the one on the phone that reads “VeniceNoise.org” and includes a sound wave stylized into the fish shape of Venice. Underneath this is a navigation bar that brings users to other pages on the site. Tabs on the bar include an “About Us” tab as well as an “App” tab that will take users to a page to download the application. There is also a link to the project website which features team blogs and project related documents.

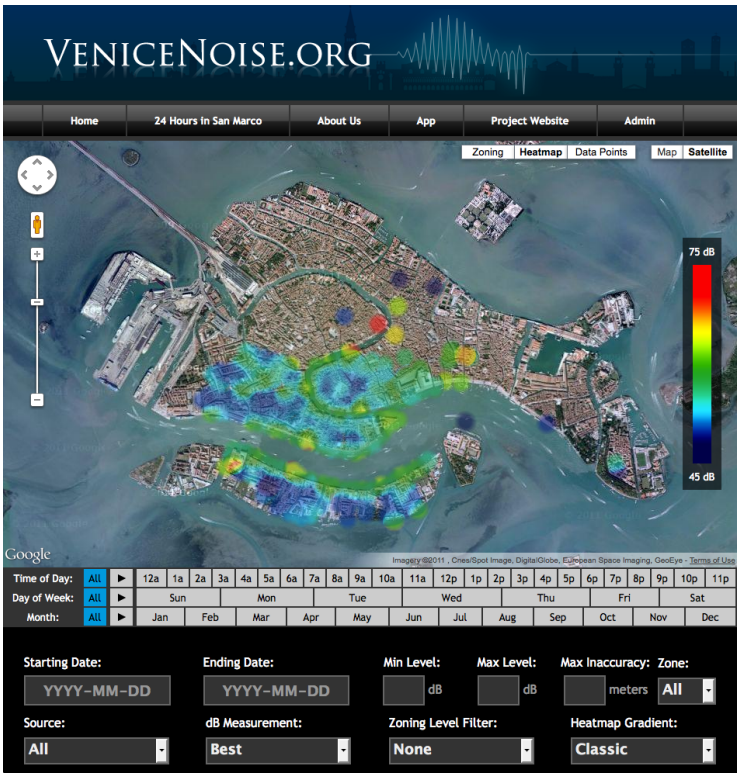


Figure 47: VeniceNoise.org Homepage

The map is the focal point of the entire site and is the main tool for viewing project data. There are three major view options for the map, all of which lie underneath the heat map overlay and the data points. The primary option is Satellite mode, which displays the map as a photographic satellite view and allows user to easily identify structures and locations. The second option displays a map of Venice with labels that can be toggled on or off. Additional options exist for toggling the zoning map, heat map, and individual data points. The zoning option displays a map that outlines the zoning laws of the city. This version of the map causes the data points to appear either red or green depending on whether or not zoning levels are exceeded.

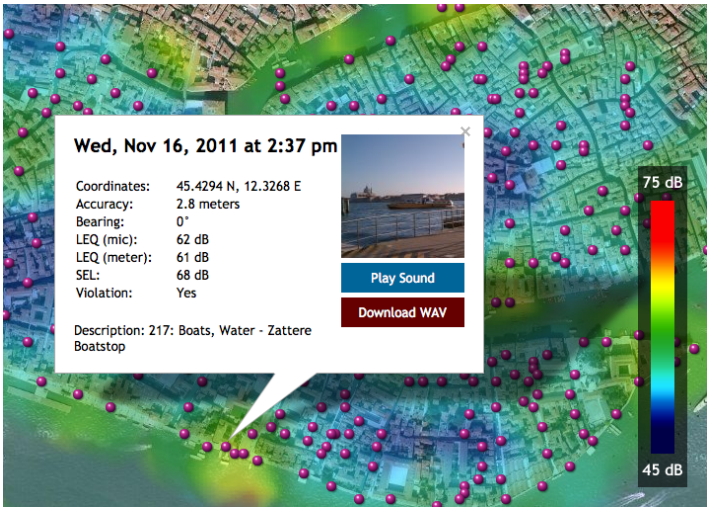


Figure 48: The Data Box

The default homepage of the site shows the entirety of Venice in the map. Users can zoom in on this map using either the zoom bar on the left of the screen, or by double clicking on the map. Once users have zoomed in to a certain level, purple points appear on the map, representing every sample that is in the database. Each of these samples is interactive and can be clicked to view the corresponding data. When users select a point, a box appears that contains a thumbnail image and all of the information associated with that point. This information includes GPS coordinates, the accuracy of the point in meters, the bearing (compass direction), the L_{eq} calculated by the algorithm, the L_{eq} calculated by the sound pressure meter, and the description. To the right of this information under the thumbnail, there are two buttons. The top button plays the sound file and the bottom button downloads a WAV file of the recording. Users can also click on the thumbnail image to display a larger photo.

The heat map on the site features a number of different gradients that can be modified by the user. The default gradient uses the traditional hot and cold color scale to represent different levels. The cold colors such as blue on the gradient are indicative of quiet noises, while the hot colors such as red and yellow represent loud locations on the map. The gradient features 5 colors: blue, light blue, green, yellow, and red. Additional gradients are also available on the website.

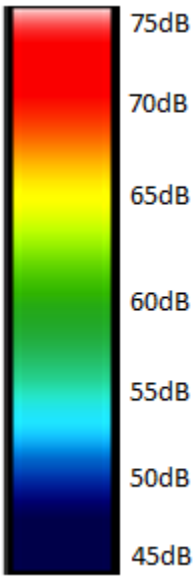


Figure 49: The Map Gradient

The points are also viewable in the data table at the bottom of the site. This table displays the ten most recent points entered into the database and can be searched to view older entries. The table displays the same information as popup boxes on the map in a simplified format. Clicking on any entry in the table will bring a user to that specific point on the map. From the data table, users can also play the sound file using the blue play icon at the right of the row. The photo can be viewed using the red button.

Figure 50: Data Table Showing 3 Samples

4.2.2 Data Tools

The website includes more than one thousand data points, making the data tools vital. Directly underneath the map is a set of buttons, which can be used to change the time of day, day of the week, and month of the data represented in the heat map. On the left edge of each of these tools is a play button. Clicking this button starts an animation that plays through all of the categories in that specific field. For example, if a user selects to play the time of day category, the heat map will animate to show 24 different times of day. These tools can be used for comparison purposes or to identify trends over the course of a day or a week. With enough data, these tools can also represent the differences in the map depending on the time of year.

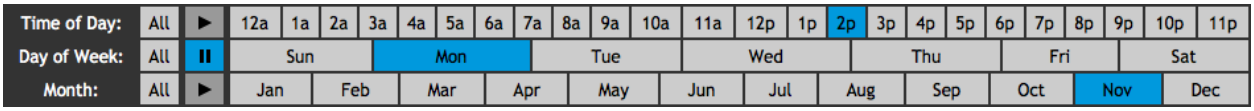


Figure 51: The Animation Tools Displaying Samples from Mondays at 2pm in November

Directly underneath the set of time selection tools is a set of search tools. These can be used to filter the data that is presented on the map. Users can enter the desired parameters into these filter tools and it will automatically remove points from the map that do not meet the specifications. In addition, a data table is provided that lists points that satisfy the search. Users are allowed to enter a starting date, an end date, a maximum and minimum L_{eq}, a maximum inaccuracy, and keywords for descriptions. There are also a number of fields where preset options can be selected. The first of these fields is source. There

are three options in this category: public data, field data, and test data. Public data shows all of the points collected by any version of the application, while field data shows only data collected by our team.

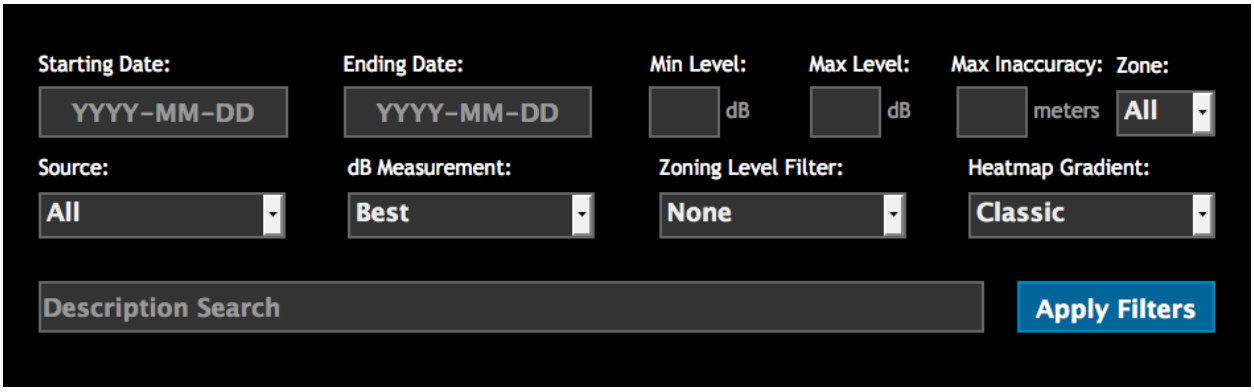
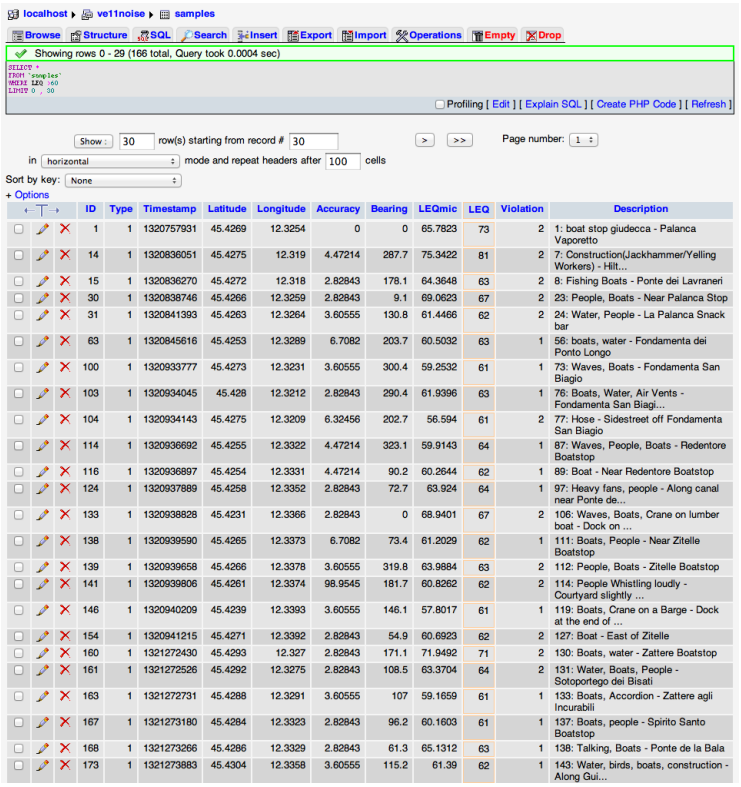


Figure 52: The Filter Tools

There is also a field that allows users to filter by type of dB measurement. Users are allowed to view measurements from only the algorithm or only the sound pressure meter. By default, the website displays the sound pressure meter measurement when it is available and only uses the algorithm when this data is missing. Users can also filter data with respect to zoning and have two options: Above zoning levels, or below zoning levels. By default, all points are shown regardless of whether they exceed zoning levels. Users are also able to select a heat map gradient. Currently there are six available gradients: Classic, Stoplight, Fire, Gold, Purple Haze, and Grayscale.

In addition to the publically available data tools, our database also features private tools that can run more advanced queries on the data. The database is capable of analyzing the data and providing statistics such as the percent of points that exceed zoning levels, or the percent of points that fall into a certain decibel range.



ID	Type	Timestamp	Latitude	Longitude	Accuracy	Bearing	LEQmic	LEQ	Violation	Description
1	1	1320757931	45.4269	12.3254	0	0	65.7823	73	2	1: boat stop giudecca - Palanca Vaporetto
14	1	1320836051	45.4275	12.319	4.47214	287.7	75.3422	81	2	7: Construction(Jackhammer/Yelling Workers) - Hilt...
15	1	1320836270	45.4272	12.318	2.82843	178.1	64.3648	63	2	8: Fishing Boats - Ponte dei Lavraneri
30	1	1320838746	45.4266	12.3259	2.82843	9.1	69.0623	67	2	23: People, Boats - Near Palanca Stop
31	1	1320841393	45.4263	12.3264	3.60555	130.8	61.4466	62	2	24: Water, People - La Palanca Snack bar
63	1	1320845616	45.4253	12.3289	6.7082	203.7	60.5032	63	1	56: boats, water - Fondamenta dei Ponto Longo
100	1	1320933777	45.4273	12.3231	3.60555	300.4	59.2532	61	1	73: Waves, Boats - Fondamenta San Biagio
103	1	1320934045	45.428	12.3212	2.82843	290.4	61.9396	63	1	76: Boats, Water, Air Vents - Fondamenta San Biagi...
104	1	1320934143	45.4275	12.3209	6.32456	202.7	56.594	61	2	77: Hose - Sidestreet off Fondamenta San Biagio
114	1	1320936692	45.4255	12.3322	4.47214	323.1	59.9143	64	1	87: Waves, People, Boats - Redentore Boatstop
116	1	1320936897	45.4254	12.3331	4.47214	90.2	60.2644	62	1	89: Boat - Near Redentore Boatstop
124	1	1320937889	45.4258	12.3352	2.82843	72.7	63.924	64	1	97: Heavy fans, people - Along canal near Ponte de...
133	1	1320938828	45.4231	12.3366	2.82843	0	68.9401	67	2	106: Waves, Boats, Crane on lumber boat - Dock on ...
138	1	1320939590	45.4265	12.3373	6.7082	73.4	61.2029	62	1	111: Boats, People - Near Zitelle Boatstop
139	1	1320939658	45.4266	12.3378	3.60555	319.8	63.9884	63	2	112: People, Boats - Zitelle Boatstop
141	1	1320939806	45.4261	12.3374	98.9545	181.7	60.8262	62	2	114: People Whistling loudly - Courtyard slightly ...
146	1	1320940209	45.4239	12.3393	3.60555	146.1	57.8017	61	1	119: Boats, Crane on a Barge - Dock at the end of ...
154	1	1320941215	45.4271	12.3392	2.82843	54.9	60.6923	62	2	127: Boat - East of Zitelle
160	1	1321272430	45.4293	12.327	2.82843	171.1	71.9492	71	2	130: Boats, water - Zattere Boatstop
161	1	1321272526	45.4292	12.3275	2.82843	108.5	63.3704	64	2	131: Water, Boats, People - Sotoportego dei Bisati
163	1	1321272731	45.4288	12.3291	3.60555	107	59.1659	61	1	133: Boats, Accordion - Zattere agli Incurabili
167	1	1321273180	45.4284	12.3323	2.82843	96.2	60.1603	61	1	137: Boats, people - Spirito Santo Boatstop
168	1	1321273266	45.4286	12.3329	2.82843	61.3	65.1312	63	1	138: Talking, Boats - Ponte de la Bala
173	1	1321273883	45.4304	12.3358	3.60555	115.2	61.39	62	1	143: Water, birds, boats, construction - Along Gui...

Figure 53: Running a Query

These tools require the use of MySQL code commands, so it is not practical to make them publically available. These tools were vital for analyzing the large amounts of data collected during fieldwork.

4.3 Noise Data Collection Results

Field data collection was important not only to validate the application, but also to populate the database with noise data points and to investigate zoning laws throughout the city. This data collection was done in a number of different phases that included field testing, breadth recording, and two types of depth recording: a 24-hour analysis of St. Mark's Square and an analysis of the square at 12PM for each day of the week. All field recordings were used to identify the most common noise producers in the city and to identify dB levels that exceeded zoning limits. In addition, all field recordings were performed with the least bias possible. The team attempted to not specifically target loud points. Often, a data point was immediately retaken due to a large change in the dB level. All noise data collected by the team was verified using a sound pressure meter, which was determined to be accurate to within 1 dB by ARPAV. Since the sound pressure meter rounds to the nearest whole number, levels calculated by the algorithm were rounded in an identical fashion.

4.3.1 Field Testing

Field-testing was a two-day process intended to determine the best recording procedures for field data collection. Field-testing was run in a trial and error fashion and a number of problems were identified and solved. One problem was determining the best orientation of the phone. Different orientations were experimented with, and it was determined that the best orientation for the phone was lying flat in the user's palm with the microphone pointed away from the user's body. The user also attempted to avoid pointing the microphone directly into the wind. This orientation resulted in the best recording quality and was the easiest to use with the layout of the buttons on the app.

Figure 54: Orientation of the Phone during Field Recording

Field recording began on November 9 on the western half of Giudecca. The eastern half of Giudecca was covered the following day. These two days of

field-testing revealed a number of problems that were then corrected for later fieldwork. One major problem was battery life. Each time a point was taken, the camera, microphone and the GPS were all used. Each of these devices drew a large amount of power and the battery life of the phone was only about 3 hours. To solve this problem the flash was disabled through code in the application. We also took note to shut off the GPS if we were not planning on recording in close proximity to the previous point. The removal of flash greatly extended the phone's battery life, and the GPS management helped as well. The battery problem was solved by the second day of field-testing.

On the second day, another problem arose that was not discovered on the first. The area encompassed in the collection on day one was relatively close to our apartment, and we were familiar with the layout of streets and canals. On the second day, we found ourselves getting lost and backtracking quite frequently. It became evident that a route would need to be planned ahead of time in order for us to effectively record on the island. On the second day, we also corrected the GPS system to record coordinates when the noise is recorded, rather than when the noise sample is submitted or queued.

For the most part, field-testing was a complete success. It identified a number of problems and proved the application and the website were working correctly. It also showed that large-scale data collection was possible. The heat map generated without issue, and the test data allowed us to modify certain aspects of how the map rendered and how the data appeared in the database. It also laid the foundation for all future fieldwork and allowed us to develop a system that worked efficiently and effectively. With the field-testing completed it was possible to move onto the data collection.

4.3.1 Heat Map Representation

Generating a heat map that represents noise levels was one of the primary goals of the project. This heat map shows the noise levels throughout the *sestieri* of Dorsoduro and San Marco as well as the island of Giudecca. The heat maps displayed in this section show only the field data collected by our team during the project. Data from other sources were removed to ensure accuracy. Since the map uses only data from field recording, each point has a dB level determined by a sound pressure meter. Since all points submitted in the future will rely on the algorithm, a heat map using only algorithm data is displayed as well. These two maps are very similar, which attests to the accuracy of the algorithm.

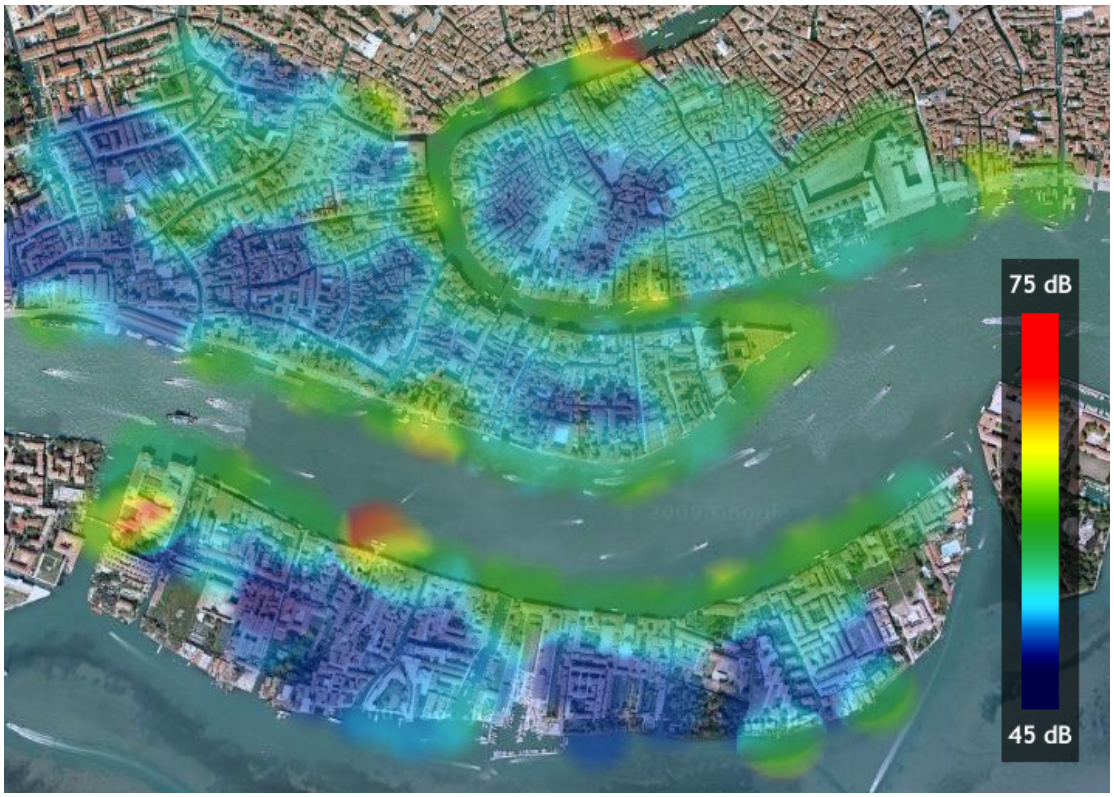


Figure 55: The Heat Map Using the Sound Pressure Meter Levels

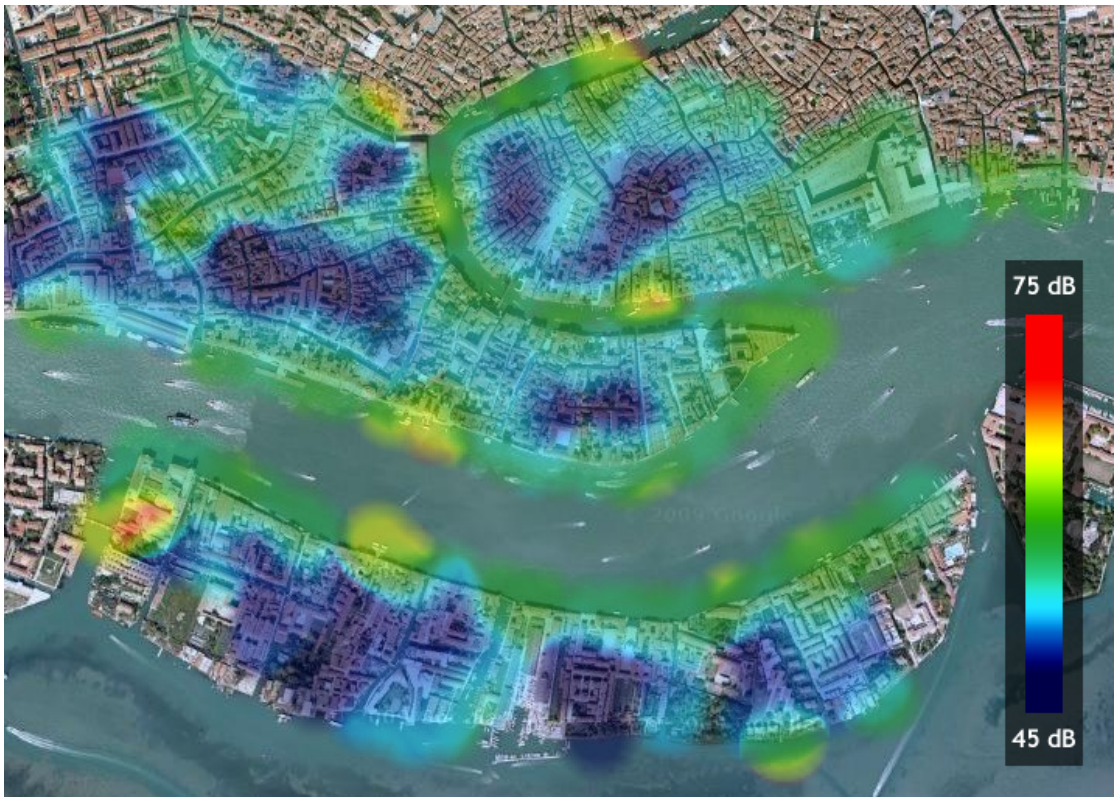


Figure 56: Heat Map Using the Algorithm Levels

There are slight differences between the two maps. Since the sound pressure meter cannot measure below 50 dB, it is not able to show levels at the low end of the gradient. This causes the algorithm map to have darker levels of blue. The other significant difference comes at the opposite end of the gradient. The algorithm becomes slightly less accurate for decibel levels above 70 dB. This causes the algorithm map to display slightly less red than the sound pressure meter map.

These two heat maps indicate some important trends in the noise patterns of Venice. Decibel levels are noticeably louder along the canals; the average level along large canals is around 60 dB, while just inland from these canals, decibel levels are significantly lower. This reveals that boats are a primary source of much of the noise throughout the city. This conclusion is readdressed in later parts of the results section. On this map, St. Mark's square does not appear excessively loud. This could be misleading. The large number of late night points taken lowers the average level displayed. Despite this, the average level is around 60 dB, which is still above the average level for most of the city.

The filters on the website make it possible to generate a number of different heat maps. These maps include only the points that meet the specifics of the filter. Heat maps for points above and below 60 dB were generated to demonstrate this capability. These maps were created using the sound pressure meter levels, but could have been made in an identical fashion using the algorithm. A heat map was also generated using the stoplight gradient to further demonstrate the website's capabilities. These maps are only a small sample of what the site can generate. Using just the field data collected in a single term, the heat map is capable of generating $2x3^{1221}$ different maps.

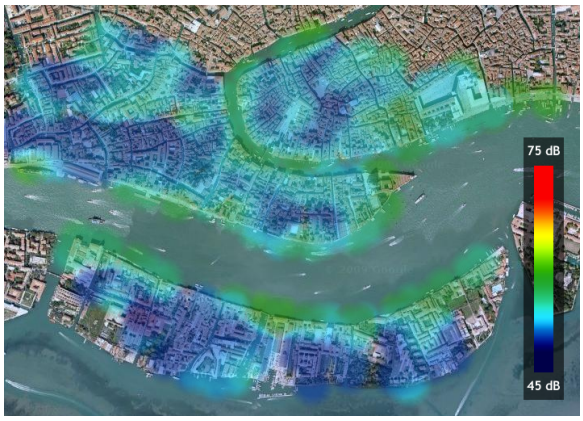


Figure 57: Levels Under 60 dB

Figure 58: Levels Over 60 dB

Figure 59: Heat Map Using the Stoplight Gradient

4.3.4 Piazza San Marco 24-Hour Analysis

While the heat maps in the previous section show relative noise levels throughout the city, they do not have any respect to time of day or day of the week. To address this concern, we choose to survey Saint Mark's square throughout the day to gain an understanding of how noise levels vary. A 24-hour analysis of the square was performed on Friday, December 2. This analysis collected 7 points every 30 minutes. An

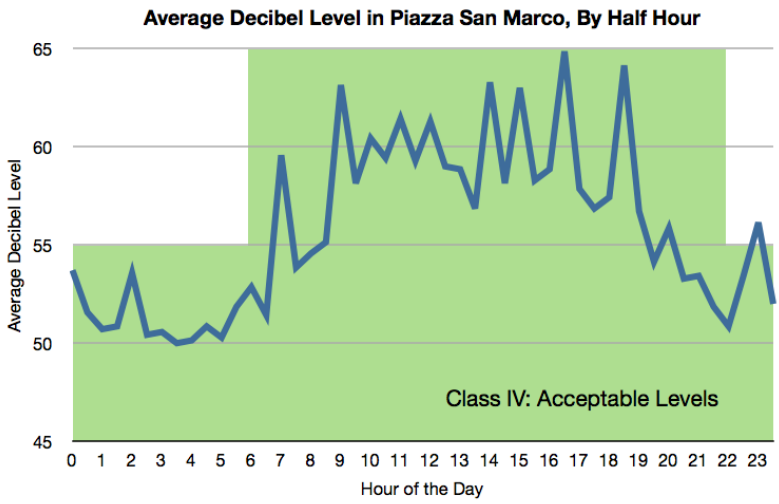


Figure 60: Saint Mark's Square Over 24 Hours

animation was made using this data that shows how the heat map evolves throughout the day. A time-lapse video was presented along with this animation. Additionally, a line graph was created.

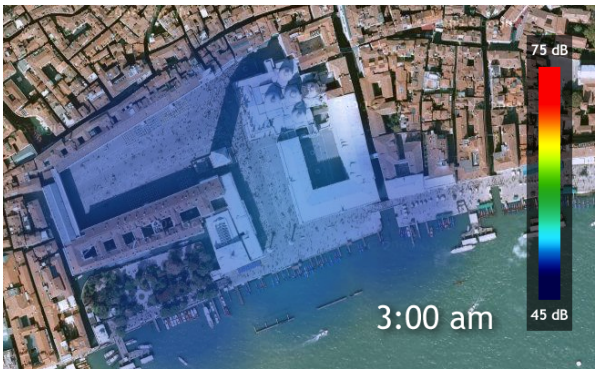


Figure 61: The Square at the Quietest Time

The noise levels fluctuated throughout the day as we hypothesized. It was quiet at night and louder during the day. There was also a slight drop during the middle of the day when people took a break to eat lunch. Only one hour of the day was actually found to have levels above the allowable zoning limit. This was between 11:00PM and 12:00AM and resulted partially from bells. The quietest time of day was between 3:00AM and 4:00AM. The loudest time of day was between 4:00PM and 5:00PM. At this time of day there was a large amount of people in the square, and the bells rang loudly at both 4:00 and 4:30.

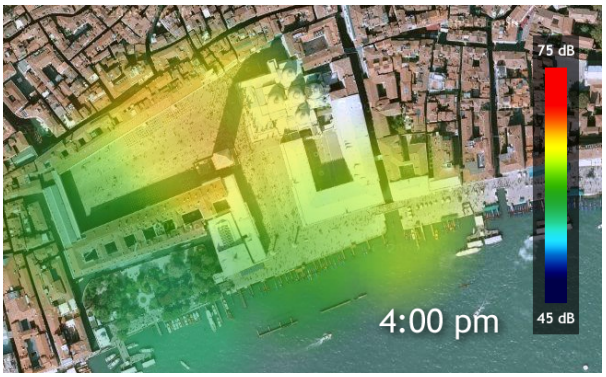


Figure 62: The Square at the Loudest Time

There were some problems with this analysis, however. Friday was chosen since the square is usually most crowded on Friday. Many tourists arrive in Venice for a long weekend and immediately visit the square. Cruise ships normally arrive in the city on Thursday or Friday as well. Unfortunately no cruise ships docked this particular week and the square was significantly less crowded than average due to inclement weather. It rained for much of the day and it was very cold. At lunchtime, people would normally be seated at outdoor restaurants. On this day however, these restaurants were empty and the square was relatively quiet during midday. If this experiment were to be duplicated, we expect that significantly louder levels would be found throughout the day.

4.3.3 San Marco Throughout the Week

To supplement the 24-hour recording, the same 7 recordings were taken at 12PM on Monday through Thursday of the following week. These recordings were used for comparison against each other and the corresponding time slot during the 24-hour analysis. To show the relative levels, a heat map was made for each day. These heat maps are presented here for comparison purposes.

Going into this study, we expected Friday to be the loudest day of the week because of tourists taking long weekends or taking the day off. Cruise ships often arrived on Fridays and stayed for the weekend as well. This prompted us to perform the 24-hour analysis on a Friday. As previously mentioned, this analysis did not go as planned. The weekly analysis was affected by some unexpected variables as well. Thursday was by far the loudest day of the week due to the fact that it fell on a holiday. The amount of people in the city was much higher than average and the square was very crowded. This holiday showed how loud the square can get, and it produced levels upwards of 70 dB.

The other days of the week showed more expected results. Monday and Friday proved to be louder than Tuesday and Wednesday. We accredit this to travelers who are taking a long weekend. We were not able to collect noise data on the Friday of the holiday weekend. We suspect that this day might be as loud as Thursday. These results do not demonstrate any concrete trend since the number of variables is too high. The study was affected by a holiday weekend as well as weather, and the outdoor restaurants in San Marco were empty on Friday because of the cold and rain. These results are inconclusive, but they do show that St. Mark's Square can become very loud. It also shows how erratically noise levels can fluctuate.

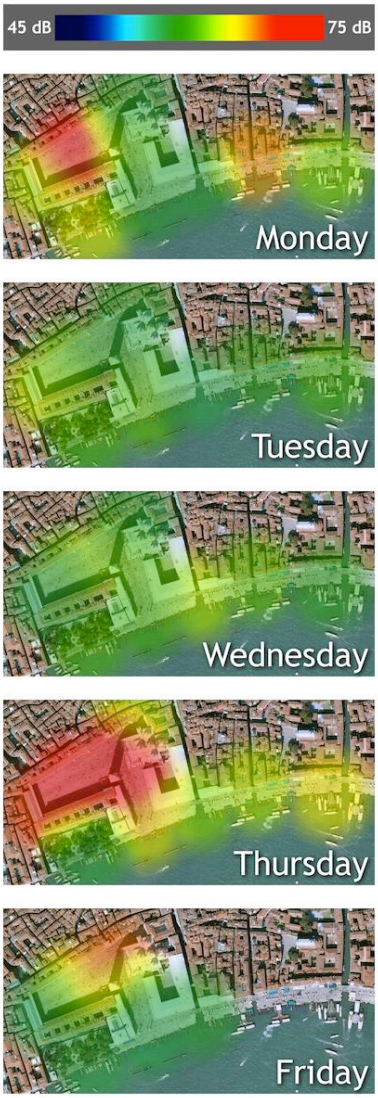


Figure 63: Saint Mark's Square at 12PM

4.3.2 Noise Levels Exceeding Zoning Limits

Zoning laws were used as a standard to assess the existence of a noise problem in Venice. We collected data in zoning classes 3 and 4. Zone 3 is present in mixed residential and commercial areas, while zone 4 designates areas of high human traffic and major canals. When ARPAV assesses noise violations, they use advanced recording equipment and elevated microphones. They also record over long periods of time such as hours, days or even weeks and use the average L_{eq}. The "violations" we identified represent only a single instance. Instead of trying to determine if the average level for the day is too high, we chose instead to determine whether specific points are above the legal threshold. By doing so, we indicated a number of major sources that could be responsible for larger, more serious violations.

The majority of the area we covered was class 3 zoning. Often these zones directly border the canals, which are zone 4. The boats, which operate under legal canal limits, can be very loud even from the shore. Boats caused 16 noise violations in class 3 zoning, which accounted for 53% of violations in these areas. The next largest source of class 3 zoning violations was construction. Construction was sporadically located around the city and produced some of the loudest levels we recorded. A total of 7 violations, or 23% of total violations, were related to construction. Large groups of people also produced levels above the legal limits. 20% of violations were caused by people, with a total of 6 violations. There was one additional violation caused by a garden hose that accounts for the remaining 3%.

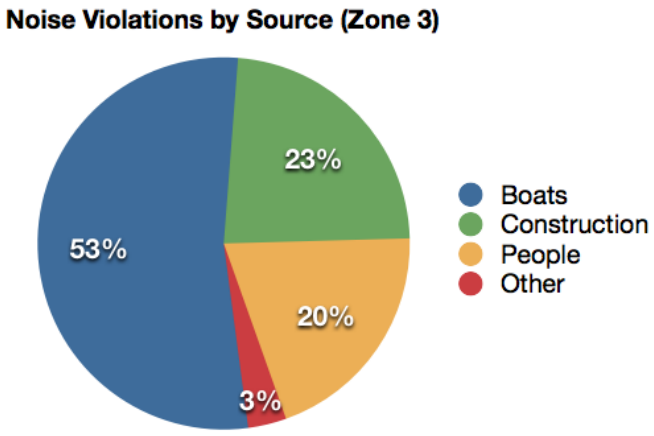


Figure 64: Zone 3 Noise Violations Breakdown

In zone 4 areas, similar results were found. The violations in St. Mark's Square during the 24-hour testing were not included because most of these were caused by the *Marangona* Bells and the sources were not documented. In class 4 zoning areas, there were 4 boat violations and 3 construction violations. These accounted for 57% and 43% respectively. There were no violations caused by people or any other sources.

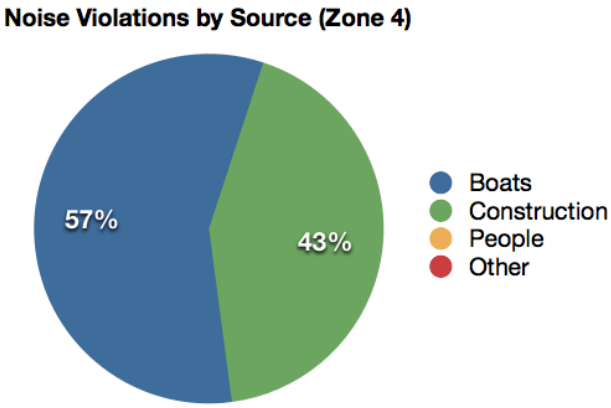


Figure 65: Zone 4 Noise Violations Breakdown

The number of zoning violations we discovered is significantly lower than the number of non-violations. We discovered 38 violations as opposed to 463 non-violations. This means that only 7.6% of points collected were

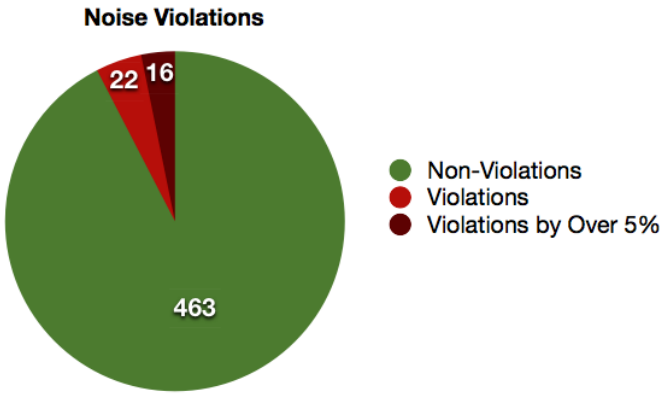


Figure 66: Noise Violations vs. Non-Violations

violations and 92.4% of points were well under zoning limitations. These measurements were also instantaneous. Often, the dB level dropped after a high level was recorded, so these violations were very minor. If points within 5% of the legal range are removed, only 16 violations were recorded, accounting for only 3.2% of points. Based on these figures, it is safe to conclude that few, if any, of these points can be considered a true violation.

This does not mean that these sources are not a problem. On average, boats operate around the 60 dB limits of certain areas. By moving, boats are able to avoid breaking regulations. Extremely loud boats can travel down the canals and produce significant noise levels but not affect a long-term recording's L_{eq}. The problem in Venice relates not to constant levels, but instead spikes in the noise level. Since zoning laws do not address these spikes, the largest problem in Venice is not loud noise levels but rather zoning laws that do not address violations in the correct way.

4.3.3 Major Noise Sources

Our data does not show a large number of noise violations, but it does identify the primary noise producers in the city. We identified 3 major sources: boats, construction and people. These sources accounted for 97% of all noise violations. Additionally, these three sources accounted for 79% of the total points. Construction was recorded 56 times while boats were recorded 129 times and people 209 times.

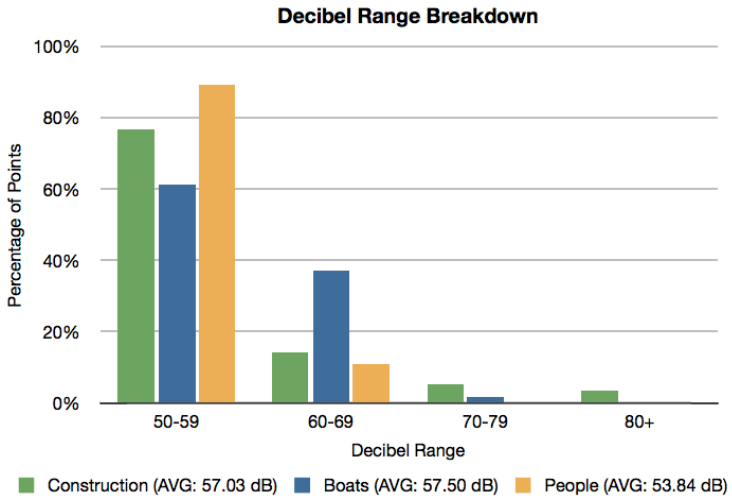


Figure 67: Decibel Range Breakdown for 3 Major Noise Sources

Boats, construction, and people contribute to noise levels in different ways. People were the most common noise source but never exceeded 70 dB. Sound levels generated by only people never reach extremes, but they cover Venice in a constant blanket of sound. Construction was an entirely different type of problem. Sounds from construction often radiated very far from the actual source. These levels were also the highest we found, even exceeding 80 dB. While construction was less frequent, it produced some of the most disturbing noise in the city. Boats are in the middle ground for both number of points and decibel levels. They were recorded commonly and often had levels that exceeded 60 dB. Boats move throughout the canals constantly and cause the sound levels of the city to vary erratically.

4.3.4 Inconclusive Research

It was theorized before the project began that *plateatici* and cruise ships would both be major sources of noise. We were unable to come to a solid conclusion on either of these potential sources because of a number of different reasons. During fieldwork, we did not ever identify loud noise levels to be directly linked to *plateatici*. When surveying areas during lunch hours, we often found these to be quiet or even empty. Our fieldwork did not take place during a major tourist season, and cold weather may often have caused people to eat inside. Due to time constraints, it was not possible to take recordings at night in S. Margherita, where *plateatici* are often cited as a major noise source.

The tourist off-season also made it difficult to record noise levels associated with cruise ships. Developing the application and the website occupied a large amount of time at the beginning of the project. Once field recording began, cruise season was over and data was never taken at the docks. Two points in the database do make reference to cruise ships. These points were taken on Giudecca while a cruise ship was passing between the island and the main island. These points recorded levels of 57dB and 55 dB from a large distance away. Additionally, the description identifies that the sound of the cruise ship was a "low hum." This ship could have been much louder up close. Unfortunately, it was not possible to collect data for these ships. This paper cannot make any conclusions on these ships because of the unavailability of data.

Figure 68: A Cruise Ship Photographed During Field Testing

5 Conclusions

Before the start of the project, there was a large amount of concern that using a smartphone application for data collection was unscientific and unreliable. Over the course of the term, we collected over 1,000 noise samples and used this data to create maps of noise levels in Venice and create a website to display our results. Since this information was recorded electronically, it was possible to easily organize and sort the information so that it could be used to generate statistics, figures, and graphs. It would have been impossible to collect such a large amount of noise samples and generate figures using this volume of data without the smartphone application. If the data collected by the application was entered into a database by hand, and photographs and sound files were uploaded individually, the team would have wasted entire days, if not weeks, tediously copying points from field forms into the computer. Not to mention, the margin for user error would have been extremely high. The smartphone application not only proved to be a legitimate and efficient tool for data collection, it exceeded expectations and allowed much larger quantities of noise samples to be taken. The smartphone application made this project possible.

Our database and website made it possible to organize and view extensive amounts of noise samples. The type of analysis performed in our results section was only possible because of the database. With this tool in place, future noise researchers will be able to catalog even more noise samples and continue to discover the sound profile of the city.

This paper set out to investigate the noise situation in Venice and to identify common noise producers. We identified boats, construction, and people to be the top three sources of noise. Yet, throughout the course of the project, only 3.2% of all noise samples taken were above the legal thresholds set by zoning laws. Most of these loud samples lasted only a short period of time and would not have qualified as an actual zoning violation. Almost all of these levels above the threshold were unavoidable since they were caused by essential boat transportation, construction, and maintenance of the city's eroding infrastructure. A number of sources, which we believed would be widespread throughout the city, were never identified as a problem. In addition, only a minimal amount of points collected ever exceeded 70 dB. After 7 weeks in Venice, we can conclude that noise levels were not a problem in any of the regions that we surveyed and that Venice remains a quiet city.

6 Recommendations

This project was not the continuation of any other project and was an entirely new idea. Our major objectives included developing the smartphone application and the website. These two tools are tremendously versatile and can be adapted for projects in future years. Unfortunately, developing these tools occupied an extensive amount of time and limited the amount of fieldwork that we were able to complete. While we were able to collect an extensive amount of data, more time would have been greatly appreciated. With additional time, we would have been able to gain a much larger understanding of the noise situation in Venice. Our recommendations are split into two parts. The first outlines how future "Noise" projects can improve upon our fieldwork. The second suggests various ways that our application can be applied to future WPI IQPs.

6.1 Future "Noises of Venice" Projects

The ideal heat map of Venice would include a noise sample for every location in Venice at every time of day, for every day of the year. While this goal is impossible, working towards it is not. Our project originally hoped to generate a heat map for the entirety of Venice without any respect to time of day. We soon realized that even this was not possible given the timeframe and resources we had to work with. We have determined that there are two major ways that future teams should work towards completing the map. The first is fieldwork. The second is marketing the application and collecting crowd-sourced data. This was originally a goal of our project but proved to be beyond our time limitations.

6.1.1 Data Collection

Using the application and the database, teams should be able to collect an extensive amount of data. Our project focused around the areas of Dorsoduro and San Marco. While taking recordings in these areas, we identified boats to be a major source of noise. Because of this, we would recommend that future noise teams focus on areas along the Grand Canal, as well as along the lagoon. During our project, we performed a 24-hour analysis on St. Mark's Square. By chance, the weather was less than ideal and there was an incredibly low number of tourists in the square, despite the day being a Friday. We would recommend that future teams once again perform this 24-hour analysis using the same technique we followed. In complement to this analysis, a 24-hour analysis of S. Margherita should be performed. S.

Margherita is the focus of most of the nightlife in Venice, and we theorize that it will be loudest at night unlike St. Mark's Square, which is loudest during the late morning and afternoon.

Going into the project, we suspected that both cruise ships and *plateatici* would be major noise sources. Unfortunately, we were unable to come to a definitive conclusion on either of these. We would suggest that future teams investigate these potential sources heavily early in the term. We attempted to do this research late in the year, once the tourist season had already passed. We also never made it to the cruise ship docks on the western part of the main island. Future teams should find a cruise ship schedule in preparation and plan to visit the docks when multiple cruise ships are docked there in late October and early November. These cruise ships keep their engines on while they are docked and are the source of many noise complaints. We also were never able to get any recordings near the hospital, where zoning laws require very low noise levels.

We investigated most of the *sestiero* of San Marco and found that the shops and the area immediately around the square are often crowded and noisy. It is because of this that we would suggest future teams focus heavily on San Marco and also the Rialto area. These are two crowded tourist areas. Choosing additional recording locations is up to the members of future teams, but we would discourage investigating Giudecca or Dorsoduro again, since they rarely had much of a crowd and didn't provide very interesting noise data. To summarize the recording plan: Take data frequently. Take data repetitively. Target cruise ships and the Grand Canal as well as tourist areas.

Figure 69: Areas Future Teams Should Target

6.1.2 Marketing the Application

Our application was geared towards two possible types of users. The first is the Venetian who is looking to complain about noise. The second is the citizen scientist, a person who is willing to collect data just to help contribute to the map. Getting the application to as many people as possible should be a priority. Crowd sourcing with an extensive user base has the potential to generate large amounts of data and improve the heat map. With the current app, this dream may not be realistic. Most people simply don't care about a noise map of Venice or will just play with the application a few times. It is for this reason that we suggest future teams market the application to tourists.

One possible way to do this is by a creating a "sound postcard" application. This would allow tourists to record noise samples, submit them to a website, and have their samples registered under their account. They could then listen to these samples and view the photographs that they uploaded. To serve this purpose better, the application could be modified to take longer recordings or even videos. The audio from the videos could be used for the analysis and users would gain a mapped video log of their trip. Speculating on marketing ideas was outside of the objectives for this project, but future noise teams should market the application. Only through marketing can the Venice Noise App be truly successful.

Figure 70: Sound Postcard Concept Art

6.2 Use of the App in Other Projects

The smartphone application we created is not exclusively geared towards noise analysis in any way. Analysis was performed entirely by the database. The app was designed to be a universal data collection tool. This tool could have been applied to a number of other projects this year at the Venice Project Center and has the potential to be used in future projects. The application can prevent an extensive amount of manual labor, and make it possible to collect data more efficiently and accurately. The application could also save the project center money, since it reduces the need for tools such as a GPS or a microphone.

A team studying material culture project could certainly benefit from this application. This project involved traveling around Venice and locating pieces of public art. Using the application, students could locate public art and use the application to take a picture, enter a description, and even record a note for themselves. Then the file could be uploaded to a database and logged on an interactive map. The application can be modified in certain ways to better favor this type of project. For example, it could be reprogrammed to include multiple photographs, or the sound recording could be removed and replaced with a field to indicate the category of public art. Additional fields could also be added, such as the condition of the piece.

Figure 71: The Culture Team Could Use the App

A team studying supermarkets could have benefitted from our application. This project also involved a large amount of fieldwork and required group members to locate stores throughout Venice. The application would make it simple to plot stores on an interactive map using the phone's GPS, and the description field could be used to explain what the store sells. Since this project included interviews with storeowners, the recording length could be extended so that the entire conversation could be recorded. The application could also be modified to take multiple photos so that every aspect of the store could be photographed. Using the app's connection to the database, the team could easily create an interactive map that shows the locations of all the stores, as well as product lists, photographs and interviews.

These are just a couple examples of the adaptability of our application, but it has the potentials be applied to a number of future projects. Our project chose to employ the app for sound recording and, in the process, demonstrated its effectiveness. Paired with a database, the application is a versatile data collection tool with nearly unlimited possibilities. Just the application's ability to plot points on a map makes it a useful tool to nearly every project at the Venice Project Center. The application is easy to modify and can be reapplied with only minor coding ability. The versatile smartphone application and the powerful database and website are by far the greatest successes of our project and could be vital parts of future projects for years to come.

7 Bibliography

Adrian Rolufs. "Cell Phone Board Design Affects Audio Performance." *Electronic Engineering Times* no. 1488 (2007): 36.

Classificazione Acustica Del Territorio Comunale, (2005): 2, http://sit.comune.venezia.it:81/website/Classificazione-acustica/Relazione.pdf (accessed 9/28/2011).

Berger, E. H. *The Noise Manua*l American Industrial Hygiene Association, 2003, http://books.google.com/books?id=hCB1LYIGgdcC.

Bettin, Assesore. "INAIL - BETTIN:'SERVE UNA CARTA DEI RUMORI' " Inial. http://www.inail.it/Portale/appmanager/portale/desktop?_nfpb=true&_pageLabel=PAGE_SALASTAMPA&nextPage=Per_i_Giornalisti/Rassegna_Stampa/Indice_Cronologico/2011/Giugno/28/SETTORE_MARITTIMO/info-711419351.jsp (accessed 9/19/2011, 2011).

Bronzaft AL, McCarthy D. "The Effect of Elevated Train Noise on Reading Ability " *Environment and Behavio*r (1976): 517.

Bronzaft, AL. "The Effect of a Noise Abatement Program on Reading Ability." *Environment and Psycholog*y (1981): 215.

Bronzaft, Arline L. "Abating New York City Transit Noise: A Matter of Will, Not Way." *Noise & Healt*h 12, no. 46 (2010): 1-6.

Canadian Centre for Occupational Health and Safety. "OSH Answers: Noise - Basic Information " Canadian Centre for Occupational Health & Safety. http://www.ccohs.ca/oshanswers/phys_agents/noise_basic.html (accessed 12/12, 2011).

Carrera, Fabio, Novello, Andrea and Gallo, Alberto. "STREET PERFORMANCES, the ROLE of VISUAL ANALYSIS in the MICROZONING of PUBLIC SPACE in VENICE, ITALY." http://ece.wpi.edu/CityLab/Publications/Conferences/VisA-SDS-06-Carrera-Gallo-Novello.pdf (accessed 12/13/2011, 2011).

Eddy B Brixen. "Microphones: What to Look for." *Broadcast Engineerin*g 47, no. 3 (2005): 14.

Gibbon, David C. and Zhu Liu. "Audio Processing." In , 145-175. Berlin, Heidelberg: Springer Berlin Heidelberg, 2008.

Gray, L. "Properties of Sound." *Journal of Perinatology : Official Journal of the California Perinatal Associatio*n 20, no. 8 Pt 2 (2000): 6-S11.

K. Karami and S. Frost. "Traffic Noise and Annoyance." *Environmental Management and Healt*h 6, no. 4 (1995): 29-31.

Keith, S., D. McMurchy, and D. Michaud. "Noise Annoyance in Canada." *Noise and Healt*h 7, (2011/09, 2005), http://go.galegroup.com/ps/i.do?id=GALE%7CA164718575&v=2.1&u=mlin_c_worpoly&it=r&p=AONE&sw=w.

Lynn, R. . *A Discussion of several Factors Contributing to Good Recordin*g. Vol. 13: ASA, 1942, http://dx.doi.org/doi/10.1121/1.1902278.

Maling Jr., George. "Noise." In *Springer Handbook of Acoustic*s, edited by Thomas D Rossing, 961-1017: Springer New York, 2007.

McReynolds, Michael C. "Noise-Induced Hearing Loss." *Air Medical Journa*l 24, no. 2 (2005): 73-78.

Miller, James D. "Effects of Noise on People." *The Journal of the Acoustical Society of Americ*a 56, no. 3 (1974): 729.

Muzet, Alain. "Environmental Noise, Sleep and Health." *Sleep Medicine Review*s 11, no. 2 (2007): 135-142.

Newman, Jay. "Sound." In , 1-273. New York, NY: Springer New York, 2008.

Schafer, R. Murray. *The Tuning of the World*. New York: Knopf, 1977.

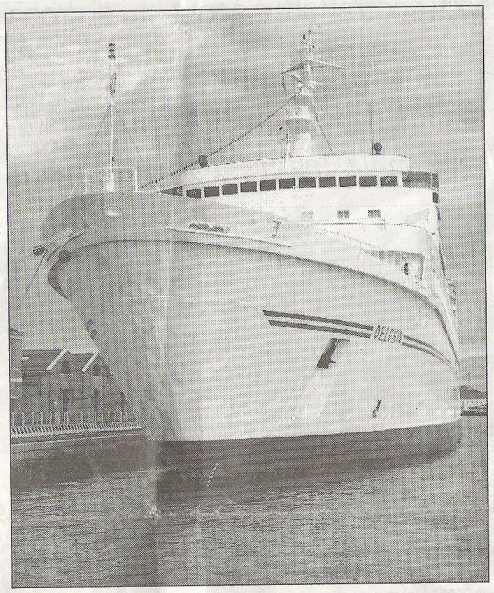
Tafalla, R. J. and G. W. Evans. "Noise, Physiology, and Human Performance: The Potential Role of Effort: The Potential Role of Effort." *Journal of Occupational Health Psycholog*y 2, no. 2 (1997): 148-155.

Venice Port Authority. "Venice Terminal Passeggeri " http://www.vtp.it/azienda/statistiche.jsp (accessed 9/27/2011, 2011).

Weinhold, Bob. "How Earplugs can Help Your Heart: Health Effects of Noise Pollution." *Environmental Health Perspective*s 110, no. 3 (2002): A151-A151.

World Health Organization. "WHO/Europe | Noise " http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/noise (accessed 9/13/2011, 2011).

Yamanaka, Hiroo, Junichi Haruna, Takashi Mashimo, Takeshi Akita, and Keiko Kinouchi. "The Sound Intensity and Characteristics of Variable-Pitch Pulse Oximeters." *Journal of Clinical Monitoring and Computin*g 22, no. 3 (2008): 200.



SAN BASILIO Le navi ormeggiate in banchina disturbano il vicinato

IL CASO Dopo la protesta dei residenti per le navi rumorose l'assessore ammette le difficoltà e lancia una proposta

Bettin: «Serve una carta dei rumori»

Roberta Brunetti
VENEZIA

Una "carta di Venezia del rumore", che metta d'accordo tutte le autorità competenti su quelle che devono essere le soglie di tolleranza per l'inquinamento acustico. La propone l'assessore all'ambiente, Gianfranco Bettin, dopo il caso sollevato dai residenti dei Mendicoli "beffati" da un vuoto legislativo: nonostante l'Arpav abbia certificato che le navi ormeggiate nelle vicine banchine provocano un rumore superiore al consentito tra le loro case, il Comune non può intervenire perché quelle navi sono in area portuale e manca il decreto attuativo sulle "fasce di pertinenza" delle "infrastrutture marittime". Un problema noto all'assessore. «E non è il solo in cui il Comune è più o meno impotente - ammette Bettin -. Da circa un anno ricevo continue segnalazioni anche dai residenti che stanno sulla traiettoria dell'elicottero che si leva dal Nicelli per far ammirare ai turisti la città. Il rumore, in effetti, è fastidioso. Ora partiranno anche i giri con l'idrovolante e immagino problemi analoghi. Sono cose che passano sulla testa del Comune e che i residenti scontano». Di qui l'idea di una "carta di Venezia del rumore", da concordare con gli altri enti, tanto più necessaria «in una città che è una meravigliosa camera acustica. Anche Arpav è d'accordo - continua l'assessore -. Non è possibile che il Comune faccia la guerra, ad esempio, per la musica e le chiacchiere a Santa Margherita e poi non possa fare nulla su altri fronti: dagli elicotteri che sorvolano la laguna, alle discoteche galleggianti che ormeggiano in banchina».

In attesa della "carta del rumore", intanto il Comune si muoverà sui singoli fronti. «Stiamo raccogliendo documentazione per arrivare a un confronto con l'Enav sull'elicottero. Credo che potrebbe bastare una rettifica della traiettoria di volo». Quanto ai rapporti con il Porto, il Comune chiederà al Governo di emanare i decreti attuativi (relativi, peraltro, a una legge di 16 anni fa!), ma soprattutto cercherà un accordo con Vtp che gestisce le banchine del Porto. «Vogliamo arrivare ad una regolamentazione dell'uso di quelle banchine così vicine all'abitato - conclude Bettin - che limiti i disagi».

© riproduzione riserva

TRADIZIONI Un appuntamento che attira migliaia di persone, tra stand, mostre, spettacoli e tour in gondola

Domani al via la "Festa de San Piero de Casteo"

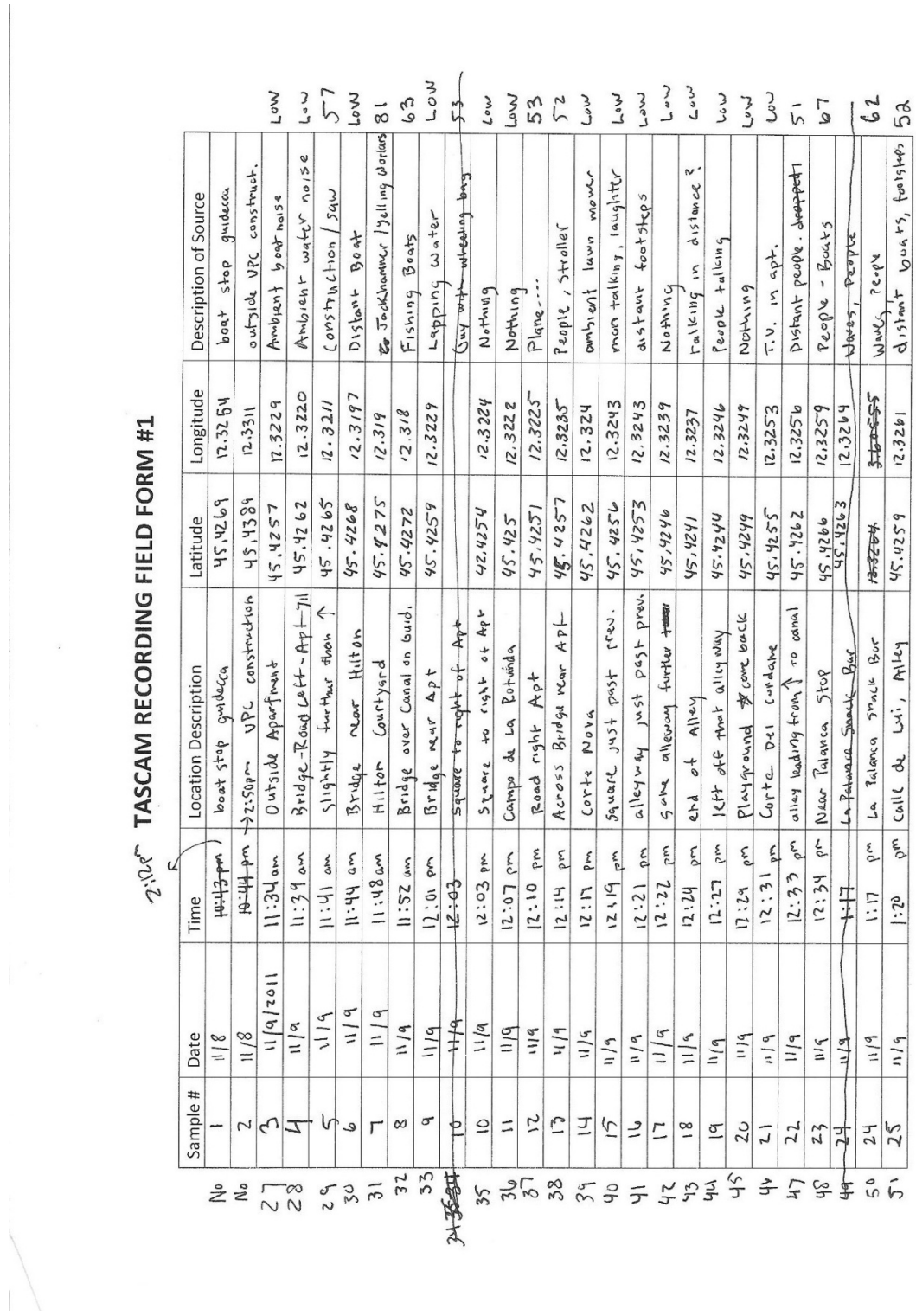
Claudia Meschini
VENEZIA

Parte domani la 41° edizione della Festa de San Piero de Casteo, la «più genuina delle feste veneziane», come l'ha definita il vicesindaco Sandro Simionato, una festa che l'amministrazione ha scelto di appoggiare nonostante le difficoltà di bilancio.

«Energia e vitalità confermata dalle centinaia di volontari che vi lavorano e dalle migliaia di persone di Venezia e non solo che ogni anno l'affollano», ha aggiunto il presidente del Comivo, in memoria dell'attore e regista di Castello, Paolo Giacomini; giovedì 30 alle 16 "Ocio ciò - anziani e sicurezza", a seguire il cabaret dei Cafè Sconcerto, alle 21.15 AbbaShow in concerto, cover degli Abba; venerdì 1 alle 17 regata delle "maciaree", alle 17.30 presentazione del libro "Labirinto Ducale" di Federico Moro, alle 21 esibizione dei gruppi Pure Voices (scuola Media Sansovino) con ospite Benedetta Carretta, vincitrice di "Io Canto", alle 21.30 sul palco Natural Grove e In Blues in concerto; sabato 2 alle 17 spettacolo di burattini, a seguire XVII regata delle Marie su mascarete, alle 18 regata di San Piero su gondole a due remi, alle 21.15, cover band Sensi di Colpa; domenica 3 alle 9 gara di torte, alle 10.15 solenne celebrazione eucaristica presieduta dal Patriarca Angelo Scola e tradizionale consegna dell'anello piscatorio, alle 11.30 concerto della banda musicale di Sant'Erasmo, alle 17 concerto in basilica del coro Cantori Veneziani, alle 21.15 Laura's Tribute Show, gli ex Disco Inferno si cimentano nel repertorio di Laura Pausini, alle 23 estrazione della lotteria di San Pietro. Durante la festa sarà possibile partecipare alle visite gratuite della basilica, al "Fresco Notturno in gondola" (mini giro dell'isola di San Piero ed entrata in Arsenale), offerta libera. Non mancheranno il consueto mercatino della solidarietà, il ricco e popolare stand gastronomico di piatti tipici, nonchè due mostre, quella fotografica di Marco Rizzo e "Metamorfosi dell'idea", sculture lignee di Manuel Tschager. Durante la festa sarà esposta in basilica una statua in bronzo del beato Papa Giovanni Paolo II.

RISTORAZIONE

Appendix B: Field Forms (Spatial)



TASCAM RECORDING FIELD FORM #1

No	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
1	1	11/8	~~10:43 pm~~	boat stop gondeca	45.4269	12.3264	boat stop gondeca	
2	2	11/8	~~10:44 pm~~ → 12:50pm	VPC construction	45.4384	12.3311	outside VPC construct.	
27	3	11/9/2011	11:34 am	Outside Apartment	45.4257	12.3229	Ambient boat noise	Low
28	4	11/9	11:39 am	Bridge-Road Left-Apt-Tall	45.4262	12.3220	Ambient water noise	Low
29	5	11/9	11:41 am	Slightly further down ↑	45.4265	12.3211	Construction / saw	57
30	6	11/9	11:44 am	Bridge near Hilton	45.4268	12.3197	Distant Boat	Low
31	7	11/9	11:48 am	Hilton Courtyard	45.4275	12.319	Footsteps/talking/dishes	81
32	8	11/9	11:52 am	Bridge over Canal on Gud.	45.4272	12.318	Fishing Boats	63
33	9	11/9	12:01 pm	Bridge near Apt	45.4259	12.3229	Lapping water	Low
34 ~~Scott~~	10	~~11/9~~	~~12:03~~	~~Square to right of Apt~~			Guy with weeding bag	53
35	10	11/9	12:03 pm	Square to right of Apt	42.4254	12.3224	Nothing	Low
36	11	11/9	12:07 pm	Campo de la Rotunda	45.425	12.3222	Nothing	Low
37	12	11/9	12:10 pm	Road right Apt	45.4251	12.3225	Plane....	53
38	13	11/9	12:14 pm	Across Bridge near Apt	45.4257	12.3235	People, Stroller	52
39	14	11/9	12:17 pm	Corte Nova	45.4262	12.324	ambient lawn mower	Low
40	15	11/9	12:19 pm	Square just past prev.	45.4256	12.3243	man talking, laughter	Low
41	16	11/9	12:21 pm	alleyway just past prev.	45.4253	12.3243	distant footsteps	Low
42	17	11/9	12:22 pm	same alleyway further ~~down~~	45.4246	12.3239	Nothing	Low
43	18	11/9	12:24 pm	end of Alley	45.4241	12.3237	Talking in distance?	Low
44	19	11/9	12:27 pm	left off that alley way	45.4244	12.3246	People talking	Low
45	20	11/9	12:29 pm	Playground ~~#~~ come back	45.4249	12.3249	Nothing	Low
46	21	11/9	12:31 pm	Corte Del condame	45.4255	12.3253	T.V. in apt.	Low
47	22	11/9	12:33 pm	alley leading from ↑ to canal	45.4262	12.3256	Distant people. deeper!	51
48	23	11/9	12:34 pm	Near Palanca Stop	45.4266	12.3259	People - Boats	67
49	24	~~11/9~~	~~1:17~~	~~La Palanca Snack Bar~~	45.4263	12.3264	Voices, People	
50	24	11/9	1:17 pm	La Palanca Snack Bar	~~45.4264~~	~~12.3266~~	Waves, People	62
51	25	11/9	1:20 pm	Calle de Lui, Alley	45.4259	12.3261	distant boats, footsteps	52

closed, come back

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
52	26	11/9	1:22 pm	By Guidecca Coop ☆	42.4254	12.3258	distant footsteps	Low
53	27	11/9	1:25 pm	Corte Grande	45.4252	12.3254	Water with garbage	Low
54	28	11/9	1:27 pm	Corte Grande Playground	45.4247	12.3252	People - 3 talking	51
55	29	11/9	1:28 pm	Ponte de la scuole	45.4246	12.3258	Distant talking and footsteps	Low
56	30	11/9	1:30 pm	Alley near previous	45.4249	12.3256	Nothing, Air duct	Low
57	31	11/9	1:36 pm	Fondamenta de la Scuola	45.4242	12.3255	Distant kids	Low
58	32	11/9	1:38 pm	Same Road ↑ at ocean end	45.4237	12.325	Ocean, Boat distant	51
59	33	11/9	1:41 pm	Campo Junghans	45.4243	12.3264	Kids at school	53
60	34	11/9	1:42 pm	Little past previous -	45.424	12.365	distant kids playing	51
61	35	11/9	1:46 pm	Towards ocean from ↖	45.4234	12.3264	distant kids, boats / waves	52
62	36	11/9	1:48 pm	By Boat docks	45.4236	12.3256	distant kids, water, boats	53
63	37	11/9	1:52 pm	Ponte dei scorzeri	45.424	12.3268	kids, people talking	51
64	38	11/9	1:53 pm	Water near ↑	45.4235	12.3268	distant boats	51
65	39	11/9	1:55 pm	Calle dei scorzeri	45.4239	12.3272	distant kids, kid on scooter	Low
66	40	11/9	1:57 pm	Ramo dei ~~Botteri~~ Bolzeri	45.4235 ocean	12.3273	distant boat	54
67	41	11/9	1:59 pm	Calle dei Bolzeri	45.424	12.3276	boat traffic	60
68	42	11/9	2:00 pm	Calle Junghans	45.4242	12.3279	People	51
69	43	11/9	2:01 pm	Campo de la Sponza	45.4245	12.3281	Gentle water sound	Low
70	44	11/9	2:03 pm	Fondamenta San Angelo	45.4247	12.3283	Construction hammering	52
71	45	11/9	2:05 pm	Fondamenta de la palada	45.4248	12.3277	distant hammering	Low
72	46	11/9	2:07 pm	Campo de la Sponza	45.4247	12.3274	People in House, birds	Low
73	47	~~11/10~~ 11/9	2:09 pm	Ponte de la Palada	45.4249	12.3287	Water, distant yelling	Low
74	48	11/9	2:10 pm	Calle dei Conza Curame	45.4246	12.3265	distant kids	Low
75	49	11/9	2:12 pm	Calle stretta Farando	45.4253	12.3269	small fountain	Low
76	50	11/9	2:15 pm	Calle stretta Farando campo	45.4259	12.3272	distant boats	Low
77	51	11/9	2:17 pm	end of here ↴ by canal	45.4262	12.3273	boats, water	58
78	52	11/9	2:19 pm	unamed alley	45.4258	12.3272	persons TV	Low
79	53	11/9	2:23 pm	Fondamenta S. Angelo	45.4251	12.3284	People walking + talking	Low
80	54	11/9	2:25 pm	Ponte Longo	45.4254	12.3287	Waves, Boats	60

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
81	55	11/9	2:26 pm	other end Punte longo	45.4258	12.3293	ocean, people, boats	59
82	56	11/9	2:27 pm	Fondamenta dei ↑	45,4253	12,3289	Boats, water	63
83	57	11/9	2:32 pm	~~For~~ same street	45.4247	12.3287	Fork lift, water	52
84	58	11/9	2:32 pm	end of same street	45.4241	12.3283	water, boats	52
85	59	11/9	2:34 pm	Street along canal by Ponte	45.4257	12.3298	boat, water, people.	60
86	60	11/9	2:38 pm	campo San Giacomo	45,4255	12,3311	boat, water	59
87	61	11/9	2:40 pm	Calle S. Giacomo	45.425	12,3309	Birds, People in house, footsteps	51
88	62	11/9	2:41 pm	Calle de la Mora	45.4247	12.3311	Construction of some type	Low
89	63	11/9	2:43 pm	Unlabelled street off of	45,4245	12,331	Nothing	Low
90	64	11/9	2:44 pm	Calle S. Giacomo Half down	45,4243	12.3308	Two tourist ladies	Low
91	65	11/9	2:45 pm	Calle Del L'Albergo	45,4242	12,3313	Nothing	Low
92	66	11/9	2:47 pm	Calle de la cape	~~12.3317~~ 45,4245	~~12.3311~~ 12.3317	Music in an Apt	Low
93	67	11/9	2:49 pm	Calle dei Frati	~~12.3315~~ 45.4239	~~12.3~~ 12.3315	Birds and a distant hum	Low
94	68	11/9	2:50 pm	Park at end of ↑	~~12.3315~~ 45.4232	12.3315	Birds distant humming	Low
95	69	11/10	2:47 pm	Near ~~Apt~~ garbage	45.4265	12.3222	Nothing	LOW
97 ~~96~~	70	11/10	2:50 pm	Little Further than ↑	45.4269	12.322	Distant voices	Low
98	71	11/10	2:55 pm	Path from Apt to canal	45.4263	12.3231	Boat	54
99	72	11/10	2:57 pm	Bridge by big canal ponte	S.G.q fonica 45.4271	12.3235	Water, Boats	56
100	73	11/10	2:59 pm	Fondamenta S. Biagio	45.4273	12.3231	Waves, Boats	61
101	74	11/10	3:00	Same street (further)	45,4274	12,3286	Low cruise ship hum	55
102	75	11/10	3:01	same street (further)	45.4277	12.322	Boats, water	58
103	76	11/10	3:03	same street	45.428	12,3212	Boats, water, vents	63
104	77	11/10	3:05	side street off ↑	45,4275	12.3209	Hose or something	61
105	78	11/10	3:06	continuing on this ↑	45,4272	12.3209	Nothing	Low
106	79	11/10	3:07	Across from ~~80~~ 70	45.4267	12.3207	~~People water~~ None	Low
107	80	11/10	3:10	Boat gas station	45,4282	12.3206	People Water	56
108	81	11/10	3:11	Dock past station	45,4283	12,3203	Dock creaking	57
109	82	11/10	3:13	Little Further	45,4284	12.3197	Dock still	55
110	83	11/10	3:15	Little Further	45,4286	12.3189	Cruise ship, water, boat	57

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
111	84	11/10	3:36	Near Guidecca slums	45.4281	12.3187	Waves, distant boats	55
112	85	11/10	3:41	Redentore Boat stop	42.4255	12.3318	Boats, Waves, People	56
113	86	11/10	3:44	Campo del Santissimo Red.	45.4255	12.3323	Waves	54
114	87	11/10	3:47	Redentore	45.4255	12.3322	Waves, Boat, People	64
115	88	11/10	3:48	Calle dei Frati	45.425	12.3326	Distant voices	Low
116	89	11/10	3:50	Near Redentore	45.4254	12.3331	Boat	62
118	90	11/10	3:51	R. C. A. Rio de la croce	45.4251	12.3334	talking, shovelling	53
119	91	11/10	3.53	Fondamenta al no de la croce	45.4249	12.3336	distant boat	53
120	92	11/10	3:55	Campo off prev	45.4244	12.3332	birds?	Low
121	93	11/10	3:57	(further)	45.424	12.3335	distant boat, water	~~50~~ 51
122	94	11/10	3:59	end of here ↑	45.4236	12.3334	Birds, very distant boat	Low
123	95	11/10	4:02	Ponte de la Croce	45.4254	12.3337	Boats, phone, cart guy	60
124	96	11/10	4:05	Along canal from here ↑	45.4255	12.3342	distant boats	55
125	97	11/10	4:07	Same ↑	45.4258	12.3352	Heavy cars, people	64
126	98	11/10	4:08	Near Guidecca Civic Center	~~45.4358~~	~~12.3449~~	Talking distant	Low
127	99	11/10	4:09	Guidecca Library	45.4255	12.3358	Nothing	Low
128	100	11/10	4:14	Library Courtyard	45.4255	12.3359	quiet birds	Low
129	101	11/10	4:16	Near courtyard	45.4248	12.3365	Nothing	Low
130	102	11/10	4:16	Campo Near abandonned prison	45.4247	12.3362	Nothing	Low
131	103	11/10	4:18	Same campo	45.4244	12.3362	Electrical Equipment inside	Low
132	104	11/10	4:20	Near prev.	45.4239	12.3358	Nothing	Low
133	105	11/10	4:21	Dock in ocean	45.4235	12.3364	Giant boat with logs	54
134	106	11/10	4:21	same	45.4235	12.3366	waves, boats, ↑	67
135	107	11/10	4:27	camp slightly inland	45.4232	12.3366	distant boat, or lawn mower	51
136	108	11/10	4:28	near ↑	45.4231	12.3367	distant boat	Low
137	109	11/10	4:32	back by canal	X 45.4234	12.3366	boat traffic	60
138	110	11/10	4:33	Same	45.4262	12.3368	boat, people	56
139	111	11/10	4:34	Near Zitelle	45.4265	12.3373	boats, people	62
140	112	11/10	4:36	Zitelle	45.4260	12.3378	People, boats	63

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
141	113	11/10	4:38	courtyard near zitelle	45.4263	12.3377	People, Echoes	58
142	114	11/10	4:39	same	45.4261	12.3374	Dudes whistling, ~~candy~~ gun	62
143	115	11/10	4:41	Calle del gran	45.4259	12.3378	Kids, people talking	58
144	116	11/10	4:42	calle Michelangelo	45.4254	12.3382	kids, People	51
145	117	11/10	4:43	Same street	45.4247	12.3387	Runners, Stroller	Low
146	118	11/10	4:44	Same street	45.4243	12.3389	Not much	Low
147	119	11/10	4:46	dock at street end	45.4239	12.3393	Boats, crane barge	61
148	120	11/10	4:48	Calle de la fonderia	45.4244	12.3381	sengless rattling, tools, kid	52
149	121	11/10	4:50	Calle del squero	45.4240	12.3377	distant tools / kids	Low
150	122	11/10	4:51	Calle larga de la coop.	45.4244	12.3375	Birds, distant voice	Low
151	123	11/10	4:55	Ramo del Squero	45.4247	12.3372	Random saw guy	57
152	124	11/10	4:56	Calle del campo di marte	45.4251	12.3371	Dog barking, Saw guy	56
153	125	11/10	4:57	Calle del Gran alley	45.4255	12.3367	Distant stuff	Low
154	126	11/10	4:59	Near Zitelle again	45.4268	12.3385	Water, boats	57
155	127	11/10	5:02	Past Zitelle	45.4271	12.3392	Boat	62
156	128	11/10	5:04	Past Pievlous	45.4274	12.3399	distant boats	56
157	129	11/10	5:06	End of Road	45.4277	12.3404	water, boats	55
158	130	11/14	1:01	Zattere Boat stop	45.4293	12.3270	boats, water	83 ★ Convert
159	131	11/14	1:04	Sotoportego dei bisati	45.4292	12.3275	water, boats, people	64
160	132	11/14	1:05	Ponte de la Calcina	45.4290	12.3285	voices, water	55
161	133	11/14	1:06	Zattere agli incurabili	45.4288	12.3291	Boats, Accordion	61
162	134	11/14	1:07	Ponte Agli incurabili	45.4286	12.3297	Water, Accordion	53
163	135	11/14	1:08	Accademia d. belle arti	45.4286	12.3304	water, voices	58
164	136	11/14	1:13	Calle dello Zuccaro	45.4285	12.3314	water, boats, voices	55
165	137	11/14	1:15	Spirito Santo	45.4284	12.3323	Boat stop	61
166	138	11/14	1:17	Ponte de la Bala	45.4288	12.3329	Talking Boats	63
167	139	11/14	1:18	Across bridge by crane	45.4288	12.3337	distant boats, walking	56
168	140	11/14	1:19	still along canal	45.4291	12.3343	birds, water, boats	54
169	141	11/14	1:21	Ponte dei Umilta	45.4295	12.3348	boat, water	59

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
170 #69	142	11/14	1:24	Along Canal Still	45.4299	12.3353	People, Construction, boats	59
171	143	"/14	1:26	Same road	45.4304	12.3358	Water, birds, boats, constr.	62
172	144	11/14	1:28	same road	45.4307	12.3366	boats, water	61
173	145	"/14	1:29	By the nake frog boy	45.4309	12.3370	boats, people, water	61
174	146	"/14	1:31	Around corner along G.C	45.4310	12.3366	boats, people, water	61
175	147	"/14	1:33	Fond. della dogana alla Salute	45.4311	12.3358	People, water, boats	63
176	148	"/14	1:35	by big church	45.4310	12.3351	boats, water	59
177	149	"/14	1:36	by same	45.4316	12.3346	boats, people, water	59
178	150	"/14	1:39	Next to church	45.4305	12.3341	water, distant voices	53
179	151	"/14	1:41	Calle del squero	45.4302	12.3343	construction	55
180	152	"/14	1:42	same	45.4299	12.3344	construction, talking	53
181	153	"/14	1:43	Same, closer to canal	45.4296	12.3346	const., distant boats	54
182	154	"/14	1:45	Rio terra dei catecumeni	45.4302	12.3336	tons of construction	71
183	155	~~Nov~~ "/14	2:03	Rio terra al salonai	45.4297	12.3337	construction	56
184	156	"/14	2:05	Same	45.4293	12.3338	construction - distant	55
185	157	"/14	2:07	Sketchy Alley	45.4300	12.3335	Nothing of merit	Low
186	158	"/14	2:09	Near Hotel Messner	45.4301	12.3333	const.	58
187	159	"/14	2:11	Alley towards G.C.	45.4305	12.3331	distant const.	51
188	160	"/14	2:12	Calle S. Gregorio	45.4307	12.3335	distant work	52
189	161	"/14	2:13	(Retake)	45.4306	12.3335	(Retake)	51
190	162	"/14	2:15	Calle di Mezzo	45.4304	12.3334	construction	60
191	163	"/14	2:16	Calle de L'Abazia	45.4305	12.3336	kids	51
192	164	"/14	2:18	Sotoportego de L'Abazia	45.4308	12.3338	Footsteps	Low
193	165	"/14	2:21	Calle del Bastion	45.4308	12.3329	talking	54
194	166	"/14	2:23	Fond. ca' Bala	45.4307	12.3326	Footsteps	52
195	167	"/14	2:24	~~streek from~~ same street	45.4304	12.3327	sweeping	Low
196	168	"/14	2:25	same	45.4306	12.3327	Nothing	Low
197	169	"/14	2:26	same	45.4295	12.3328	waves	Low
198	170	"/14	2:27	Corte dell' orati	45.4294	12.3324	Nothing	Low

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
199	171	11/14	2:30	Random Alley	45.4291	12.3324	Distant humming	Low
200	172	11/14	2:32	End of Fondamenta	45.4289	12.3328	water, distant boat	52
201	173	11/14	2:33	Random Campo	45.4289	12.3323	Nothing of note	Low
202	174	11/14	2:34	Calle del Monastero	45.4288	12.3320	distant boats	54
203	175	11/14	2:35	Calle larga della chiesa	45.4286	12.3319	boats, people	57
204	176	11/14	2:36	Calle del Monastero	45.4287	12.3320	distant, boats	53
205	177	11/14	2:38	Rio terra S. Vio	45.4296	12.3320	distant const.	Low
206	178	11/14	2:39	Huge Street Name	45.4299	12.3328	Nothing	Low
207	179	11/14	2:41	Campiello Barbaro	45.4304	12.3322	Fountain, Work	52
~~208~~	~~180~~	~~11/14~~		~~Ramo Barbaro~~				
208	180	11/14	2:46	Calle San Christofaro	45.4305	12.3320	soundscape guy	53
209	181	11/14	2:47	Calle San Christoforo	45.4304	12.3315	kids	60
210	182	11/14	2:51	Fondamenta Venier dei Leoni	45.4304	12.3311	guy with cart	51
211	183	11/14	2:52	Ponte del Formager	45.4304	12.3308	People	Low
212	184	11/14	2:55	Sotoportego e Corpo Venier	45.4306	12.3310	Nothing	Low
213	185	11/14	2:56	Random Street	45.4306	12.3304	People	57
214	186	11/14	~~3~~ 3:00	Campo S. Vio	45.4308	12.3302	Boats	58
215	187	11/14	3:01	Campo S. Vio on GC	45.4311	12.3304	Boats	64
216	188	11/14	3:03	Campo S. Vio	45.4306	12.3299	People, Boats	53
217	189	11/14	3:05	Fondamenta Venier	45.4305	12.3297	People	51
218	190	11/14	3:07	same	45.4300	12.3294	People	53
219	191	11/14	3:09	same	45.4296	12.3292	Boat	60
220	192	11/14	3:10	same	45.4294	12.3290	Water	Low
221	193	11/14	3:12	Fondamenta de ca'bragadin	45.4296	12.3291	Boat	61
~~222~~ 223	194	11/14	3:12	same	45.4293	12.3289	dude walking	51
224	195	11/14	3:14	Calle S. Domenico	45.4293	12.3294	distant boat	51
225	196	11/14	3:15	same	45.4291	12.3300	Nothing	Low
226	197	11/14	3:16	Little Alley	45.4296	12.3295	Nothing	Low
227	198	11/14	3:17	Little Alley	45.4294	12.3301	Water	Low

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
228	199	11/14	3:32	Another alley	45.4298	12.3297	distant yelling	LOW
229	200	11/14	3:33	same	45.4296	12.3302	water	51
230	201	11/14	3:35	Street	45.4302	12.3294	const.	51
231	202	11/14	3:28	Piscina something (near Acc.)	45.4307	12.3294	People	51
232	203	11/14	3:29	Side street	45.4306	12.3292	voices	LOW
233	204	11/14	3:30	Same	45.4306	12.3289	vent, voices	LOW
234	205	11/14	3:31	Piscina Venier?	45.4297	12.3287	construction	52
235	206	11/14	3:33	Call Delgomans	45.4295	12.3286	construction	55
236	207	11/14	3:36	Campo S. Agnese	45.4296	12.3281	distant accordion	51
237	208	11/14	3:37	Same	45.4297	12.3278	Accordion - distant bells	57
238	209	11/14	3:40	Road to Accademia	45.4301	12.3280	Acordion	56
239	210	11/14	3:40	Calle Pompea	45.4304	12.3285	Nothing of note	LOW
240	211	11/14	3:42	Same	45.4309	12.3285	People	51
241	212	11/14	3:44	calle nuova S. Agnese	45.4308	12.3290	People	56
242	213	11/14	3:46	Base of Accademia	45.4310	12.3286	People	56
243	214	11/14	3:47	Same	45.4312	12.3285	People	57
244	215	11/14	3:48	Accademia Boat stop	45.4316	12.3284	Boats	62
245	216	11/14	3:52	Rio Tara Gesuati	45.4296	12.3274	People	56

SMARTPHONE RECORDING FIELD FORM #1

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
246	217	11/16	2:31	Zattere			Boats, Water	61
247	218	11/16	2:35	Ristorante Terrazza			People, Boats	61
248	219	11/16	2:38	Fond. Nani			People, water	55
249	220	11/16	2:40	Same			Water, people	57
250	221	11/16	2:41	Calle Larga Nani			Footsteps	Low
251	222	11/16	2:42	Alley near Accademia			walking	51
252	223	11/16	2:44	Campiello Calbo			distant boats, talking	51
253	224	11/16	2:46	Left of Accademia			Talking, distant boats	51
254	225	11/16	2:48	Calle Gambara			People	60
255	226	11/16	2:50	Blank street name			Hot Chicks asking for photo	57
257	227	11/16	2:51	Campiello Malipiero			Water Voices	Low
258	228	11/16	2:53	Ponte S. Trovaso			People, distant boats	54
259	229	11/16	2:55	Nogaduro Campo			Workers talking	51
260	230	11/16	2:56	Fond. Bonlini			Guy Sawing	55
261	231	11/16	2:59	Ponte Trevisian			Footsteps	Low
262	232	11/16	3:01	Calle ochialera			People talking	53
263	233	11/16	3:03	Calle del Forno			Nothing of note	Low
264	234	11/16	3:05	Osteria Enoteca Ai Artisti			Talking	53
265	235	11/16	3:09	Calle dei Cerchieri			Talking	51
266	236	11/16	3:11	corte del comare			Nothing	Low
267	237	11/16	3:14	GC			Boats, Guy, Water	57
268	238	11/16	3:15	same street			Walking Lady	Low
269	239	11/16	3:18	Ponte della Tolleta			Walking Lady	Low
270	240	11/16	3:20	Ramo Secondo Della Tolleta			distant talking	Low

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
271	241	11/16	3:21	Toletta area & art			People	53
272	242	11/16	3:24	Bridge			Nothing	Low
273	243	11/16	3:26	Ponte delle Turchette			People walking	Low
274	244	11/16	3:30	Calle della Turchette			People	54
275	245	11/16	3:36	Calle del Traghetto			Losers fighting	54
276	246	11/16	3:31	Ca' Rezzonico Stop			Boats, const	63
277	247	11/16	3:32	Ca' Rezzonico Stop			Boats, const. LOUD!!!	82
278	248	11/16	3:37	Sotoportego del casin dei nobili			People, const.	57
279	249	11/16	3:39	Sotoportego e calle Pedrocchi			distant. Hammering	53
280	250	11/16	3:41	Calle del Fabro			People talking	58
281	251	11/16	3:43	Calle Barnaba			distant boat	Low
282	252	11/16	3:44	G.C.			Boats	64
283	253	11/16	3:48	Campiello dei Squelini			People	51
284	254	11/16	3:50	Calle della madonna			Distant Person	Low
285	255	11/16	3:52	Random camp			People distant	Low
286	256	11/16	3:54	Random Street			distant people	Low
287	257	11/16	3:57	Some canal			Boat Guy	63
288	258	11/16	3:59	San. Margherita			People, dog	61
289	259	11/16	4:02	Corte del Fontego			Not much	51
290	260	11/16	4:04	S. Margarita			People	55
291	261	11/16	4:06	Rio de ca' foscari			People, water	54
292	262	11/16	4:07	Alley off S. Margarita			Not much	Low
293	263	11/16	4:09	Calle del Forno			People, dog	55
294	264	11/16	4:12	S. Margarita			People	54
295	265	11/16	4:15	S. Margarita			Kid playing Soccer	53
296	266	11/16	4:17	calle della scuole			Ominous Italian Man	57
297	267	11/16	4:18	Campo dei Carmini			People	53
298	268	11/16	4:21	~~Calle~~ Socorso Fond.			People	51
299	269	11/16	4:22	Fond. Socorso			People, Water, Boats	64

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
300	270	11/16	4:25	Fond. Socorso			Boats, birds	65
301	271	11/16	4:30	Fond. San Sebastiano			Bells, People	51
302	272	11/16	4:31	Ponte de S. Sebastian			People	55
303	273	11/16	4:32	Side street towards Marg.			People	Low
304	274	11/16	4:33	Campiello Balastro			Nothing	Low
305	275	11/16	4:35	Usefess Campiello			Nothing	Low
306	276	11/16	4:39	Ponte de L'Avogaria			distant whirring kids	Low
307	277	11/16	4:41	Corte della Zuccharo			Nothing	Low
308	278	11/16	4:44	Back Alley			Nothing expt paranoid woman	Low
309	279	11/16	4:46	I don't even know			People	51
310	280	11/16	4:48	side street from ʃ :-			Nothing	Low
311	281	11/16	4:50	Calle dei Pitti, terrazzera			Nothing	Low
312	282	11/16	4:52	Back to Idk			talking guys	Low
313	283	11/16	4:54	Ponte Ognisanti			Distant voices	Low
314	284	11/16	4:54	Rio tera Ognisanti			distant yelling	Low
315	285	11/16	4:58	same			distant bells, talking	Low
316	286	11/16	5:00	Giustinian			Purse salesmen	54
317	287	11/16	5:02	Side street			Nothing	Low
318	288	11/16	5:05	Ponte Sartorio			People	57
319	289	11/16	5:05	Random Street			People	Low
320	290	11/16	5:06	Fond. de S. Basegio			water	51
321	291	11/16	5:07	S. Basilico			Boatstop	61
322	292	11/16	5:08	Along Guidecca canal			boats, water	57
323	293	11/16	5:10	same			↓	54
324	294	11/16	5:12	same			People talking, Boats	63
325	295	11/16	5:14	same			People, Boats	58
★ 326	296	11/17	1:57	Ponte S. Basegio			water, distant hum	51
327	297	11/17	1:58	Street by ↗			distant hum	52
328	298	11/17	1:59	Calle Nova			voices	Low

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
329	299	"/17	2:02	Calle Nova ?			birds, distant hum	51
330	300	"/17	2:03	Same			People	53
331	301	"/17	2:04	Calle Lardoni			Nothing	Low
332	302	"/17	2:06	Same			Nothing	Low
333	303	"/17	2:09	Campo de L'Azola Raphael			People talking	Low
334	304	"/17	2:11	Calle de Frati			Nothing	Low
335	305	"/17	2:12	Campazzo S. Sebastian			Non	Low
336	306	"/17	2:14	Ponte S. Sebastian			Nothing	Low
337	307	"/17	2:16	Campiello dei Squero			Plane	Low
338	308	"/17	2:18	Same			Nothing	Low
339	309	"/17	2:20	Fondamenta Briati			distant boat	Low
340	310	"/17	2:21	Fond. Barbarigo			distant voices	Low
341	311	"/17	2:24	unlabelled/unmapped bridge			Footsteps	Low
342	312	"/17	2:25	Rielo			Guys in Boat	Low
343	313	"/17	2:27	Fond. Barbarigo			distant talking	Low
344	314	"/17	2:29	Calle drio la Chiesa			Nothing	Low
345	315	"/17	2:30	IUAV			People talking	Low
346	316	"/17	2:32	Campo S. Nicolo dei Mendicoli			Nothing	Low
347	317	"/17	2:34	Campiello Tron			The noise inside computers	Low
348	318	"/17	2:36	Same			Literally nothing	Low
349	319	"/17	2:37	Campiello S. Lorenzo			Nothing	Low
350	320	"/17	2:39	Ponte de le Terese			People	52
351	321	"/17	2:42	Calle Larga			Noisy Construction	56
352	322	"/17	2:55	Calle da L'Ogio			People	53
353	323	"/17	2:57	Calle de la Madonna			Boats	53
354	324	"/17	3:00	Ponte de la Madonna			Water, dist const.	Low
355	325	"/17	3:01	Ponte Storto			Water, dist const.	Low
356	326	"/17	3:03	Campiello del Terren			dist footsteps + Boat	Low
357	327	"/17	3:05	Fond. Cereré			dist const.	Low

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
358	328	11/17	3:08	Calle de le Rouvrafic			distant voices	Low
359	329	11/17	3:10	Calle dei Guardian			People	52
360	330	11/17	3:12	same			People	53
361	331	11/17	3:14	Calle Spor ?			People, Birds ?	Low
362	332	11/17	3:16	By some school play ground			Nothing	Low
363	333	11/17	3:18	Calle Cappello			Birds, fountain	51
364	334	11/17	3:20	other end of ↑			People, Boat horn	55
365	335	11/17	3:21	Ponte de cà Rizza			People, Boat	62
366	336	11/17	3:24	Unlabelled bridge			People, distant const.	56
367	337	11/17	3:26	Ponte del Pagan			People, Boat water	55
368	338	11/17	3:28	I.N.P.S Fond. del Rio Novo			People	51
369	339	11/17	3:30	near previous			Boat, People	53
370	340	11/17	3:32	near prev.			People	52
371	341	11/17	3:34	Fond del Rio Novo (Across)			People	Low
372	342	11/17	3:36	Rio S. Margherita			Water, People	Low
373	343	11/17	3:38	still along Rio			Boat, People	55
374	344	11/17	~~4:20~~ 3:40	Near S. Margherita			People, water	54
375	345	11/17	~~4:22~~ 3:42	unlabelled street near ↑			People	51
376	346	11/17	~~4:24~~ 3:44	same street			People	55
377	347	11/17	3:45	Bridge along Rio S. Margarita			People	54
378	348	11/17	3:47	Calle del cristo			Angry Boat drivers	67
379	349	11/17	3:47	Ponte Foscarini			~~Garbage boat~~ const.	63
380	350	11/17	3:48	Alley			Me ~~being~~ being polite	Low
381	351	11/17	3:50	same Alley			Guy at door	51
382	352	11/17	3:52	Calle E Corte Contarini			Suitcase guy	61
383	353	11/17	3:54	Fond. Rosso			Nothing	Low
384	354	11/17	3:56	same			Elliott falling in the water[101]	Low
385	355	11/17	3:58	Ponte Briati			People + Boats	60
386	356	11/17	4:00	Fond. Briati			Boat + People	57

	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	
387	357	11/17	~~11/17~~ 4:02	Ponte del Soccorso			People	Low
388	358	11/17	4:07	By Giudecca Canal			distant voices	Low
389	359	11/17	4:09	same			↓	51
390	360	11/17	4:11	Parking Lot			distant boats	53
391	361	11/17	4:13	same			boats	53
392	362	11/17	4:14	same			car, boats	60

Recording Field Form – TASCAM + Smartphone

Tascam #	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	Leq
396	396	11/28	1:14 pm	Accademia Bridge			People, Boats	58
397	397	"/28	1:16	Campo S. Vidal			People, Boats	54
398	398	"/28	1:18	Sotoportego Giustinian			distant boats	55
399	399	"/28	1:20	Calle Giustinian			People	52
400	400	"/28	1:22	Calle Viturì o Fallier			Guy slamming door	51
401	401	"/28	1:24	same			Boats	61
402	402	"/28	1:26	same			Footsteps	51
403	403	"/28	1:28	Fond. de la Scuole (borsodura)			footsteps	Low
404	404	"/28	1:30	Corte del Teatro			footsteps	Low
405	405	"/28	1:31	Ramo Calle del Teatro			distant cont.	52
406	406	"/28	1:33	same			Boats	60
407	407	"/28	1:35	Calle dei Orbi			squeking Noise	51
409 ~~408~~	408	"/28	1:37	Salizada Malipiero			Not much	Low
410	409	"/28	1:39	S. Samuele Boatstop			Boats	56
411	410	"/28	1:42	Calle Orassi			People	51
412	411	"/28	1:44	unlabelled street			Boats	56
413	412	"/28	1:44	near previous			People, distant boat	58
414	413	"/28	1:45	Calle Morolin			Boats	59
415	414	"/28	1:46	Calle Lezze			Nothing	Low
416	415	"/28	1:47	Ramo Corte Lezzo			Dog Barks	Low
417	416	"/28	1:48	Calle Moncenigo cà Vechia			Low - distant voices	Low
418	417	"/28	1:49	across from S. Toma			distant boats	58
419	418	"/28	1:50	same location			docking boat	61
420	419	"/28	1:55	Salizada S. Samuele			cont.	51
421	420	"/28	1:56	Soto. E corto de la Pelle			const.	55
422	421	"/28	1:57	side street from ↑			const	51
423	422	"/28	1:59	Ramo di Piscini Crosera			Footsteps	Low
424	423	"/28	2:00	Calle corner o del Magazen			Rustling Pigeons maybe	Low
425	424	"/28	2:01	Piscina S. Samula			Wheeley Backpack girl	56
426	425	"/28	2:04	Servizio Gondole S. Toma			Boats	63
427	426	"/28	2:05	Rio de ea garzoni			People walking	53

Tascam #	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	Leq
428	427	11/28	2:09	Campiello Nuovo o dei Morti			People	51
429	428	"/28	2:11	Campiello S. Stefano			People, Restaurant Noise	53
430	429	"/28	2:13	Calle de le Botteghe			Talking	51
431	430	"/28	2:15	Corte de Munaghne			Nothing	Low
432	431	"/28	2:17	Calle dei Todeschi			Nothing	Low
433	432	"/28	2:17	Corte de la Vida			Nothing	Low
434	433	"/28	2:22	Campo S. Stefano			People	54
435	434	"/28	2:24	Calle Pasquatigo o de L'olio			Water	55
436	435	"/28	2:26	Campo S. Stefano			People	54
437	436	"/28	2:27	Campo S. Stefano			People	55
438	437	"/28	2:28	same			People, distant birds	51
439	438	"/28	2:29	Sotoportego Barbaro			distant instruments	Low
440	439	"/28	2:31	Ponte S. Maurizio			People	53
441	440	"/28	2:33	Campo " "			People playing music	Low
442	441	"/28	2:36	Calle del Forno			Nothing	Low
443	442	"/28	2:37	same			Nothing	Low
444	443	"/28	2:38	Fond. del Traghetto S. Maurizio			Boats	60
445	444	"/28	2:40	Ponte Zaguri			People	53
446	445	"/28	2:45	~~Street~~ Fond. Zaguri			Nothing	Low
447	446	"/28	2:47	same			Boats	58
448	447	"/28	2:50	Campiella dio la Chiesa			Nothing	Low
449	448	"/28	2:52	Ponte de la Malvasia Vecchia			People	——
450	449	"/28	3:45	Ponte De S. Partinian			People	56
451	450	"/28	3:48	Calla de la Mandola			const.	56
452	451	"/28	3:49	Calle S. Andrea			footsteps	Low
453	452	"/28	3:51	corte d'Apello di Venezia			rumbling building	52
454	453	"/28	3:55	Campo S. Beneto			distant talking	Low
455	454	"/28	3:57	Calle del Traghetto			construction	74
456	455	"/28	3:59	Calle 3 Sarò			distant J	51
457	456	"/28	4:00	Calle Benzon			Boats	60
458	457	"/28	4:02	Calle Pesaro			jackhammer	79
459	458	"/28	4:04	Corte de L'olio			Nothing	Low
460	459	"/28	4:06	Corte de L'Albergo			Nothing	Low

Tascam #	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	Leq
461	460	11/28	4:08	Campiello del Teatro (S. Angelo)			Boatstop	56
462	461	11/28	4:14	Parocchia de S. Luca			People	LOW
463	462	11/28	4:16	Rio Tera de la Mandola			People	57
464	463	11/28	4:17	Same			Nothing	Low
465	464	11/28	4:18	Calle a fianco ca' Pesaro			Nothing	LOW
~~466~~	465	11/28	4:20	Rio Terra dei Assassini			People	55
466	466	11/29	1:20	Campo S. Anzolo			People	52
467	467	11/29	1:22	Calle caotorta			Woman walking, distant voices	LOW
468	468	11/29	1:24	Ponte Storto			Noisy women	LOW
469	469	11/29	1:26	Parocchia di S. Moise			distant instrument	Low
470	470	11/29	1:28	Hotel Bel Sito			People	52
471	471	11/29	1:30	Campo del Traghetto			construction crane	66
~~472~~ 472	472	11/29	1:31	Same			construction	67
473	473	11/29	1:33	Calle Gritti o del campanile			Viglio Boatstop	65
474	474	11/29	1:36	Sotoportego de le Ostreghie			distant const. People	56
475	475	11/29	1:37	Calle Minotto			People	LOW
476	476	11/29	1:39	Ramo Primo Minotto			People	LOW
477	477	11/29	1:41	calle del Pestrin			dist. const / people	53
478	478	11/29	1:43	Calle del Traghetto			people. Man blowing nose	58
479	479	11/29	1:45	Calle Barozzi			Air vents	59
480	480	11/29	1:46	same			distant const.	51
481	481	11/29	1:47	Calle del Squero			People	52
482	482	11/29	1:49	Campiello Barozzi			Venetian Gondola drivers	57
483	483	11/29	1:51	Hotel San Moise			dist const.	56
484	484	11/29	1:52	Piscina S. Moise			Footsteps + ↑	51
485	48#5	11/29	1:54	Gran Teatro La Fenice			People	55
486	486	11/29	1:56	Ponte de Piscina			People	LOW
487	487	11/29	1:57	Near previous			Hammering	61
488	488	11/29	1:59	Albergo Ateneo			People	54
489	489	11/29	2:01	Ramo Minelli			Seagulls	Low
490	490	11/29	2:03	Campiello Marinonio de la Fenice			Footsteps	Low
491	491	11/29	2:05	Calle del cafetier			Nothing	Low
492	492	11/29	2:07	S. Anzolo			People	LOW

Tascam #	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	Leq
493	493	11/29	2:09	Calle del Cristo			Nothing	~~62~~ LOW
494	494	11/29	2:11	Sotoportego e corte Balbi o Morosini			distant people	51
495	495	11/29	2:13	Osteria Ai Assassini			Nothing	LOW
496	496	11/29	2:15	Ristorante Rossa Rossa			People	59
497	497	11/29	2:17	Ponte de la Cortesia			People	63
~~498~~ 515	~~498~~ 515	12/1	2:04	Campo Manin			People, Plane	53
516	516	12/1	2:07	Calle de la vida o de le Locanda			People	56
517	517	12/1	2:09	Calle de Colonne			dist. const.	57
518	518	12/1	2:11	Ponte dei Fuseri			People	55
519	519	12/1	2:13	Calle Venier			People	53
520	520	12/1	2:15	same			People	LOW
521	521	12/1	2:19	calle Tron			People	56
522	522	12/1	2:21	Calle Brentana			distant people	LOW
523	523	12/1	2:23	Calle del carro			People	55
524	524	12/1	2:25	Salizada S. Moise			People / ambient noise	60
525	525	12/1	2:27	Campo S. Moise			People	58
526	526	12/1	2:30	Calle de Tredici Martiri			distant const.	56
527	527	12/1	2:32	Water by ↑			Water boats	58
528	528	12/1	2:35	Near the Square			People	61
529	529	12/1	2:38	Calle Vallaresso			Boats	56
530	530	12/1	2:40	along canal			Boats	61
531	531	12/1	2:43	Canal by San Marco			People Boats	57
532	532	12/1	2:45	San Marco by Gondolas			People	58
533	533	12/1	2:47	Same			People	58
534	534	12/1	2:50	San Marco			People	60
535	535	12/1	2:52	Directly in the middle			People	60
536	536	12/1	2:54	San Marco			People const.	58
537	537	12/1	2:56	San Marco			Bells const.	67

Appendix C: Field Forms (24 hr)

Piazza San Marco, Dec 2 (Midnight – 6 AM)

Sample #	Time	LEQ	Description
1000	12:00 AM	55	West of Square by Camera
1001	12:03 AM	67	Center of Sqaure
1002	12:06 AM	50	Immediately infront of Basillica
1003	12:09 AM	50	In front of Doge's Palace
1004	12:12 AM	52	Waterfront
1005	12:15 AM	52	Waterfront Near Ponte della Paglia
1006	12:18 AM	50	Western Part of the Waterfront
1007	12:30 AM	56	West of Square by Camera
1008	12:33 AM	52	Center of Sqaure
1009	12:36 AM	52	Immediately infront of Basillica
1010	12:39 AM	50	In front of Doge's Palace
1011	12:42 AM	54	Waterfront
1012	12:45 AM	52	Waterfront Near Ponte della Paglia
1013	12:48 AM	51	Western Part of the Waterfront
1014	1:00 AM	52	West of Square by Camera
1015	1:03 AM	50	Center of Sqaure
1016	1:06 AM	50	Immediately infront of Basillica
1017	1:09 AM	53	In front of Doge's Palace
1018	1:12 AM	50	Waterfront
1019	1:15 AM	50	Waterfront Near Ponte della Paglia
1020	1:18 AM	50	Western Part of the Waterfront
1021	1:30 AM	50	West of Square by Camera
1022	1:33 AM	50	Center of Sqaure
1023	1:36 AM	50	Immediately infront of Basillica
1024	1:39 AM	50	In front of Doge's Palace
1025	1:42 AM	52	Waterfront
1026	1:45 AM	54	Waterfront Near Ponte della Paglia
1027	1:48 AM	50	Western Part of the Waterfront
1028	2:00 AM	57	West of Square by Camera
1029	2:03 AM	50	Center of Sqaure
1030	2:06 AM	50	Immediately infront of Basillica
1031	2:09 AM	60	In front of Doge's Palace
1032	2:12 AM	50	Waterfront
1033	2:15 AM	58	Waterfront Near Ponte della Paglia
1034	2:18 AM	50	Western Part of the Waterfront
1035	2:30 AM	50	West of Square by Camera
1036	2:33 AM	50	Center of Sqaure
1037	2:36 AM	50	Immediately infront of Basillica
1038	2:39 AM	50	In front of Doge's Palace
1039	2:42 AM	50	Waterfront
1040	2:45 AM	53	Waterfront Near Ponte della Paglia
1041	2:48 AM	50	Western Part of the Waterfront

Sample #	Time	LEQ	Description
1042	3:00 AM	50	West of Square by Camera
1043	3:03 AM	50	Center of Sqaure
1044	3:06 AM	50	Immediately infront of Basillica
1045	3:09 AM	53	In front of Doge's Palace
1046	3:12 AM	50	Waterfront
1047	3:15 AM	51	Waterfront Near Ponte della Paglia
1048	3:18 AM	50	Western Part of the Waterfront
1049	3:30 AM	50	West of Square by Camera
1050	3:33 AM	50	Center of Sqaure
1051	3:36 AM	50	Immediately infront of Basillica
1052	3:39 AM	50	In front of Doge's Palace
1053	3:42 AM	50	Waterfront
1054	3:45 AM	50	Waterfront Near Ponte della Paglia
1055	3:48 AM	50	Western Part of the Waterfront
1056	4:00 AM	50	West of Square by Camera
1057	4:03 AM	50	Center of Sqaure
1058	4:06 AM	50	Immediately infront of Basillica
1059	4:09 AM	51	In front of Doge's Palace
1060	4:12 AM	50	Waterfront
1061	4:15 AM	50	Waterfront Near Ponte della Paglia
1062	4:18 AM	50	Western Part of the Waterfront
1063	4:30 AM	50	West of Square by Camera
1064	4:33 AM	50	Center of Sqaure
1065	4:36 AM	50	Immediately infront of Basillica
1066	4:39 AM	52	In front of Doge's Palace
1067	4:42 AM	50	Waterfront
1068	4:45 AM	54	Waterfront Near Ponte della Paglia
1069	4:48 AM	50	Western Part of the Waterfront
1070	5:00 AM	50	West of Square by Camera
1071	5:03 AM	50	Center of Sqaure
1072	5:06 AM	50	Immediately infront of Basillica
1073	5:09 AM	50	In front of Doge's Palace
1074	5:12 AM	51	Waterfront
1075	5:15 AM	51	Waterfront Near Ponte della Paglia
1076	5:18 AM	50	Western Part of the Waterfront
1077	5:30 AM	50	West of Square by Camera
1078	5:33 AM	50	Center of Sqaure
1079	5:36 AM	50	Immediately infront of Basillica
1080	5:39 AM	55	In front of Doge's Palace
1081	5:42 AM	54	Waterfront
1082	5:45 AM	53	Waterfront Near Ponte della Paglia
1083	5:48 AM	51	Western Part of the Waterfront

Piazza San Marco, Dec 2 (6 AM – Noon)

Sample #	Time	LEQ	Description
1084	6:00 AM	60	West of Square by Camera
1085	6:03 AM	51	Center of Sqaure
1086	6:06 AM	51	Immediately infront of Basillica
1087	6:09 AM	51	In front of Doge's Palace
1088	6:12 AM	54	Waterfront
1089	6:15 AM	53	Waterfront Near Ponte della Paglia
1090	6:18 AM	53	Western Part of the Waterfront
1091	6:30 AM	51	West of Square by Camera
1092	6:33 AM	50	Center of Sqaure
1093	6:36 AM	50	Immediately infront of Basillica
1094	6:39 AM	50	In front of Doge's Palace
1095	6:42 AM	52	Waterfront
1096	6:45 AM	57	Waterfront Near Ponte della Paglia
1097	6:48 AM	50	Western Part of the Waterfront
1098	7:00 AM	56	West of Square by Camera
1099	7:03 AM	75	Center of Sqaure
1100	7:06 AM	73	Immediately infront of Basillica
1101	7:09 AM	52	In front of Doge's Palace
1102	7:12 AM	57	Waterfront
1103	7:15 AM	54	Waterfront Near Ponte della Paglia
1104	7:18 AM	56	Western Part of the Waterfront
1105	7:30 AM	54	West of Square by Camera
1106	7:33 AM	53	Center of Sqaure
1107	7:36 AM	50	Immediately infront of Basillica
1108	7:39 AM	57	In front of Doge's Palace
1109	7:42 AM	57	Waterfront
1110	7:45 AM	54	Waterfront Near Ponte della Paglia
1111	7:48 AM	52	Western Part of the Waterfront
1112	8:00 AM	58	West of Square by Camera
1113	8:03 AM	50	Center of Sqaure
1114	8:06 AM	51	Immediately infront of Basillica
1115	8:09 AM	66	In front of Doge's Palace
1116	8:12 AM	58	Waterfront
1117	8:15 AM	55	Waterfront Near Ponte della Paglia
1118	8:18 AM	54	Western Part of the Waterfront
1119	8:30 AM	61	West of Square by Camera
1120	8:33 AM	51	Center of Sqaure
1121	8:36 AM	50	Immediately infront of Basillica
1122	8:39 AM	53	In front of Doge's Palace
1123	8:42 AM	56	Waterfront
1124	8:45 AM	59	Waterfront Near Ponte della Paglia
1125	8:48 AM	56	Western Part of the Waterfront

Sample #	Time	LEQ	Description
1126	9:00 AM	60	West of Square by Camera
1127	9:03 AM	75	Center of Sqaure
1128	9:06 AM	76	Immediately infront of Basillica
1129	9:09 AM	67	In front of Doge's Palace
1130	9:12 AM	57	Waterfront
1131	9:15 AM	58	Waterfront Near Ponte della Paglia
1132	9:18 AM	53	Western Part of the Waterfront
1133	9:30 AM	55	West of Square by Camera
1134	9:33 AM	58	Center of Sqaure
1135	9:36 AM	63	Immediately infront of Basillica
1136	9:39 AM	56	In front of Doge's Palace
1137	9:42 AM	59	Waterfront
1138	9:45 AM	57	Waterfront Near Ponte della Paglia
1139	9:48 AM	59	Western Part of the Waterfront
1140	10:00 AM	61	West of Square by Camera
1141	10:03 AM	59	Center of Sqaure
1142	10:06 AM	60	Immediately infront of Basillica
1143	10:09 AM	63	In front of Doge's Palace
1144	10:12 AM	66	Waterfront
1145	10:15 AM	62	Waterfront Near Ponte della Paglia
1146	10:18 AM	56	Western Part of the Waterfront
1147	10:30 AM	56	West of Square by Camera
1148	10:33 AM	61	Center of Sqaure
1149	10:36 AM	63	Immediately infront of Basillica
1150	10:39 AM	66	In front of Doge's Palace
1151	10:42 AM	57	Waterfront
1152	10:45 AM	61	Waterfront Near Ponte della Paglia
1153	10:48 AM	58	Western Part of the Waterfront
1154	11:00 AM	59	West of Square by Camera
1155	11:03 AM	65	Center of Sqaure
1156	11:06 AM	70	Immediately infront of Basillica
1157	11:09 AM	63	In front of Doge's Palace
1158	11:12 AM	58	Waterfront
1159	11:15 AM	60	Waterfront Near Ponte della Paglia
1160	11:18 AM	55	Western Part of the Waterfront
1161	11:30 AM	98	West of Square by Camera
1162	11:33 AM	61	Center of Sqaure
1163	11:36 AM	63	Immediately infront of Basillica
1164	11:39 AM	61	In front of Doge's Palace
1165	11:42 AM	58	Waterfront
1166	11:45 AM	60	Waterfront Near Ponte della Paglia
1167	11:48 AM	54	Western Part of the Waterfront

Piazza San Marco, Dec 2 (Noon – 6 PM)

Sample #	Time	LEQ	Description
1168	12:00 PM	56	West of Square by Camera
1169	12:03 PM	74	Center of Sqaure
1170	12:06 PM	74	Immediately infront of Basillica
☆ 1171	12:09 PM	57	In front of Doge's Palace
1172	12:12 PM	56	Waterfront
1173	12:15 PM	57	Waterfront Near Ponte della Paglia
1174	12:18 PM	55	Western Part of the Waterfront
1175	12:30 PM	58	West of Square by Camera
1176	12:33 PM	58	Center of Sqaure
1177	12:36 PM	62	Immediately infront of Basillica
1178	12:39 PM	58	In front of Doge's Palace
1179	12:42 PM	60	Waterfront
1180	12:45 PM	57	Waterfront Near Ponte della Paglia
1181	12:48 PM	60	Western Part of the Waterfront
1182	1:00 PM	57	West of Square by Camera
1183	1:03 PM	56	Center of Sqaure
1184	1:06 PM	60	Immediately infront of Basillica
1185	1:09 PM	65	In front of Doge's Palace
1186	1:12 PM	63	Waterfront
1187	1:15 PM	57	Waterfront Near Ponte della Paglia
1188	1:18 PM	54	Western Part of the Waterfront
1189	1:30 PM	54	West of Square by Camera
1190	1:33 PM	55	Center of Sqaure
1191	1:36 PM	57	Immediately infront of Basillica
1192	1:39 PM	57	In front of Doge's Palace
1193	1:42 PM	58	Waterfront
1194	1:45 PM	58	Waterfront Near Ponte della Paglia
1195	1:48 PM	59	Western Part of the Waterfront
1196	2:00 PM	57	West of Square by Camera
1197	2:03 PM	76	Center of Sqaure
1198	2:06 PM	76	Immediately infront of Basillica
1199	2:09 PM	59	In front of Doge's Palace
1200	2:12 PM	62	Waterfront
1201	2:15 PM	58	Waterfront Near Ponte della Paglia
1202	2:18 PM	55	Western Part of the Waterfront
1203	2:30 PM	52	West of Square by Camera
1204	2:33 PM	52	Center of Sqaure
1205	2:36 PM	68	Immediately infront of Basillica
1206	2:39 PM	64	In front of Doge's Palace
1207	2:42 PM	59	Waterfront
1208	2:45 PM	57	Waterfront Near Ponte della Paglia
1209	2:48 PM	55	Western Part of the Waterfront

Sample #	Time	LEQ	Description
1210	3:00 PM	56	West of Square by Camera
1211	3:03 PM	68	Center of Sqaure
1212	3:06 PM	70	Immediately infront of Basillica
1213	3:09 PM	63	In front of Doge's Palace
1214	3:12 PM	65	Waterfront
1215	3:15 PM	62	Waterfront Near Ponte della Paglia
1216	3:18 PM	57	Western Part of the Waterfront
1217	3:30 PM	58	West of Square by Camera
1218	3:33 PM	57	Center of Sqaure
1219	3:36 PM	56	Immediately infront of Basillica
1220	3:39 PM	59	In front of Doge's Palace
1221	3:42 PM	61	Waterfront
1222	3:45 PM	56	Waterfront Near Ponte della Paglia
1223	3:48 PM	61	Western Part of the Waterfront
* 1224	4:00 PM	60	West of Square by Camera
* 1225	4:03 PM	64	Center of Sqaure
* 1226	4:06 PM	63	Immediately infront of Basillica
* 1227	4:09 PM	65	In front of Doge's Palace
* 1228	4:12 PM	68	Waterfront
* 1229	4:15 PM	67	Waterfront Near Ponte della Paglia
1230	4:18 PM	56	Western Part of the Waterfront
1231	4:30 PM	60	West of Square by Camera
1232	4:33 PM	73	Center of Sqaure
1233	4:36 PM	75	Immediately infront of Basillica
1234	4:39 PM	71	In front of Doge's Palace
1235	4:42 PM	59	Waterfront
1236	4:45 PM	60	Waterfront Near Ponte della Paglia
1237	4:48 PM	56	Western Part of the Waterfront
1238	5:00 PM	56	West of Square by Camera
1239	5:03 PM	62	Center of Sqaure
1240	5:06 PM	58	Immediately infront of Basillica
1241	5:09 PM	60	In front of Doge's Palace
1242	5:12 PM	57	Waterfront
1243	5:15 PM	59	Waterfront Near Ponte della Paglia
1244	5:18 PM	53	Western Part of the Waterfront
1245	5:30 PM	54	West of Square by Camera
1246	5:33 PM	53	Center of Sqaure
1247	5:36 PM	60	Immediately infront of Basillica
1248	5:39 PM	54	In front of Doge's Palace
1249	5:42 PM	60	Waterfront
1250	5:45 PM	60	Waterfront Near Ponte della Paglia
1251	5:48 PM	57	Western Part of the Waterfront

Piazza San Marco, Dec 2 (6 PM – Midnight)

Sample #	Time	LEQ	Description
1252	6:00 PM	57	West of Square by Camera
1253	6:03 PM	59	Center of Sqaure
1254	6:06 PM	56	Immediately infront of Basillica
1255	6:09 PM	57	In front of Doge's Palace
1256	6:12 PM	59	Waterfront
1257	6:15 PM	56	Waterfront Near Ponte della Paglia
1258	6:18 PM	58	Western Part of the Waterfront
1259	6:30 PM	61	West of Square by Camera
1260	6:33 PM	78	Center of Sqaure
1261	6:36 PM	77	Immediately infront of Basillica
1262	6:39 PM	56	In front of Doge's Palace
1263	6:42 PM	58	Waterfront
1264	6:45 PM	60	Waterfront Near Ponte della Paglia
1265	6:48 PM	59	Western Part of the Waterfront
1266	7:00 PM	54	West of Square by Camera
1267	7:03 PM	65	Center of Sqaure
1268	7:06 PM	62	Immediately infront of Basillica
1269	7:09 PM	63	In front of Doge's Palace
1270	7:12 PM	65	Waterfront
1271	7:15 PM	56	Waterfront Near Ponte della Paglia
1272	7:18 PM	57	Western Part of the Waterfront
1273	7:30 PM	51	West of Square by Camera
1274	7:33 PM	55	Center of Sqaure
1275	7:36 PM	56	Immediately infront of Basillica
1276	7:39 PM	51	In front of Doge's Palace
1277	7:42 PM	56	Waterfront
1278	7:45 PM	55	Waterfront Near Ponte della Paglia
1279	7:48 PM	56	Western Part of the Waterfront
1280	8:00 PM	60	West of Square by Camera
1281	8:03 PM	64	Center of Sqaure
1282	8:06 PM	55	Immediately infront of Basillica
1283	8:09 PM	54	In front of Doge's Palace
1284	8:12 PM	53	Waterfront
1285	8:15 PM	53	Waterfront Near Ponte della Paglia
1286	8:18 PM	52	Western Part of the Waterfront
1287	8:30 PM	50	West of Square by Camera
1288	8:33 PM	56	Center of Sqaure
1289	8:36 PM	54	Immediately infront of Basillica
1290	8:39 PM	51	In front of Doge's Palace
1291	8:42 PM	57	Waterfront
1292	8:45 PM	52	Waterfront Near Ponte della Paglia
1293	8:48 PM	53	Western Part of the Waterfront

Sample #	Time	LEQ	Description
1294	9:00 PM	58	West of Square by Camera
1295	9:03 PM	51	Center of Sqaure
1296	9:06 PM	50	Immediately infront of Basillica
1297	9:09 PM	52	In front of Doge's Palace
1298	9:12 PM	54	Waterfront
1299	9:15 PM	56	Waterfront Near Ponte della Paglia
1300	9:18 PM	53	Western Part of the Waterfront
1301	9:30 PM	63	West of Square by Camera
1302	9:33 PM	50	Center of Sqaure
1303	9:36 PM	63	Immediately infront of Basillica
1304	9:39 PM	54	In front of Doge's Palace
1305	9:42 PM	50	Waterfront
1306	9:45 PM	63	Waterfront Near Ponte della Paglia
1307	9:48 PM	50	Western Part of the Waterfront
1308	10:00 PM	50	West of Square by Camera
1309	10:03 PM	50	Center of Sqaure
1310	10:06 PM	51	Immediately infront of Basillica
1311	10:09 PM	51	In front of Doge's Palace
1312	10:12 PM	53	Waterfront
1313	10:15 PM	50	Waterfront Near Ponte della Paglia
1314	10:18 PM	51	Western Part of the Waterfront
1315	10:30 PM	52	West of Square by Camera
1316	10:33 PM	52	Center of Sqaure
1317	10:36 PM	53	Immediately infront of Basillica
1318	10:39 PM	56	In front of Doge's Palace
1319	10:42 PM	53	Waterfront
1320	10:45 PM	52	Waterfront Near Ponte della Paglia
1321	10:48 PM	56	Western Part of the Waterfront
1322	11:00 PM	52	West of Square by Camera
1323	11:03 PM	65	Center of Sqaure
1324	11:06 PM	70	Immediately infront of Basillica
1325	11:09 PM	53	In front of Doge's Palace
1326	11:12 PM	50	Waterfront
1327	11:15 PM	52	Waterfront Near Ponte della Paglia
1328	11:18 PM	51	Western Part of the Waterfront
1329	11:30 PM	57	West of Square by Camera
1330	11:33 PM	57	Center of Sqaure
1331	11:36 PM	66	Immediately infront of Basillica
1332	11:39 PM	52	In front of Doge's Palace
1333	11:42 PM	57	Waterfront
1334	11:45 PM	51	Waterfront Near Ponte della Paglia
1335	11:48 PM	50	Western Part of the Waterfront

Daily San Marco 1

Tascam #	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	Leq
	1340	12/5	11:40	Palanca Boat Stop			Ambient Noise	63
	1341	12/5	12:00	San Marco: Drain			Bells	63
	1342	12/5	12:02	" : Grate			Bells	73
	1343	12/5	12:05	" : Flagpole			Ambient	62
	1345	12/5	12:11	" : Doge's Palace			Ambient	60
	1346	12/5	12:14	" : Pillars			Ambient	58
	1347	12/5	12:17	" : Giardinetti			Street Vendors	64
	1348	12/5	12:21	" : P. della Paglia			Ambient, water	58
	1349	12/5	12:24	" : P del Vin			Boats Under Bridge	67
	1350	12/5	12:27	" : San Zaccharia			Boat stop	62
	1344	12/5	12:07	" : Lions of San Marco			Ambient	57
	1351	12/6	12:00	San Marco: Drain			Ambient People	63
	1352	12/6	12:02	: Grate			Ambient	60
	1353	12/6	12:05	: Flagpole			People	58
	1354	12/6	12:07	: well			People rolling bag	58
	1355	12/6	12:11	: Doge's Palace			People, music	60
	1356	12/6	12:14	: Pillars			Gulls, music, people	61
	1357	12/6	12:17	:Giardinetti			Street Vendors, music	60
	1358	12/6	12:21	: P. della Paglia			Boats, water, people	57
	1359	12/6	12:24	: P del Vin			Boats, water, people	59
	1360	12/6	12:27	: San Zaccaria			Boat stop	60
	1361	12/7	12:00	San Marco: Drain			People	57
	1362	12/7	12:02	: Grate			Voices	61
	1363	12/7	12:05	: Flagpole			Voices	63
	1364	12/7	12:07	: well			" 06	57
	1365	12/7	12:11	: Doge's Palace			07	60
	1366	12/7	12:14	: Pillars			08	60
	1367	12/7	12:17	: Giardinetti			09	60
	1368	12/7	12:21	: P della Paglia			10	63
	1369	12/7	12:24	: P del Vin			11	61
	1370	12/7	12:27	: San Zaccaria			12	59

Daily San Marco 2

Tascam #	Sample #	Date	Time	Location Description	Latitude	Longitude	Description of Source	Leq
	1371	12/8	12:00	San Marco: Drain			Bells	69
	1372	12/8	12:02	: Grate			Bells	72
	1373	12/8	12:05	: Flagpole			Bells	83
	1374	12/8	12:07	: Well			People	63
	1375	12/8	12:11	: Doge's Palace			Man Talking	70
	1376	12/8	12:14	: Pillars			People, music	65
	1377	12/8	12:17	: Giardinetti			Street Vendors	58
	1378	12/8	12:21	: P della piagia			Water, People, Birds	82
	1379	12/8	12:24	: P del Vin			Water, People, Boats	63
	1380	12/8	12:27	: San Zaccaria			Boat stop	65
	1381	12/8	1:06	San Marco: Drain				
	1382	12/8	1:02	: Grate				
	1383	12/8	1:05	: Flagpole				
	1384	12/8	1:07	: Well				
	1385	12/8	1:11	: Doges Palace				
	1386	12/8	1:14	: Pillars				
	1387	12/8	1:17	: Giardinetti				
	1388	12/8	1:21	: P della Piagia				
	1389	12/8	1:24	: P del Vin				
	1390	12/8	1:27	: San Zaccaria				

Appendix D: Field Navigation

Appendix E: Recording Schedule

November

Monday	Tuesday	Wednesday	Thursday	Friday
7	8	9	10	11
		Giudecca	Giudecca	
14	15	16	17	18
Dorsoduro		Dorsoduro	Dorsoduro	
21	22	23	24	25
28	29	30		
San Marco	San Marco			

December

Monday	Tuesday	Wednesday	Thursday	Friday
			1	2
			San Marco	24 Hours San Marco
Week Long San Marco	Week Long San Marco	Week Long San Marco	Week Long San Marco	

Appendix F: Website Database

Database ID	Timestamp	Latitude	Longitude	Accuracy (m)	Bearing (deg)	Phone LEQ (dB)	Meter LEQ (dB)	Description
1	11/8/2011 14:12	45.4269	12.3254	0	0	65.7823	73	1: boat stop giudecca - Palanca Vaporetto
2	11/8/2011 14:50	45.4389	12.3311	0	0	49.464	50	2: Construction - Outside VPC
10	11/9/2011 11:39	45.4257	12.3229	6.7082	0	51.0142	50	3: Ambient Boat Noise - Outside Apartment
11	11/9/2011 11:44	45.4262	12.322	2.82843	177.8	51.6224	50	4: Ambient Water Noise - Fondamenta de le Convertite
12	11/9/2011 11:46	45.4265	12.3211	6.32456	283.3	56.3097	57	5: Construction - Fondamenta de le Convertite
13	11/9/2011 11:50	45.4268	12.3197	2.82843	0	49.9731	50	6: Distant Boat - Fondamenta de le Convertite (near Hilton)
14	11/9/2011 11:54	45.4275	12.319	4.47214	287.7	75.3422	81	7: Construction(Jackhammer/Yelling Workers) - Hilton Courtyard
15	11/9/2011 11:57	45.4272	12.318	2.82843	178.1	64.3648	63	8: Fishing Boats - Ponte dei Lavraneri
16	11/9/2011 12:06	45.4259	12.3229	2.82843	99.7	51.3385	50	9: Lapping Water - Bridge Near Apartment
17	11/9/2011 12:09	45.4254	12.3224	2.82843	0	49.4763	50	10: Nothing - Campo San Cosmo
18	11/9/2011 12:12	45.425	12.3222	2.82843	251.5	47.4202	50	11: Nothing - Campo de la Rotunda
19	11/9/2011 12:15	45.4251	12.3225	13.4164	45	53.7618	53	12: Plane - Fondamenta de la Rotunda
20	11/9/2011 12:18	45.4257	12.3235	3.60555	101.4	53.1315	52	13: People, Stroller - Campo san Cosmo
21	11/9/2011 12:21	45.4262	12.324	3.60555	24.1	48.2506	50	14: Ambient, Lawn mower - Corte Nova
22	11/9/2011 12:24	45.4256	12.3243	8.24621	88.4	49.0894	50	15: Man Talking, Laughter - Square Past Previous

23	11/9/2011 12:25	45.4253	12.3243	3.60555	194.1	47.5331	50	16: Distant Footsteps - Alleyway Just Past Previous
24	11/9/2011 12:27	45.4246	12.3239	4.47214	193.5	46.0345	50	17: Nothing - Same as Previous
25	11/9/2011 12:29	45.4241	12.3237	2.82843	240.1	46.8897	50	18: talking in distance - End of Alley
26	11/9/2011 12:31	45.4244	12.3246	2.82843	79.6	49.0066	50	19: People Talking - Left off that alleyway
27	11/9/2011 12:33	45.4249	12.3249	6.32456	206.3	46.6013	50	20: Nothing - Playground
28	11/9/2011 12:35	45.4255	12.3253	2.82843	33	47.202	50	21: TV in Apartment - Corte dei Curdame
29	11/9/2011 12:37	45.4262	12.3256	6.7082	193	50.9224	51	22: Distant People - Alley Connecting Corte dei Curdame to Canal
30	11/9/2011 12:39	45.4266	12.3259	2.82843	9.1	69.0623	67	23: People, Boats - Near Palanca Stop
31	11/9/2011 13:23	45.4263	12.3264	3.60555	130.8	61.4466	62	24: Water, People - La Palanca Snack bar
32	11/9/2011 13:25	45.4259	12.3261	8.48528	205.7	54.6066	52	25: distant boats, footsteps - Calle de Lui
33	11/9/2011 13:27	45.4254	12.3258	2.82843	287.9	48.4811	50	26: distant footsteps - Coop Grocery
34	11/9/2011 13:29	45.4252	12.3254	7.2111	206.2	49.4804	50	27: Woman with Garbage - Corte Grande
35	11/9/2011 13:31	45.4247	12.3252	2.82843	85.2	52.6733	51	28: People (3) talking - Corte Grande Playground
36	11/9/2011 13:33	45.4246	12.3258	2.82843	119.2	54.5864	50	29: Distant Talking, distant footsteps - Ponte de la Seuole
37	11/9/2011 13:36	45.4249	12.3256	4.24264	12.1	47.8962	50	30: Nothing, Air Duct - Ponte de la Seuole
38	11/9/2011 13:40	45.4242	12.3255	2.82843	272.9	47.6631	50	31: Distant Children - Fondamenta de la Scoula
39	11/9/2011 13:42	45.4237	12.325	3.60555	222.1	51.473	51	32: Ocean, Distant Boats - Fondamenta de la Scoula
40	11/9/2011 13:46	45.4243	12.3264	2.82843	0	50.5506	53	33: Children at School - Campo Junghans
41	11/9/2011 13:47	45.424	12.3265	6.7082	188.5	50.6418	51	34: distant children playing - Campo Junghans

42	11/9/2011 13:49	45.4234	12.3264	5	156.1	52.7371	52	35: distant children, boats, waves - Campo Junghans
43	11/9/2011 13:53	45.4236	12.3256	2.82843	0	53.2797	53	36: distant children, boats, waves - Docks
44	11/9/2011 13:55	45.424	12.3268	2.82843	127.2	53.5059	51	37: children, people talking - Ponte dei Scorzeri
45	11/9/2011 13:58	45.4235	12.3268	2.82843	99.3	50.7235	51	38: distant Boats - Water Near Ponte dei Scorzeri
46	11/9/2011 14:00	45.4239	12.3272	6.7082	218.5	46.5738	50	39: distant children, scooter - Calle dei Scorzeri
47	11/9/2011 14:01	45.4235	12.3273	3.60555	349.9	56.0098	54	40: distant boat - Ramo dei Bolzeri
48	11/9/2011 14:03	45.424	12.3276	3.60555	30.9	56.9154	60	41: boat traffic - Calle dei Bolzeri
49	11/9/2011 14:05	45.4242	12.3279	2.82843	1.6	57.5274	51	42: People - Calle Junghans
50	11/9/2011 14:06	45.4245	12.3281	2.82843	21.4	52.0231	50	43: Gentle Water - Campo de la Sponza
51	11/9/2011 14:08	45.4247	12.3283	2.82843	45.8	52.7266	52	44: Construction (hammering) - Fondamenta San Angelo
52	11/9/2011 14:10	45.4248	12.3277	6.7082	285	46.6274	50	45: distant Hammering - Fondamenta de la Palada
53	11/9/2011 14:11	45.4247	12.3274	8.94427	173.1	49.4635	50	46: People in House, birds - Fondamenta de la Sponza
54	11/9/2011 14:13	45.4249	12.3267	2.82843	265.3	47.3541	50	47: Water, distant yelling - Ponte de la Palada
55	11/9/2011 14:14	45.4246	12.3265	3.60555	186.4	48.9621	50	48: distant children - Calle dei Conza Curame
56	11/9/2011 14:16	45.4253	12.3269	4.47214	218.5	51.9201	50	49: small fountain - Calle Stretta Farando
57	11/9/2011 14:18	45.4259	12.3272	6.7082	7.3	47.6062	50	50: distant boats - Calle Stretta Ferando Campo
58	11/9/2011 14:20	45.4262	12.3273	2.82843	313.3	56.2105	58	51: boats, water - Calle Stretta Ferando Campo end (by canal)
59	11/9/2011 14:22	45.4258	12.3272	3.60555	175.1	47.4407	50	52: TV - Unnamed Alley
60	11/9/2011 14:27	45.4251	12.3284	7.2111	120	47.0549	50	53: Footsteps, talking - Fondamenta San Angelo
61	11/9/2011 14:29	45.4259	12.3287	4.47214	22.2	58.111	60	54: waves, boats - Ponte Longo

62	11/9/2011 14:31	45.4258	12.3293	2.82843	63.2	58.7726	59	55: ocean, people, boats - Ponte Longo
63	11/9/2011 14:33	45.4253	12.3289	6.7082	203.7	60.5032	63	56: boats, water - Fondamenta dei Ponto Longo
64	11/9/2011 14:35	45.4247	12.3287	2.82843	204.3	52.3734	52	57: Forklift, Water - Fondamenta dei Ponte Longo
65	11/9/2011 14:36	45.4241	12.3283	7.2111	204.1	52.6876	52	58: water, boats - Fondamenta dei Ponte Longo
66	11/9/2011 14:40	45.4257	12.3298	3.60555	108.1	58.5399	60	59: boat, water, people - Fondamenta ...
67	11/9/2011 14:42	45.4255	12.3311	2.82843	137.1	57.4884	59	60: boat, water - Campo San Giacomo
68	11/9/2011 14:44	45.425	12.3309	3.60555	192	51.4587	51	61: Birds, people in houses, footsteps - Campo San Giacomo
69	11/9/2011 14:46	45.4247	12.3311	3.60555	46	48.7597	50	62: Construction - Calle de le Mose
70	11/9/2011 14:47	45.4245	12.331	24.7386	118.5	47.9187	50	63: Nothing - Unlabeled Street
71	11/9/2011 14:49	45.4243	12.3308	5	195.9	47.3954	50	64: Tourists - Calle San Giacomo
72	11/9/2011 14:50	45.4242	12.3313	8.48528	171.4	48.0966	50	65: Nothing - Calle de l'Albergo
73	11/9/2011 14:52	45.4243	12.3317	7.2111	0	46.9585	50	66: Music in Apartment - Calle de la Cape
74	11/9/2011 14:53	45.4239	12.3315	6.7082	182.6	47.9772	50	67: Birds, Distant Hammer - Calle de Frati
75	11/9/2011 14:55	45.4232	12.3315	2.82843	62.9	47.6575	50	68: Birds, Distant Hammer - Calle de Frati
96	11/10/2011 14:52	45.4265	12.3222	8.94427	73.4	47.1995	50	69: Nothing - Near Garbage
97	11/10/2011 14:54	45.4269	12.322	3.60555	303.3	47.1601	50	70: Distant Voices - Further Down Past Garbage
98	11/10/2011 14:59	45.4263	12.3231	3.60555	359	54.0449	54	71: Boat - Path From Apartment to Canal
99	11/10/2011 15:01	45.4271	12.3235	2.82843	32.2	55.7616	56	72: Water, Boats - Ponte San Eufamia
100	11/10/2011 15:02	45.4273	12.3231	3.60555	300.4	59.2532	61	73: Waves, Boats - Fondamenta San Biagio
101	11/10/2011 15:04	45.4274	12.3226	2.82843	0	56.3204	55	74: Cruise Ship Hum - Fondamenta San Biagio

102	11/10/2011 15:05	45.4277	12.322	2.82843	291	57.9162	58	75: Boats, Water - Fondamenta San Biagio
103	11/10/2011 15:07	45.428	12.3212	2.82843	290.4	61.9396	63	76: Boats, Water, Air Vents - Fondamenta San Biagio
104	11/10/2011 15:09	45.4275	12.3209	6.32456	202.7	56.594	61	77: Hose - Sidestreet off Fondamenta San Biagio
105	11/10/2011 15:10	45.4272	12.3209	12.6491	206.8	50.2166	50	78: Nothing - Sidestreet off Fondamenta San Biagio
106	11/10/2011 15:11	45.4267	12.3207	3.60555	197.5	49.509	50	79: Nothing - Across from Point 70
107	11/10/2011 15:15	45.4282	12.3206	2.82843	336.4	55.6355	56	80: People, Water - Gas Station
108	11/10/2011 15:16	45.4283	12.3203	2.82843	351.4	56.0718	57	81: Dock Creaking - Stucky Boat Dock
109	11/10/2011 15:18	45.4284	12.3197	8.94427	319.4	55.2353	55	82: Dock Creaking - In front of Stucky
110	11/10/2011 15:19	45.4286	12.3189	2.82843	21.9	56.7048	57	83: Cruise Ship, Water, Boats - In Front of Stucky
111	11/10/2011 15:21	45.4281	12.3187	3.60555	250.6	55.009	55	84: Waves, distant boats - Near Giudecca Slums
112	11/10/2011 15:47	45.4255	12.3318	3.60555	94.1	55.6167	56	85: Boats, Waves, People - Redentore Boatstop
113	11/10/2011 15:48	45.4255	12.3323	3.60555	96.8	54.5447	54	86: Waves - Capo del Santissimo Redentore
114	11/10/2011 15:51	45.4255	12.3322	4.47214	323.1	59.9143	64	87: Waves, People, Boats - Redentore Boatstop
115	11/10/2011 15:53	45.425	12.3326	71.5542	0	49.4914	50	88: Distant Voices - Calle dei Frati
116	11/10/2011 15:54	45.4254	12.3331	4.47214	90.2	60.2644	62	89: Boat - Near Redentore Boatstop
117	11/10/2011 15:57	45.4251	12.3334	4.24264	297.4	54.304	53	90: Talking, Shovelling - R.C.A. Rio de la Croce
118	11/10/2011 15:58	45.4249	12.3336	3.60555	173.6	54.7611	53	91: Distant Boat - Fondamenta al Rio de la Croce
119	11/10/2011 15:59	45.4244	12.3332	2.82843	187.8	47.1089	50	92: Birds - Campo near Fondamenta al rio de la Croce
120	11/10/2011 16:01	45.424	12.3335	4.47214	178.1	53.0883	51	93: Distant boat, water - Fondamenta al rio de la Croce

121	11/10/2011 16:02	45.4236	12.3334	5	182.5	52.2101	50	94: Birds, very distant boat - End of Fondamenta al rio de la Croce
122	11/10/2011 16:07	45.4254	12.3337	2.82843	166.7	57.9315	60	95: Boats, phone, guy pushing cart - Ponte de la Croce
123	11/10/2011 16:09	45.4255	12.3342	2.82843	53.2	55.3008	55	96: Distant Boats - Along Canal from Ponte de la Croce
124	11/10/2011 16:11	45.4258	12.3352	2.82843	72.7	63.924	64	97: Heavy fans, people - Along canal near Ponte de la Croce
125	11/10/2011 16:14	45.4255	12.3358	2.82843	330.3	49.3669	50	98: Talking distant - Near Giudecca Civic Center
126	11/10/2011 16:16	45.4248	12.3359	3.60555	171.9	48.7411	50	99: Nothing - Giudecca Library
127	11/10/2011 16:18	45.4247	12.3365	2.82843	54.5	48.6508	50	100: Quiet Birds - Library Courtyard
128	11/10/2011 16:19	45.4244	12.3362	3.60555	187.8	49.2087	50	101: Nothing - Near Library Courtyard
129	11/10/2011 16:21	45.4239	12.3362	6.7082	225	48.2265	50	102: Nothing - Campo Near Abandonned Prison
130	11/10/2011 16:23	45.4235	12.3358	2.82843	236.8	51.6223	50	103: Electrical Equipment inside a shed - Campo near abandoned prison
131	11/10/2011 16:24	45.4235	12.3364	3.60555	109.7	50.0678	50	104: Nothing - Near Prison
132	11/10/2011 16:26	45.4232	12.3366	2.82843	0	55.8784	54	105: Giant boat carrying lumber - Dock along Ocean on South of Giudecca
133	11/10/2011 16:27	45.4231	12.3366	2.82843	0	68.9401	67	106: Waves, Boats, Crane on lumber boat - Dock on South of Giudecca
134	11/10/2011 16:32	45.4236	12.3367	4.47214	35.5	52.3931	51	107: Distant Boat, or possibly a lawn mower - Campo near Prison and ocean
135	11/10/2011 16:33	45.4241	12.3366	2.82843	9.7	50.6272	50	108: Distant Boats - Inland in neighborhood near prison
136	11/10/2011 16:37	45.4259	12.3361	2.82843	54.9	57.4697	60	109: Boat traffic - Along Giudecca canal
137	11/10/2011 16:38	45.4262	12.3368	2.82843	173.9	56.0022	56	110: Boats, People - Along Giudecca Canal

138	11/10/2011 16:39	45.4265	12.3373	6.7082	73.4	61.2029	62	111: Boats, People - Near Zitelle Boatstop
139	11/10/2011 16:40	45.4266	12.3378	3.60555	319.8	63.9884	63	112: People, Boats - Zitelle Boatstop
140	11/10/2011 16:42	45.4263	12.3377	25.2982	186.1	58.8852	58	113: People, Heavy Echoes - Courtyard slightly inland from Zitelle
141	11/10/2011 16:43	45.4261	12.3374	98.9545	181.7	60.8262	62	114: People Whistling loudly - Courtyard slightly inland from Zitelle
142	11/10/2011 16:44	45.4259	12.3378	7.2111	181.7	55.1076	58	115: Kids, People, Talking - Calle del Gran
143	11/10/2011 16:45	45.4254	12.3382	3.60555	150.3	51.1422	51	116: Kids, People - Calle Michelangelo
144	11/10/2011 16:47	45.4247	12.3387	4.47214	170	50.4183	50	117: Runners, Person with Baby Carriage - Calle Michelangelo
145	11/10/2011 16:48	45.4243	12.3389	2.82843	174.8	48.8684	50	118: Nothing - Calle Michelangelo
146	11/10/2011 16:50	45.4239	12.3393	3.60555	146.1	57.8017	61	119: Boats, Crane on a Barge - Dock at the end of Calle Michelangelo
147	11/10/2011 16:52	45.4244	12.3381	6.7082	267	52.0215	52	120: Rattling noise from building, construction, kids - Calle de la Fonderia
148	11/10/2011 16:54	45.424	12.3377	5	184.3	50.723	50	121: Distant Construction, kids - Calle del Squero
149	11/10/2011 16:55	45.4244	12.3375	2.82843	340	48.6574	50	122: Birds, Distant Voices - Calle larga de la Coopertivo
150	11/10/2011 16:57	45.4247	12.3372	2.82843	335.3	55.1944	57	123: Man using a Saw - Ramo del Squero
151	11/10/2011 16:59	45.4251	12.3371	8.48528	37.8	55.0113	56	124: Dog Barking, Man using a power saw - Calle del campo di Marte
152	11/10/2011 17:00	45.4255	12.3367	7.2111	304.4	50.069	50	125: Distant Sawing - Calle del Gran
153	11/10/2011 17:04	45.4268	12.3385	2.82843	64.8	56.4852	57	126: Water, boats - Near Zitelle
154	11/10/2011 17:06	45.4271	12.3392	2.82843	54.9	60.6923	62	127: Boat - East of Zitelle

155	11/10/2011 17:08	45.4274	12.3399	2.82843	322.7	55.8702	56	128: Distant boats - West of Zitelle
156	11/10/2011 17:09	45.4277	12.3404	2.82843	69.8	55.4959	55	129: water, boats - As west as possible along Giudecca canal
160	11/14/2011 13:07	45.4293	12.327	2.82843	171.1	71.9492	71	130: Boats, water - Zattere Boatstop
161	11/14/2011 13:08	45.4292	12.3275	2.82843	108.5	63.3704	64	131: Water, Boats, People - Sotoportego dei Bisati
162	11/14/2011 13:10	45.429	12.3285	3.60555	107	55.5102	55	132: Voices, water - Ponte de la Calcina
163	11/14/2011 13:12	45.4288	12.3291	3.60555	107	59.1659	61	133: Boats, Accordion - Zattere agli Incurabili
164	11/14/2011 13:14	45.4286	12.3297	2.82843	113.5	54.0567	53	134: Boats, Accordion - Ponte agli Incurabli
165	11/14/2011 13:15	45.4286	12.3304	2.82843	83.8	57.4392	58	135: Water, Voices - Accademia di Belle Arte
166	11/14/2011 13:17	45.4285	12.3314	2.82843	140.1	55.0395	55	136: Water, boats, talking - Calle dello Zuccaro
167	11/14/2011 13:19	45.4284	12.3323	2.82843	96.2	60.1603	61	137: Boats, people - Spirito Santo Boatstop
168	11/14/2011 13:21	45.4286	12.3329	2.82843	61.3	65.1312	63	138: Talking, Boats - Ponte de la Bala
169	11/14/2011 13:22	45.4288	12.3337	2.82843	74.7	57.0833	56	139: Distant Boats, Walking - Across Ponte de la Bala near a construction crane
170	11/14/2011 13:24	45.4291	12.3343	3.60555	47.2	55.5601	54	140: Birds, Water, Boats - Along Giudecca Canal near Ponte de la Bala
171	11/14/2011 13:26	45.4295	12.3348	2.82843	32.6	59.6894	59	141: Boat, water - Ponte dei Umilta
172	11/14/2011 13:29	45.4299	12.3353	3.60555	119	57.8994	59	142:People, Construction, Boats - Along Giudecca Canal
173	11/14/2011 13:31	45.4304	12.3358	3.60555	115.2	61.39	62	143: Water, birds, boats, construction - Along Giudecca canal in Dorsoduro
174	11/14/2011 13:33	45.4307	12.3366	3.60555	122.4	60.5983	61	144: Boats, water - Along Giudecca canal in Dorsoduro

175	11/14/2011 13:34	45.4309	12.337	2.82843	86.5	60.7791	61	145: Boats, People, Water - By the statue of the naked boy holding a frog
176	11/14/2011 13:36	45.431	12.3366	8.544	264.1	59.801	61	146: Boats, People, Water - Along Grand Canal near the South Eastern tip in Dorsoduro
177	11/14/2011 13:38	45.4311	12.3358	2.82843	280.8	62.3438	63	147: People, Water, Boats - Fondamenta Della Dogana all Salute
178	11/14/2011 13:39	45.431	12.3351	2.82843	276.4	57.5181	59	148: Boats, water - Giant Church on Dorsoduro side of Grand Canal
179	11/14/2011 13:41	45.431	12.3346	3.60555	255.3	56.9089	59	149: Boats, people, water - By Large Church
180	11/14/2011 13:43	45.4305	12.3344	3.60555	143.6	53.0541	53	150: water, distant voices - Near Giant Church, slightly inland
181	11/14/2011 13:44	45.4302	12.3343	6.7082	230.5	55.1471	55	151: Construction - Calle del Squero
182	11/14/2011 13:46	45.4299	12.3344	13.4164	170.8	54.5016	53	152: Construction, Talking - Calle del Squero
183	11/14/2011 13:47	45.4296	12.3346	14.4222	157.9	54.9428	54	153: Construction, Distant Boats - Calle del Squero near Grand Canal
184	11/14/2011 13:50	45.4302	12.3336	4.24264	274.3	68.1067	71	154: Large amounts of Construction - Rio Terra dei Catecumeni
185	11/14/2011 14:08	45.4297	12.3337	5	152	55.2507	56	155: Construction - Rio terra al Saloni
186	11/14/2011 14:09	45.4293	12.3338	4.24264	182.2	55.2501	55	156: Construction, distant - Rio Terra al Saloni
187	11/14/2011 14:12	45.43	12.3335	13.4164	350.8	45.7659	50	157: Nothing - Alley near Rio Terra al Saloni
188	11/14/2011 14:14	45.4301	12.3333	7.2111	221.6	55.7541	58	158: Construction - Near Hotel Messner
189	11/14/2011 14:15	45.4305	12.3331	8.544	333.5	51.7318	51	159: Distant Construction - Alley near Grand Canal
190	11/14/2011 14:16	45.4307	12.3335	6.7082	107.1	52.5452	52	160: Distant Construction - Calle S. Gregorio

191	11/14/2011 14:18	45.4306	12.3335	4.24264	142.9	52.0773	51	161: Distant Construction - Calle S. Gregorio (Retake)
192	11/14/2011 14:19	45.4304	12.3334	10	200	55.0149	60	162: Construction - Calle di Mezzo
193	11/14/2011 14:21	45.4305	12.3336	20	8.3	52.722	51	163: Kids, Calle de L'Abazia
194	11/14/2011 14:23	45.4308	12.3338	12.6491	59.7	50.2277	50	164: Footsteps - Sotoportego de L'Abazia
195	11/14/2011 14:25	45.4308	12.3329	12.3693	331.4	54.9951	54	165: Talking - Calle del Bastion
196	11/14/2011 14:26	45.4307	12.3326	7.2111	253.7	53.5129	52	166: Footsteps - Fondamenta ca' Bala
197	11/14/2011 14:28	45.4304	12.3327	8.48528	167.1	48.9203	59	167: Street Sweeper - Fondamenta ca' Bala
198	11/14/2011 14:29	45.43	12.3327	3.60555	167.1	51.7228	50	168: Nothing - Fondamenta ca' Bala
199	11/14/2011 14:31	45.4295	12.3328	6.7082	178	51.8598	50	169: Waves - Fondamenta ca' Bala
200	11/14/2011 14:32	45.4294	12.3324	3.60555	248.8	43.9767	50	170: Nothing - Corte dell'arati
201	11/14/2011 14:34	45.4291	12.3324	6.7082	218.6	49.8234	50	171: Distant humming - Alley near Corte dell'Arati
202	11/14/2011 14:36	45.4289	12.3328	3.60555	175.4	52.6348	52	172:Water, distant boats - Street near previous points
203	11/14/2011 14:38	45.4289	12.3323	10	286	47.455	50	173: Nothing - Unlabelled Dorsoduro Campo
204	11/14/2011 14:39	45.4288	12.332	13.4164	225.5	55.7401	54	174: Distant Boats, Calle del Monestero
205	11/14/2011 14:40	45.4286	12.3319	7.2111	202.2	56.3985	57	175: Boats, People - Calle Larga della Chiesa
206	11/14/2011 14:41	45.4287	12.332	53.6656	15.5	54.8545	53	176: Distant, Boats - Calle del Monestero
207	11/14/2011 14:43	45.4296	12.332	3.60555	358.6	48.1305	50	177: Distant Construction - Rio Terra S. Vio
208	11/14/2011 14:44	45.4299	12.3321	10	17.5	43.3023	50	178: Nothing - Street with enormous name
209	11/14/2011 14:45	45.4304	12.3322	8.94427	21.3	53.1322	52	179: Fountain, Construction - Campiello Barbaro
210	11/14/2011 14:50	45.4305	12.332	6.32456	252.5	54.4579	53	180: Man Saying Soundscape - Calle San Christofaro

211	11/14/2011 14:52	45.4304	12.3315	5	69.7	58.756	60	181: Kids - Calle San Christofaro
212	11/14/2011 14:56	45.4304	12.3311	3.60555	224.9	51.9109	51	182: Man pushing cart - Fondamenta Venier dei Leoni
213	11/14/2011 14:58	45.4304	12.3308	6.7082	285.6	49.0221	50	183: People - Ponte del Formager
214	11/14/2011 15:00	45.4306	12.331	10	83.4	51.647	50	184: Nothing - Sotoportego E Corpe Venier
215	11/14/2011 15:03	45.4306	12.3304	12.6491	288.4	54.9298	57	185: People - Street Near Sotoportego E Corpe Venier
216	11/14/2011 15:04	45.4308	12.3302	6.7082	7.9	57.2331	58	186: Boats - Campo S. Vio
217	11/14/2011 15:05	45.4311	12.3304	6.7082	13.9	65.5433	64	187: Boats - Campo S. Vio on Grand Canal
218	11/14/2011 15:08	45.4306	12.3299	3.60555	228.4	55.3077	53	188: People, Boats - Campo S.Vio
219	11/14/2011 15:09	45.4305	12.3297	3.60555	117.6	50.8613	51	189: People - Fondamenta Venier
220	11/14/2011 15:10	45.43	12.3294	5	276.9	54.5616	53	190: People - Fondamenta Venier
221	11/14/2011 15:12	45.4296	12.3292	3.60555	170	58.6435	50	191: Boat - Fondamenta Venier
222	11/14/2011 15:13	45.4294	12.329	4.47214	192.9	50.7888	50	192: Water - Fondamenta Venier
223	11/14/2011 15:14	45.4296	12.3291	5	200.7	58.4286	61	193: Boat - Fondamenta de ca'Bragadin
224	11/14/2011 15:16	45.4293	12.3289	3.60555	206.5	51.6019	51	194: Person Walking - Fondamenta de ca'Bragadin
225	11/14/2011 15:18	45.4293	12.3294	4.47214	111.6	52.8649	51	195: Distant Boats - Calle S. Domenico
226	11/14/2011 15:19	45.4291	12.33	2.82843	91.9	45.8016	50	196: Nothing - Calle S. Domenico
227	11/14/2011 15:21	45.4296	12.3295	4.47214	116.3	44.6097	50	197: Nothing - Alley near Calle S. Domenico
228	11/14/2011 15:23	45.4294	12.3301	3.60555	124.6	46.82	50	198: Water - Alley near Calle S. Domenico
229	11/14/2011 15:26	45.4298	12.3297	24.7386	91.3	46.045	50	199: Distant Yelling - Alleyway
230	11/14/2011 15:27	45.4296	12.3302	4.47214	116.5	53.2422	51	200: Water - Alleyway

231	11/14/2011 15:30	45.4302	12.3294	6.7082	19	53.5356	51	201: Construction - Unlabelled Street
232	11/14/2011 15:32	45.4307	12.3294	5	293.8	52.0702	51	202: People - Unlabelled Street
233	11/14/2011 15:34	45.4306	12.3292	10	196.6	48.8475	50	203: Voices - Unlabelled Side Street
234	11/14/2011 15:35	45.43	12.3289	6.7082	194.4	50.7256	50	204: Air vent, Talking - Small Side Street
235	11/14/2011 15:37	45.4297	12.3287	5	195.6	54.1045	52	205: Construction - Piscina Venier
236	11/14/2011 15:39	45.4295	12.3286	7.2111	182.5	54.7876	55	206: Construction - Calle Delgamans
237	11/14/2011 15:40	45.4296	12.3281	3.60555	278.6	52.7593	51	207: Distant Accordion - Campo S. Agnese
238	11/14/2011 15:42	45.4297	12.3278	2.82843	306	56.1174	57	208: Accordion and Distant Bells - Campo S. Agnese
239	11/14/2011 15:43	45.4302	12.328	4.24264	26.2	55.7918	56	209: Accordion - Road near Accademia
240	11/14/2011 15:45	45.4304	12.3285	14.4222	22	47.8202	50	210: Nothing - Calle Pompea
241	11/14/2011 15:47	45.4309	12.3285	3.60555	27.4	52.5427	51	211: People - Road to Accademia
242	11/14/2011 15:48	45.4308	12.329	8.48528	108.6	55.2731	56	212: People - Calle Nuova S. Agnese
243	11/14/2011 15:50	45.431	12.3286	10	307.4	55.218	56	213: People - Base of Accademia Bridge
244	11/14/2011 15:51	45.4312	12.3285	8.544	164.5	55.7728	57	214: People - Base of Accademia Bridge
245	11/14/2011 15:52	45.4316	12.3284	2.82843	336.1	61.2259	62	215: Boats - Accademia Boatstop
246	11/14/2011 15:57	45.4296	12.3274	8.94427	237.5	55.9875	56	216: People - Rio Tera Gesuati
269	11/16/2011 14:37	45.4294	12.3268	2.82843	0	61.6419	61	217: Boats, Water - Zattere Boatstop
270	11/16/2011 14:39	45.4296	12.3259	2.82843	348	63.4284	61	218: People, Boats - Ristorante Terrazza
271	11/16/2011 14:42	45.43	12.326	6.32456	43.2	54.8502	55	219: People, Water - Fondamenta Nani
272	11/16/2011 14:43	45.4304	12.3263	3.60555	33	56.9135	57	220: Footsteps - Fondamenta nani

273	11/16/2011 14:46	45.4308	12.3274	6.32456	94	50.8371	50	221: Footsteps - Calle Larga Nani
274	11/16/2011 14:47	45.4307	12.3278	6.7082	130.3	53.3087	51	222: Walking - Alley near Accademia
275	11/16/2011 14:49	45.431	12.3276	7.2111	330.4	54.4341	51	223: Distant Boats, talking - Campiello Calbo
276	11/16/2011 14:50	45.4312	12.3278	5.65685	10.7	52.6192	51	224: Talking, distant boats - Left of Accademia
277	11/16/2011 14:52	45.4316	12.3278	8.94427	304.2	59.869	60	225: People - Calle Gambara
278	11/16/2011 14:54	45.4319	12.3271	26.8328	347.4	56.2371	57	226: Girls asking for a photo - Unlabelled Street
279	11/16/2011 14:56	45.432	12.327	6.7082	30.3	52.0143	50	227: Water, Voices - Campiello Malpiero
280	11/16/2011 14:58	45.431	12.3265	5	193	54.115	54	228: People, distant boats - Ponte S. Trovaso
281	11/16/2011 15:00	45.4306	12.3259	2.82843	274.6	53.2124	51	229: Workers talking - Dosoduro Campo
282	11/16/2011 15:03	45.4305	12.3249	3.60555	307.6	55.3864	55	230: Guy using a saw - Fondamenta Bonlini
283	11/16/2011 15:04	45.4308	12.3244	2.82843	276.8	51.764	50	231: Footsteps - Ponte Trevisian
284	11/16/2011 15:06	45.4313	12.3246	4.24264	19.4	53.1985	53	232: People Talking - Calle Ochialera
285	11/16/2011 15:09	45.4317	12.3251	6.7082	95.1	43.5385	50	233: Nothing - Calle del Forno
286	11/16/2011 15:11	45.4322	12.3254	2.82843	50.9	53.6936	53	234: Talking - Osteria Enoteca Ai Artisti
287	11/16/2011 15:13	45.4324	12.3252	6.7082	347.4	52.0178	51	235: Talking - Calle dei Cerchieri
288	11/16/2011 15:15	45.4326	12.3262	8.48528	68.9	45.4827	50	236: Nothing - Corte del Comare
289	11/16/2011 15:17	45.4328	12.3273	13.4164	91.8	56.8011	57	237: Boats, People, Water - Along Grand Canal
290	11/16/2011 15:19	45.4327	12.3266	5	281.7	48.8878	50	238: Walking Lady - Corte del Comare
291	11/16/2011 15:22	45.4322	12.3259	5	11.6	46.1835	50	239: Walking Lady - Ponte della Tolleta
292	11/16/2011 15:24	45.4319	12.326	5.65685	157.3	50.7726	50	240: Distant Talking - Ramo Secondo Della Tolleta

293	11/16/2011 15:26	45.4318	12.3258	17.088	279.9	54.0187	53	241: People - Toletta Arch & Art
294	11/16/2011 15:28	45.432	12.3246	3.60555	249.8	44.2018	50	242: Nothing - Bridge
295	11/16/2011 15:30	45.4323	12.3245	2.82843	343.4	47.8974	50	243: People walking - Dontedelle Turchette
296	11/16/2011 15:32	45.4327	12.3244	4.24264	6.7	54.301	64	244: People - Calle della Turchette
297	11/16/2011 15:34	45.433	12.3255	7.2111	85.7	53.6958	54	245: Boats, Construction - Calle del Traghetto
298	11/16/2011 15:36	45.4332	12.327	4.24264	97.5	64.6538	63	246: Boats, Construction - Ca'Rezzonico Boatstop
299	11/16/2011 15:38	45.4333	12.327	6.32456	125.9	81.6262	82	247: Boats, Loud Construction - Ca'Rezzonico Boatstop
300	11/16/2011 15:41	45.4331	12.3251	3.60555	314.5	56.1137	57	248: People, Construction - Sotoportego del Casin dei Nobile
301	11/16/2011 15:43	45.4333	12.3258	6.7082	83.8	54.5617	53	249: Distant Hammering - Sotoportego e Calle Pedrocchi
302	11/16/2011 15:46	45.4337	12.3253	6.32456	4.8	56.8414	58	250: People Talking - Calle del Fabro
303	11/16/2011 15:48	45.4339	12.3262	6.7082	67	47.4939	50	251: Distant Boat - Calle Barnaba
304	11/16/2011 15:49	45.4339	12.3269	17.088	93.3	60.754	64	252: Boats - Grand Canal
305	11/16/2011 15:53	45.4341	12.3257	4.24264	4.3	52.6881	51	253: People - Campiello dei Squelini
306	11/16/2011 15:55	45.4339	12.3252	10	258.9	45.2595	50	254: Distant Person - Calle della Madonna
307	11/16/2011 15:58	45.4342	12.3248	8.94427	333.6	45.0659	50	255: Distant People - Random Street
308	11/16/2011 16:00	45.4346	12.3249	8.94427	20.1	43.9483	50	256: Distant People - Random Street
309	11/16/2011 16:02	45.4351	12.3252	4.47214	13	66.0393	63	257: Boats, People - Canal
310	11/16/2011 16:05	45.4345	12.3238	3.60555	307.8	57.196	61	258: People, Dog - San Margherita
311	11/16/2011 16:07	45.4348	12.3244	11.3137	104.5	52.1862	51	259: Nothing - Corte dei Fontego
312	11/16/2011 16:08	45.435	12.3239	13.4164	19.5	55.2647	55	260: People - S. Marghertia

313	11/16/2011 16:10	45.4353	12.3242	7.2111	10	55.1296	54	261: People, Water - Rio de Ca'Foscari
314	11/16/2011 16:12	45.4306	12.326	50	0	49.3816	50	262: Nothing - Alley off S. Margherita
315	11/16/2011 16:14	45.4346	12.3236	26.8328	297.5	56.3306	55	263: People, dog - Calle del Forno
316	11/16/2011 16:16	45.4343	12.3237	2.82843	165.5	54.0966	54	264: People - S. Margarita
317	11/16/2011 16:20	45.4339	12.3233	2.82843	181.5	53.8067	53	265: Kids playing soccer - S. Margarita
318	11/16/2011 16:22	45.4336	12.3223	5	201.1	56.9448	57	266: Ominous Italian Man - Calle della Scuole
319	11/16/2011 16:23	45.4339	12.3218	2.82843	340.1	53.7359	53	267: People - Campo dei Carmini
320	11/16/2011 16:25	45.4336	12.321	2.82843	267.1	51.4942	51	268: People - Fondamenta Socorso
321	11/16/2011 16:27	45.4333	12.3202	4.47214	217.6	63.7783	64	269: People, water, boats - Fondamenta Socorso
322	11/16/2011 16:30	45.4329	12.3197	2.82843	159	77.9021	65	270: Boats, Birds - Fondamenta Socorso
323	11/16/2011 16:35	45.4321	12.3205	2.82843	208.5	52.448	51	271: Bells, People - Fondamenta Sebastiano
324	11/16/2011 16:36	45.4321	12.3205	5	208.5	52.8904	55	272: People - Ponte de S. Sebastian
325	11/16/2011 16:38	45.4323	12.3211	14.4222	32.8	50.2928	50	273: People - Side street near S. Margarita
326	11/16/2011 16:39	45.4321	12.3217	7.2111	143.2	44.3538	50	274: Nothing - Campiello Balastro
327	11/16/2011 16:42	45.4327	12.3214	3.60555	51.8	44.9558	50	275: Nothing - Small Campiello
328	11/16/2011 16:44	45.4323	12.3217	4.47214	135.5	47.5254	50	276: Distant whining kids - Ponte de L'Avogaria
329	11/16/2011 16:46	45.4322	12.3221	20	89.3	44.2649	50	277: Nothing - Corte della Zucchero
330	11/16/2011 16:49	45.4319	12.3225	11.3137	170.7	45.2788	50	278: Nothing except paranoid woman - Back Alley
331	11/16/2011 16:51	45.4325	12.3227	10	92.4	52.5073	51	279: People - Lost in a Back Alley
332	11/16/2011 16:52	45.4329	12.3226	17.088	0.8	49.6131	50	280: Nothing - Lost in a back alley

333	11/16/2011 16:54	45.4306	12.326	50	0	45.1825	50	281: Nothing - Calle dei Pitti of Terrazzera
334	11/16/2011 16:56	45.4325	12.3235	8.94427	63.9	52.3737	50	282: Talking Men - Lost
335	11/16/2011 16:57	45.4323	12.3237	7.2111	55.9	46.7212	50	283: Distant Voices - Ponte Ognisanti
336	11/16/2011 16:59	45.4318	12.3238	10	177.9	47.4961	50	284: Distant Yelling - Rio Terra Ognisanti
337	11/16/2011 17:01	45.431	12.3236	3.60555	185.3	51.613	50	285: Distant Bells, Talking - Rio Tera Ognisanti
338	11/16/2011 17:03	45.4312	12.3231	2.82843	26.4	55.418	54	286: People and Purse Salesman - Calle Giustinian
339	11/16/2011 17:05	45.431	12.3225	6.7082	194	51.0608	50	287: Nothing - Side Street of Calle Giustinian
340	11/16/2011 17:06	45.4314	12.322	2.82843	223.6	53.0388	51	288: People - Ponte Sartorio
341	11/16/2011 17:08	45.4314	12.3214	12.3693	266.7	50.1438	50	289: People - Ponte Sartorio
342	11/16/2011 17:09	45.4314	12.3209	5.65685	250.5	53.0678	51	290: Water - Fondamenta de S. Basegio
343	11/16/2011 17:11	45.4307	12.321	2.82843	163.5	59.6041	61	291: Boats, People - S. Basilico Boatstop
344	11/16/2011 17:13	45.4306	12.3218	2.82843	112.6	56.6925	57	292: Boats, water - Along Giudecca Canal
345	11/16/2011 17:15	45.4304	12.3228	2.82843	97.4	55.7946	56	293: Boats, water - Along Giudecca Canal
346	11/16/2011 17:16	45.4302	12.3236	2.82843	163	60.5426	63	294: People talking, Boats - Along Giudecca Canal
347	11/16/2011 17:18	45.43	12.3243	2.82843	98.5	58.092	58	295: People, Boats - Along Giudecca Canal
378	11/17/2011 14:02	45.4313	12.3205	2.82843	293.5	53.1144	51	296: Water, Distant Boats - Ponte S. Basegio
379	11/17/2011 14:03	45.4314	12.3199	3.60555	267.8	54.7815	52	297: Distant Boats - Street near Ponte Basegio
380	11/17/2011 14:04	45.4315	12.3191	2.82843	15.5	51.0225	50	298: Voices - Calle Nova
381	11/17/2011 14:06	45.4316	12.3186	4.47214	263.6	53.8942	51	299: Birds, Distant Boats - Calle Nova
382	11/17/2011 14:08	45.432	12.3185	4.24264	100.7	53.7796	53	300: People - Calle Nova

383	11/17/2011 14:10	45.4319	12.3183	3.60555	318.5	44.695	50	301: Nothing - Calle Lardoni
384	11/17/2011 14:11	45.4322	12.3181	2.82843	350.8	47.6202	50	302: Nothing - Calle Lardoni
385	11/17/2011 14:13	45.4322	12.3188	5	185.2	51.546	50	303: People Talking - Campo de L'Azola Raphael
386	11/17/2011 14:16	45.4321	12.3194	10	147.1	50.9202	50	304: Nothing - Calle de Frati
387	11/17/2011 14:17	45.432	12.3198	4.47214	71.8	49.1861	50	305: Nothing - Campazzo S. Sebastian
388	11/17/2011 14:18	45.4321	12.3204	2.82843	72.7	48.2131	50	306: Nothing - Ponte S. Sebastian
389	11/17/2011 14:20	45.4323	12.3198	6.7082	29.7	50.9924	50	307: Plane - Campiello del Squero
390	11/17/2011 14:23	45.4326	12.3192	4.47214	4.1	49.9405	50	308: Nothing - Campiello del Squero
391	11/17/2011 14:25	45.4327	12.3187	3.60555	260.9	49.1217	50	309: Distant Boats - Fondamenta Briati
392	11/17/2011 14:26	45.4326	12.3183	4.24264	249.4	48.4785	50	310: Distant Voices - Fondamenta Barbarigo
393	11/17/2011 14:28	45.4326	12.3173	2.82843	268.9	50.6852	50	311: Footsteps - Unlabelled Bridge
394	11/17/2011 14:29	45.4325	12.3169	2.82843	255	49.8487	50	312: Men in Boat - Rielo
395	11/17/2011 14:31	45.4323	12.3164	2.82843	227.4	54.9834	50	313: Distant Talking - Fondamenta Barbarigo
396	11/17/2011 14:32	45.4322	12.316	2.82843	231	50.8321	50	314: Nothing - Calle Drio la Chiesa
397	11/17/2011 14:34	45.4324	12.3154	2.82843	254.4	48.4825	50	315: People Talking - IUAV
398	11/17/2011 14:36	45.4328	12.3159	2.82843	10.6	47.8444	50	316: Nothing - Campo S. Nicolo dei Mandicoli
399	11/17/2011 14:38	45.4329	12.3162	2.82843	30.8	46.9546	50	317:Nothing - Campiello Tron
400	11/17/2011 14:39	45.433	12.3166	2.82843	48.1	47.3573	50	318: Nothing - Campiello Tron
402	11/17/2011 14:42	45.4328	12.3171	4.47214	348.9	51.6519	50	319: Nothing - Campiello Lorenzo
403	11/17/2011 14:45	45.4331	12.3171	6.32456	34.1	53.6203	52	320: People - Ponte de le Terese
405	11/17/2011 14:47	45.4334	12.3172	2.82843	337.5	55.9098	56	321: Construction - Calle Larga

406	11/17/2011 15:00	45.4338	12.317	4.47214	0	54.0641	53	322: People - Calle de L'Ogio
407	11/17/2011 15:02	45.4344	12.3166	2.82843	357.6	54.2675	53	323: Boats - Calle de la Madonna
408	11/17/2011 15:04	45.4347	12.3174	2.82843	76.8	51.5348	50	324: Water, Distant Construction - Ponte de la Madonna
409	11/17/2011 15:06	45.4343	12.3177	2.82843	167.6	49.3808	50	325: Water, distant construction - Ponte Storto
410	11/17/2011 15:08	45.4339	12.3177	6.32456	177.4	45.3994	50	326: Distant footsteps and boat - Campiello del Terren
411	11/17/2011 15:10	45.4345	12.3184	4.47214	44	50.9886	50	327: Distant Construction - Fondamenta Cerere
412	11/17/2011 15:12	45.4347	12.3186	12.3693	261.1	45.3133	50	328: Distant Voices - Calle de le Rocuratie
413	11/17/2011 15:15	45.4338	12.3194	3.60555	119.8	53.3202	52	329: People - Calle dei Guardian
414	11/17/2011 15:16	45.4339	12.3192	10	348.2	53.3306	53	330: People - Calle dei Guardian
415	11/17/2011 15:18	45.4346	12.3191	2.82843	79.8	47.9754	50	331: People, Birds - Calle Spor?
416	11/17/2011 15:21	45.4344	12.3195	2.82843	161.7	50.5613	50	332: Nothing - Near Dorsoduro School Playground
417	11/17/2011 15:23	45.4348	12.3199	2.82843	77.3	52.4616	51	333: Birds, Fountain - Calle Capello
418	11/17/2011 15:25	45.4353	12.3196	3.60555	346.6	56.1567	55	334: People, Boat Horn - End of Calle Capello
419	11/17/2011 15:26	45.4355	12.3204	3.60555	118.6	60.3019	62	335: People, Boat - Ponte de ca'Rizza
420	11/17/2011 15:28	45.4351	12.3205	6.32456	204.6	55.8843	56	336: People, Distant Construction - Unlabelled Bridge
421	11/17/2011 15:31	45.4362	12.3203	2.82843	76.4	55.613	55	337: People, Boat Water - Ponte del Pagan
422	11/17/2011 15:33	45.436	12.321	2.82843	138.3	52.7236	51	338: People - I.N.P.S. (Fondamenta del Rio Novo)
423	11/17/2011 15:34	45.4357	12.3215	3.60555	92.3	53.7887	53	339: Boat, People - Near Fondamenta del Rio Novo
425	11/17/2011 15:35	45.4352	12.3212	5	206	55.7589	52	340: People - Fondamenta del Rio Novo

426	11/17/2011 15:37	45.4357	12.3221	2.82843	98.8	50.2552	50	341: People - Fondamenta del Rio Novo
427	11/17/2011 15:39	45.4355	12.3232	2.82843	117.4	50.5574	50	342: Water, People - Rio S. Margherita
428	11/17/2011 15:41	45.4351	12.3232	6.32456	181.2	55.1154	55	343: Boat, People - Along Rio S. Margherita
429	11/17/2011 15:42	45.4347	12.3231	6.7082	184.5	54.7478	54	344: People, water - Near S. Margherita
430	11/17/2011 15:43	45.4348	12.3226	13.4164	296.8	52.8924	51	345: People - Side street near S. Margherita
431	11/17/2011 15:45	45.4349	12.3215	5	263.6	55.1363	55	346: People - Side Street Near S. Margherita
432	11/17/2011 15:48	45.4345	12.3229	3.60555	179.9	54.3385	54	347: People - Bridge along Rio S. Margherita
433	11/17/2011 15:50	45.4342	12.3224	3.60555	243.4	64.4227	67	348: Angry Boat Drivers - Calle del Cristo
434	11/17/2011 15:51	45.434	12.3218	6.7082	247.8	63.1772	63	349: Construction - Ponte Foscarini
435	11/17/2011 15:53	45.434	12.3214	20	266.3	52.0219	50	350: Footsteps - Alleyway near Ponte Foscarini
436	11/17/2011 15:54	45.4344	12.3211	4.47214	358.1	51.2671	51	351: Person - Alley near Ponte Foscarini
437	11/17/2011 15:55	45.4348	12.3209	7.2111	357	60.2984	61	352: People and Man with suitcase - Calle E Corte Contarini
438	11/17/2011 15:58	45.4347	12.3202	2.82843	118.5	51.3509	50	353: Nothing - Fondamenta Rosso
439	11/17/2011 16:00	45.4343	12.3205	3.60555	140.6	49.3627	50	354: Water - Fondamenta Rosso
440	11/17/2011 16:02	45.4338	12.3211	2.82843	170.5	59.4268	60	355: People and Boats - Ponte Briati
441	11/17/2011 16:03	45.4336	12.3206	2.82843	217.5	56.0108	57	356: People and Boats - Fondamenta Briati
442	11/17/2011 16:05	45.4333	12.3202	5	216.4	51.5205	50	357: People - Ponte Del Socorso
443	11/17/2011 16:11	45.4313	12.3197	2.82843	261.2	49.444	50	358: Distant Voices - Along Giudecca Canal
444	11/17/2011 16:12	45.4315	12.3188	3.60555	296.8	54.4781	51	359: Distant Voices - Along Giudecca Canal
445	11/17/2011 16:14	45.4315	12.3181	3.60555	259.4	54.8512	53	360: Distant Boats - Parking Lot

446	11/17/2011 16:15	45.4315	12.3172	2.82843	277.6	55.418	53	361: Boats - Parking Lot
447	11/17/2011 16:19	45.4314	12.3164	2.82843	222.5	59.7266	60	362: Car, boats - Parking Lot
473	11/28/2011 13:19	45.4317	12.329	2.82843	41.7	57.9284	58	396: People and Boats at the Accademia Bridge.
474	11/28/2011 13:21	45.4322	12.3293	2.82843	1.7	54.1277	54	397: People and Boats in Campo S. Vidal.
476	11/28/2011 13:23	45.4324	12.3289	35.7771	317	54.9073	55	398: Distant Boats - Sotoportego Giustinian
477	11/28/2011 13:24	45.4326	12.3291	35.7771	69	52.2569	52	399: People - Calle Giustinian
478	11/28/2011 13:25	45.4328	12.3292	50.5964	69	54.2513	51	400: Door Slamming - Calle Vituri o Falier
479	11/28/2011 13:26	45.4323	12.3283	3.60555	238.1	59.6268	61	401: Boats Calle Vituri o Falier
480	11/28/2011 13:28	45.4328	12.3296	48.3735	66.7	50.5146	51	402: Footsteps - Calle Vituri o Falier
481	11/28/2011 13:30	45.433	12.3291	8.48528	150.2	47.9957	50	403: Footsteps - Fondamenta de la Scuole (Dorsoduro)
482	11/28/2011 13:30	45.4329	12.3289	32.9848	150.2	47.0355	50	404: Footsteps - Corte del Teatro
483	11/28/2011 13:32	45.433	12.3289	14.4222	150.2	52.267	52	405: distant construction - Ramo calle del Teatro
484	11/28/2011 13:33	45.4326	12.3279	8.94427	246.4	57.5565	60	406: Boats - Ramo Calle del Teatro
485	11/28/2011 13:36	45.4329	12.3283	13.4164	47.6	51.8012	51	407: Ambient Noise - Calle dei Orbi
486	11/28/2011 13:38	45.4335	12.3285	4.24264	346.2	49.5533	50	408: Nothing - Salizada Malipiero
487	11/28/2011 13:40	45.4334	12.3278	6.7082	239.3	56.5402	56	409: Boats - S. Samuele Boatstop
489	11/28/2011 13:42	45.4338	12.3283	10	54.6	53.379	51	410: People - Calle Orassi
490	11/28/2011 13:44	45.4339	12.3276	6.7082	279.4	57.9576	56	411: People - Calle Orassi
491	11/28/2011 13:46	45.434	12.3282	8.94427	56	56.2222	58	412: Boats - Near Calle Orassi
492	11/28/2011 13:47	45.4339	12.3273	10	282.6	59.7572	59	413: Boats - Calle Morolin
493	11/28/2011 13:50	45.4341	12.3287	10	340.4	45.7578	50	414: Nothing - Calle Lezze

497	11/28/2011 13:52	45.4343	12.3282	4.47214	283.9	47.8761	50	415: Dog Barking - Ramo Corte Lezzo
498	11/28/2011 13:54	45.4344	12.3287	16.2788	345.6	45.5207	50	416: Distant Voices - Calle Moncenigo ca' Vechia
499	11/28/2011 13:56	45.4347	12.3281	16.2788	346.3	57.1292	58	417: Distant Boats - Across Canal From S. Toma Boatstop
500	11/28/2011 13:56	45.4349	12.328	8.24621	346.3	58.8125	61	418: Docking Boat - Across Canal from S. Toma
501	11/28/2011 13:59	45.4342	12.3292	6.7082	126.6	51.8455	51	419: Construction - Salizada S. Samuele
502	11/28/2011 14:00	45.4343	12.3295	4.24264	50.6	55.197	55	420: Construction - Sotoportego E Corto de la Pelle
503	11/28/2011 14:01	45.4346	12.3291	12.6491	310.4	51.851	51	421: Construction - Side street near previous point
504	11/28/2011 14:03	45.4344	12.3298	3.60555	65	48.5582	50	422: Footsteps - Ramo di Piscini and Crosera Intersection
505	11/28/2011 14:05	45.4346	12.3296	8.94427	289.4	46.2018	50	423: Pigeons taking flight - Calle Corner o del Magazen
506	11/28/2011 14:06	45.4344	12.33	5	85.3	56.2394	56	424: Person wheeling suitcase - Piscina S. Samuela
507	11/28/2011 14:09	45.4353	12.3295	2.82843	331.2	60.3729	63	425: Boats - Servizio Gondole S. Toma
508	11/28/2011 14:11	45.4347	12.3302	6.32456	9.9	52.8309	53	426: People Walking - Rio de ca' Garzoni
509	11/28/2011 14:13	45.4341	12.3308	5	152.2	52.9026	51	427: People - Campiello Nuovo o dei Morti
510	11/28/2011 14:15	45.4337	12.3306	3.60555	227.2	54.1239	53	428: Restaurant Noise - Campiello S. Stefano
511	11/28/2011 14:17	45.434	12.3301	7.2111	294	50.7096	51	429: Talking - Calle de le Botegle
512	11/28/2011 14:18	45.4337	12.3297	12.1655	212.1	45.2518	50	430: Nothing - Corte de Muneghie
513	11/28/2011 14:20	45.4336	12.3294	7.2111	1.5	48.147	50	431: Nothing - Calle dei Todeschi
514	11/28/2011 14:22	45.4332	12.3293	7.2111	259.7	46.018	50	432: Nothing - Corte de la Vida
515	11/28/2011 14:26	45.4335	12.3305	2.82843	206.6	54.3225	54	433: People - Campo S. Stefano
516	11/28/2011 14:27	45.4332	12.331	53.6656	158	54.2897	55	434: Water - Calle Pasqualigo o de L'olio

517	11/28/2011 14:30	45.4331	12.3304	2.82843	0	54.7403	54	435: People - Campo S. Stefano
518	11/28/2011 14:31	45.4328	12.33	4.24264	225.9	54.4397	55	436: People - Campo S. Stefano
519	11/28/2011 14:32	45.4325	12.3303	5	165.8	52.208	51	437: People, distant birds - Campo S. Stefano
520	11/28/2011 14:34	45.4321	12.3303	115.378	200.4	47.503	50	438: Distant instruments - Sotoportego Barbaro
521	11/28/2011 14:38	45.4333	12.3309	7.2111	306.5	53.9339	53	439: People - Ponte S. Maurizio
522	11/28/2011 14:39	45.4329	12.3315	2.82843	169.9	50.5431	50	440: People playing music - Campo S. Maurizio
523	11/28/2011 14:40	45.4326	12.3313	7.2111	216.7	48.4842	50	441: Nothing - Calle del Forno
524	11/28/2011 14:42	45.4322	12.3312	8.48528	222.8	50.4421	50	442: Nothing - Calle del Forno
525	11/28/2011 14:44	45.4316	12.3307	3.60555	321.6	58.9355	60	443: Boats - Fondamenta del Traghetto S. Maurizio
526	11/28/2011 14:48	45.4327	12.3322	8.48528	140	53.7631	53	444: People - Ponte Zaguri
527	11/28/2011 14:49	45.4323	12.3322	4.24264	199.9	48.0016	50	445: Nothing - Fondamenta Zaguri
528	11/28/2011 14:51	45.4316	12.332	17.8885	151.6	55.5209	55	446: Boats - Fondamenta Zaguri
529	11/28/2011 14:54	45.4329	12.332	10	20.9	47.1886	50	447: Nothing - Campiello dio la Chiesa
530	11/28/2011 14:57	45.433	12.3323	6.32456	43.1	46.4342	50	448: Ponte de la Malvasia Vechia
531	11/28/2011 15:51	45.4352	12.3338	3.60555	259.3	55.3103	56	449: People - Ponte de S. Partinian
532	11/28/2011 15:53	45.4351	12.3333	10	257.7	55.9441	56	450: Construction - Calle de la Mandola
533	11/28/2011 15:55	45.4351	12.3333	11.3137	257.7	50.9585	50	451: Footsteps - Calle S. Andrea
534	11/28/2011 15:57	45.4352	12.3333	26.8328	257.7	53.1888	52	452: Rumbling Building - Corte d'Apello di Venezia
535	11/28/2011 16:00	45.4355	12.3324	6.7082	322.5	49.0024	50	453: Distant Talking - Campo S. Beneto
536	11/28/2011 16:02	45.4361	12.3319	6.7082	342.5	69.3231	74	454: Construction - Calle del Traghetto

537	11/28/2011 16:04	45.4355	12.3319	26.8328	227.7	52.7063	51	455: Construction - Calle ?saro (Worn off Street name)
538	11/28/2011 16:06	45.4361	12.3315	3.60555	321.5	59.2695	60	456: Boats - Calle Benzon
539	11/28/2011 16:08	45.4353	12.3317	17.088	177.5	75.6785	79	457: Construction and Jackhammer - Calle Pesaro
540	11/28/2011 16:09	45.4352	12.3316	10	177.5	53.422	50	458: Nothing - Corte de L'olio
541	11/28/2011 16:11	45.435	12.3308	5	262	52.2209	50	459: Nothing - Corte de L'Albergo
542	11/28/2011 16:14	45.4356	12.3304	2.82843	340.1	55.7659	56	460: Boatstop - Campiello del Teatro (S. Angelo)
543	11/28/2011 16:18	45.4345	12.3318	6.7082	220.6	52.0238	50	461: People - Parochia de S. Luca
544	11/28/2011 16:20	45.4347	12.3326	8.48528	74.8	56.1089	57	462: People - Rio Tera de la Mandola
545	11/28/2011 16:21	45.435	12.3323	10	345.8	50.5946	50	463: Nothing - Rio Tera de la Mandola
546	11/28/2011 16:22	45.435	12.3324	13.4164	345.8	45.7316	50	464: Nothing - Calle a Fianco ca' Pesaro
547	11/28/2011 16:25	45.4347	12.3327	17.8885	143.4	55.992	55	465: People - Rio Terra dei Assassini
549	11/29/2011 13:25	45.4343	12.3316	5	0	52.4413	52	466: People - Campo S. Anzolo
550	11/29/2011 13:26	45.4339	12.332	13.4164	101.8	51.3217	50	467: Woman walking, distant voices - Calle Caotorta
552	11/29/2011 13:28	45.4335	12.3326	6.7082	107.6	50.0504	50	468: Noisy Women - Ponte Storto
553	11/29/2011 13:30	45.4334	12.333	7.2111	80	44.4556	50	469: Distant Instrument - Parocchia di S. Moise
554	11/29/2011 13:32	45.4328	12.333	7.2111	177.9	53.2065	52	470: People - Hotel Bel Sito
555	11/29/2011 13:33	45.4322	12.333	5	171.2	60.6232	66	471: Construction Crane - Campo del Traghetto
556	11/29/2011 13:35	45.4316	12.333	3.60555	163.6	73.3828	67	472: Construction - Campo del Traghetto
557	11/29/2011 13:38	45.4316	12.3327	3.60555	37.7	67.2686	65	473: Boats - Viglio Boatstop (Calle Grittio del Campanile)
558	11/29/2011 13:41	45.4322	12.3335	8.48528	161.8	56.3282	56	474: Distant Construction - Sotoportego de la Ostreghie
559	11/29/2011	45.4323	12.334	80	18.5	51.9537	50	475: People - Calle Minotto

	13:43							
560	11/29/2011 13:44	45.4322	12.3342	3.60555	72.1	50.1157	50	476: People - Ramo Primo Minotto
561	11/29/2011 13:46	45.4327	12.3342	3.60555	1.8	53.2844	53	477: Distant Construction, people - Calle del Pestrin
562	11/29/2011 13:47	45.433	12.3347	5	75	58.4098	58	478: People, Man Blowing Nose - Calle del Traghetto
563	11/29/2011 13:49	45.4324	12.3348	25.2982	197.3	56.9823	59	479: Air Vents - Calle Barozzi
564	11/29/2011 13:50	45.4324	12.3355	5	197.3	51.0956	51	480: Distant Construction - Calle Barozzi
565	11/29/2011 13:52	45.4327	12.3353	8.94427	197.3	53.7789	52	481: People - Calle del Squero
566	11/29/2011 13:53	45.433	12.3355	3.60555	88.8	56.1498	57	482: Gondoliers talking - Campiello Barozzi
567	11/29/2011 13:55	45.4333	12.335	8.94427	353.6	56.572	56	483: Distant Construction - Hotel San Moise
568	11/29/2011 13:57	45.4333	12.335	26.8328	353.6	52.1673	51	484: Footsteps and distant construction - Piscina S. Moise
569	11/29/2011 13:58	45.4337	12.3341	5	325.9	54.0525	55	485: People - Gran Teatro La Fenice
570	11/29/2011 14:00	45.4339	12.3346	13.4164	52.8	47.6304	50	486: People - Ponte de Piscina
571	11/29/2011 14:01	45.434	12.3346	11.3137	243.3	57.625	61	487: Construction and Hammering - Near Ponte de Piscina
572	11/29/2011 14:03	45.434	12.334	6.7082	352.2	53.7355	54	488: People - Albergo Ateneo
573	11/29/2011 14:05	45.4343	12.3341	16.9706	359.7	46.5298	50	489: Seagulls - Ramo Minelli
574	11/29/2011 14:08	45.434	12.3335	6.7082	354.4	47.6103	50	490: Footsteps - Campiello Marinonio de la Fenice
575	11/29/2011 14:10	45.4342	12.3331	5	354.4	43.5868	50	491: Nothing - Calle del Cafetier
576	11/29/2011 14:11	45.4342	12.3325	6.7082	354.4	48.6941	50	492: People - S. Anzolo
577	11/29/2011 14:14	45.4339	12.3329	6.7082	133.3	44.9693	50	493: Nothing - Calle del Cristo
578	11/29/2011 14:17	45.4345	12.3332	8.94427	89	51.6081	51	494: Distant People - Sotoportego e corte Balbi o Morosini

579	11/29/2011 14:18	45.4348	12.3335	6.7082	71.4	46.5564	50	495: Nothing - Osteria Ai Assassini
580	11/29/2011 14:20	45.4348	12.3332	16.4924	55.5	57.0105	59	496: People - Ristorante Rossa Rossa
581	11/29/2011 14:22	45.4351	12.3337	7.2111	63.4	61.3904	63	497: People - Ponte de la Cortesia
648	12/1/2011 14:10	45.4354	12.3342	2.82843	209	53.3105	53	515: People, Plane - Campo Manin
649	12/1/2011 14:12	45.4353	12.3342	34.176	156.5	55.3233	56	516: People - Calle de la vida o de le Locamda
650	12/1/2011 14:14	45.4352	12.3356	6.7082	74.7	56.6655	57	517: Distant Construction - Calle de Colonne
651	12/1/2011 14:16	45.435	12.3355	7.2111	74.7	55.4654	55	518: People - Ponte dei Fuseri
652	12/1/2011 14:17	45.4347	12.3355	25.2982	74.7	54.1256	53	519: People - Calle Venier
653	12/1/2011 14:19	45.4346	12.3355	50.5964	74.7	51.0826	50	520: People - Calle Venier
654	12/1/2011 14:24	45.4345	12.3356	17.088	74.7	55.1057	56	521: People - Calle Tron
655	12/1/2011 14:25	45.4343	12.3355	24.7386	243.2	46.6083	50	522: Distant people - Calle Brentana
656	12/1/2011 14:27	45.434	12.336	25.2982	137.2	54.8981	55	523: People - Calle del Carro
657	12/1/2011 14:29	45.4334	12.3366	14.4222	156.2	57.8887	60	524: People, ambient noise - Salizada S. Moise
658	12/1/2011 14:31	45.4332	12.3358	6.7082	268.1	56.8975	58	525: People - Campo S. Moise
659	12/1/2011 14:33	45.4328	12.336	35.7771	95.4	55.0593	56	526: Distant Construction - Calle de Tredici Martiri
660	12/1/2011 14:34	45.4321	12.3365	2.82843	136.4	56.5226	58	527: Water, boats - Water by Calle de Tredici Martiri
661	12/1/2011 14:39	45.4332	12.3364	14.4222	9.6	58.8605	61	528: People - Near the square
662	12/1/2011 14:42	45.4324	12.3373	3.60555	62.6	56.0434	56	529: Boats - Calle Vallaeggo
663	12/1/2011 14:44	45.4326	12.3381	2.82843	57.6	62.2545	61	530: Boats - Along Canal
664	12/1/2011 14:46	45.433	12.3392	2.82843	69.9	56.1505	57	531: People, boats - Canal by San Marco

665	12/1/2011 14:48	45.4332	12.3398	2.82843	60	57.673	58	532: People - San Marco by Gondolas
666	12/1/2011 14:50	45.4336	12.3409	2.82843	57.5	56.8898	58	533: People - San Marco by Gondolas
667	12/1/2011 14:53	45.4337	12.3397	7.2111	343.2	58.4214	60	534: People - San Marco
668	12/1/2011 14:55	45.4344	12.339	7.2111	298	58.0544	60	535: People - Directly in the middle of San Marco
669	12/1/2011 14:57	45.4342	12.3383	4.24264	225.2	56.4496	58	536: People, construction - San Marco
670	12/1/2011 15:00	45.4338	12.3374	3.60555	242.6	64.1932	67	537: Bells, construction - San Marci
689	12/1/2011 23:58	45.4337	12.3375	6.7082	0	55.6703	55	999: Bells - Piazza San Marco
690	12/2/2011 0:00	45.4337	12.3375	5	0	57.3516	55	1,000: West of Square by Camera - Piazza San Marco
691	12/2/2011 0:03	45.434	12.3382	3.60555	67.8	70.4135	67	1001: Center of Square - Piazza San Marco
692	12/2/2011 0:06	45.4344	12.3391	5	51.2	49.6529	50	1002: Immediately infront of Basillica - Piazza San Marco
693	12/2/2011 0:09	45.4338	12.3396	5	151.9	53.8341	50	1003: In front of Doge's Palace - Piazza San Marco
694	12/2/2011 0:12	45.4333	12.3398	2.82843	166.8	59.8941	52	1004: Waterfront - Piazza San Marco
695	12/2/2011 0:15	45.4335	12.3409	8.544	61.5	52.9143	52	1005: Waterfront near Ponte della Pagila - Piazza San Marco
696	12/2/2011 0:18	45.4329	12.3385	2.82843	243.6	46.3041	50	1006: Western Part of the Waterfront - Piazza San Marco
697	12/2/2011 0:30	45.4339	12.3377	4.47214	40	45.9447	50	1007: West of Square by Camera - Piazza San Marco
698	12/2/2011 0:33	45.4341	12.3381	17.088	42.7	59.1472	52	1008: Center of Square - Piazza San Marco
699	12/2/2011 0:36	45.4344	12.339	4.24264	164.3	53.2435	52	1009: Immediately infront of Basillica - Piazza San Marco
700	12/2/2011 0:39	45.4339	12.3395	10	151.5	53.2126	50	1010: In front of Doge's Palace - Piazza San Marco
701	12/2/2011 0:42	45.4336	12.3409	6.32456	76	55.4706	54	1011: Waterfront near Ponte della Pagila - Piazza San Marco

702	12/2/2011 0:45	45.4333	12.3398	2.82843	34.9	54.6559	52	1012: Waterfront - Piazza San Marco
703	12/2/2011 0:48	45.4328	12.3385	6.7082	272.1	53.4031	51	1013: Western Part of the Waterfront - Piazza San Marco
704	12/2/2011 1:00	45.4338	12.3378	13.4164	61	50.7373	52	1014: West of Square by Camera - Piazza San Marco
705	12/2/2011 1:01	45.4341	12.3381	6.7082	52.7	53.8514	50	1015: Center of Square - Piazza San Marco
706	12/2/2011 1:03	45.4344	12.3391	7.2111	54.3	49.544	50	1016: Immediately infront of Basillica - Piazza San Marco
707	12/2/2011 1:04	45.434	12.3394	8.48528	170.7	56.0665	53	1017: In front of Doge's Palace - Piazza San Marco
708	12/2/2011 1:06	45.4336	12.3409	3.60555	87	52.6144	50	1018: Waterfront near Ponte della Pagila - Piazza San Marco
709	12/2/2011 1:07	45.4333	12.3398	2.82843	225.7	54.6979	50	1019: Waterfront - Piazza San Marco
710	12/2/2011 1:09	45.4329	12.3385	2.82843	257.4	48.7521	50	1020: Western Part of the Waterfront - Piazza San Marco
711	12/2/2011 1:30	45.4337	12.3374	8.48528	344.3	47.9275	50	1021: West of Square by Camera - Piazza San Marco
712	12/2/2011 1:31	45.4341	12.3381	4.24264	58	47.841	50	1022: Center of Square - Piazza San Marco
713	12/2/2011 1:32	45.4344	12.3391	4.47214	54.7	50.907	50	1023: Immediately infront of Basillica - Piazza San Marco
714	12/2/2011 1:33	45.4339	12.3396	8.94427	164.8	49.8628	50	1024: In front of Doge's Palace - Piazza San Marco
715	12/2/2011 1:35	45.4336	12.3409	2.82843	80.6	51.5262	52	1025: Waterfront near Ponte della Pagila - Piazza San Marco
716	12/2/2011 1:36	45.4333	12.3398	3.60555	264.4	58.1806	54	1026: Waterfront - Piazza San Marco
717	12/2/2011 1:37	45.4329	12.3385	2.82843	54	46.9759	50	1027: Western Part of the Waterfront - Piazza San Marco
718	12/2/2011 2:00	45.4337	12.3377	7.2111	0	54.6176	57	1028: West of Square by Camera - Piazza San Marco
719	12/2/2011 2:02	45.4341	12.3382	4.24264	49.3	47.139	50	1029: Center of Square - Piazza San Marco
720	12/2/2011 2:03	45.4344	12.3391	5	69.9	49.2185	50	1030: Immediately infront of Basillica - Piazza San Marco

721	12/2/2011 2:04	45.4337	12.3394	7.2111	173.3	66.7081	60	1031: In front of Doge's Palace - Piazza San Marco
722	12/2/2011 2:06	45.4336	12.3408	3.60555	94	48.554	50	1032: Waterfront near Ponte della Pagila - Piazza San Marco
723	12/2/2011 2:07	45.4333	12.3398	3.60555	226.7	64.686	58	1033: Waterfront - Piazza San Marco
724	12/2/2011 2:10	45.4328	12.3385	5	237.3	48.723	50	1034: Western Part of the Waterfront - Piazza San Marco
725	12/2/2011 2:30	45.4339	12.3375	8.94427	7.8	46.348	50	1035: West of Square by Camera - Piazza San Marco
726	12/2/2011 2:31	45.4341	12.3382	3.60555	39.9	47.1227	50	1036: Center of Square - Piazza San Marco
727	12/2/2011 2:32	45.4343	12.3391	3.60555	44.8	47.0337	50	1037: Immediately infront of Basillica - Piazza San Marco
728	12/2/2011 2:33	45.434	12.3395	14.4222	155.4	47.7259	50	1038: In front of Doge's Palace - Piazza San Marco
729	12/2/2011 2:34	45.4336	12.3408	5	234.9	48.0621	50	1039: Waterfront near Ponte della Pagila - Piazza San Marco
730	12/2/2011 2:36	45.4333	12.3397	3.60555	173.7	55.1121	53	1040: Waterfront - Piazza San Marco
731	12/2/2011 2:37	45.4329	12.3385	3.60555	220.1	46.1815	50	1041: Western Part of the Waterfront - Piazza San Marco
732	12/2/2011 3:00	45.4337	12.3376	17.8885	0	46.3539	50	1042: West of Square by Camera - Piazza San Marco
733	12/2/2011 3:01	45.4341	12.3382	8.94427	52.7	46.3248	50	1043: Center of Square - Piazza San Marco
734	12/2/2011 3:02	45.4344	12.3392	7.2111	109.2	46.6917	50	1044: Immediately infront of Basillica - Piazza San Marco
735	12/2/2011 3:04	45.4338	12.3397	7.2111	166.8	60.8887	53	1045: In front of Doge's Palace - Piazza San Marco
736	12/2/2011 3:06	45.4336	12.3409	3.60555	85.8	50.1792	50	1046: Waterfront near Ponte della Pagila - Piazza San Marco
737	12/2/2011 3:07	45.4333	12.3397	3.60555	246.6	53.7869	51	1047: Waterfront - Piazza San Marco
738	12/2/2011 3:09	45.4329	12.3385	3.60555	257.1	48.0204	50	1048: Western Part of the Waterfront - Piazza San Marco
739	12/2/2011 3:30	45.4336	12.3387	25.2982	79.5	54.1906	50	1049: West of Square by Camera - Piazza San Marco

740	12/2/2011 3:31	45.4338	12.3384	13.4164	326.3	48.2829	50	1050: Center of Square - Piazza San Marco
741	12/2/2011 3:32	45.4343	12.3391	5	202.9	46.1224	50	1051: Immediately infront of Basillica - Piazza San Marco
742	12/2/2011 3:33	45.4339	12.3395	6.7082	145.2	47.2214	50	1052: In front of Doge's Palace - Piazza San Marco
744	12/2/2011 3:35	45.4336	12.3409	3.60555	65.6	48.6425	50	1053: Waterfront near Ponte della Pagila - Piazza San Marco
745	12/2/2011 3:37	45.4333	12.3398	4.24264	246.3	52.8711	50	1054: Waterfront - Piazza San Marco
746	12/2/2011 3:38	45.4329	12.3385	3.60555	262.4	49.5166	50	1055: Western Part of the Waterfront - Piazza San Marco
747	12/2/2011 4:00	45.4344	12.3382	26.8328	0	45.7593	50	1056: West of Square by Camera - Piazza San Marco
748	12/2/2011 4:02	45.4341	12.3382	12.6491	77.1	46.0318	50	1057: Center of Square - Piazza San Marco
749	12/2/2011 4:03	45.4343	12.3391	8.48528	79.6	52.4066	50	1058: Immediately infront of Basillica - Piazza San Marco
750	12/2/2011 4:05	45.4338	12.3395	7.2111	167.3	55.1564	51	1059: In front of Doge's Palace - Piazza San Marco
751	12/2/2011 4:07	45.4336	12.3409	3.60555	95.7	47.5008	50	1060: Waterfront near Ponte della Pagila - Piazza San Marco
752	12/2/2011 4:08	45.4333	12.3398	4.24264	262.6	57.9422	50	1061: Waterfront - Piazza San Marco
753	12/2/2011 4:10	45.4329	12.3385	3.60555	271.5	47.2896	50	1062: Western Part of the Waterfront - Piazza San Marco
754	12/2/2011 4:30	45.4343	12.3384	14.4222	0	50.2222	50	1063: West of Square by Camera - Piazza San Marco
755	12/2/2011 4:31	45.4341	12.3383	6.7082	58.3	48.6624	50	1064: Center of Square - Piazza San Marco
756	12/2/2011 4:32	45.4343	12.3391	8.94427	111.9	46.6427	50	1065: Immediately infront of Basillica - Piazza San Marco
757	12/2/2011 4:33	45.4339	12.3395	8.544	184	57.8365	52	1066: In front of Doge's Palace - Piazza San Marco
758	12/2/2011 4:35	45.4336	12.3409	2.82843	79.9	49.6923	50	1067: Waterfront near Ponte della Pagila - Piazza San Marco
759	12/2/2011 4:36	45.4333	12.3398	2.82843	241.7	58.1256	54	1068: Waterfront - Piazza San Marco

760	12/2/2011 4:37	45.4329	12.3386	2.82843	76.4	48.3099	50	1069: Western Part of the Waterfront - Piazza San Marco
761	12/2/2011 5:00	45.4335	12.3376	13.4164	45.8	46.3993	50	1070: West of Square by Camera - Piazza San Marco
762	12/2/2011 5:01	45.434	12.3381	3.60555	258.8	46.2222	50	1071: Center of Square - Piazza San Marco
763	12/2/2011 5:02	45.4344	12.3391	7.2111	41.3	46.9314	50	1072: Immediately infront of Basillica - Piazza San Marco
764	12/2/2011 5:04	45.4337	12.3395	5	168.4	58.656	50	1073: In front of Doge's Palace - Piazza San Marco
765	12/2/2011 5:06	45.4336	12.3409	2.82843	88.3	53.4494	51	1074: Waterfront near Ponte della Pagila - Piazza San Marco
766	12/2/2011 5:07	45.4333	12.3397	3.60555	246.4	52.3962	51	1075: Waterfront - Piazza San Marco
767	12/2/2011 5:09	45.4329	12.3385	3.60555	253.9	49.6634	50	1076: Western Part of the Waterfront - Piazza San Marco
768	12/2/2011 5:30	45.434	12.3375	8.94427	126.5	49.2279	50	1077: West of Square by Camera - Piazza San Marco
769	12/2/2011 5:31	45.4341	12.3381	2.82843	73.1	48.2515	50	1078: Center of Square - Piazza San Marco
770	12/2/2011 5:32	45.4343	12.3392	5	83.2	50.2356	50	1079: Immediately infront of Basillica - Piazza San Marco
771	12/2/2011 5:33	45.4339	12.3396	5	151.6	65.4803	55	1080: In front of Doge's Palace - Piazza San Marco
772	12/2/2011 5:35	45.4336	12.3409	2.82843	48.8	54.7947	54	1081: Waterfront near Ponte della Pagila - Piazza San Marco
773	12/2/2011 5:36	45.4333	12.3398	2.82843	238.7	55.5789	53	1082: Waterfront - Piazza San Marco
774	12/2/2011 5:38	45.4329	12.3386	3.60555	71.3	52.3974	51	1083: Western Part of the Waterfront - Piazza San Marco
775	12/2/2011 6:00	45.4337	12.3375	13.4164	12.9	57.519	59	1084: West of Square by Camera - Piazza San Marco
776	12/2/2011 6:02	45.4341	12.3382	4.24264	66.7	47.3787	50	1085: Center of Square - Piazza San Marco
777	12/2/2011 6:04	45.4343	12.3393	5	356	48.4104	50	1086: Immediately infront of Basillica - Piazza San Marco
778	12/2/2011 6:09	45.4336	12.3397	6.7082	11	55.8212	51	1087: In front of Doge's Palace - Piazza San Marco

779	12/2/2011 6:11	45.4336	12.3409	3.60555	94.6	55.3732	54	1088: Waterfront near Ponte della Pagila - Piazza San Marco
780	12/2/2011 6:12	45.4333	12.3398	2.82843	225.7	58.5591	53	1089: Waterfront - Piazza San Marco
781	12/2/2011 6:14	45.4329	12.3385	3.60555	24.9	53.4308	53	1090: Western Part of the Waterfront - Piazza San Marco
782	12/2/2011 6:31	45.4344	12.3382	13.4164	0	54.1272	51	1091: West of Square by Camera - Piazza San Marco
783	12/2/2011 6:32	45.4341	12.3382	6.7082	54.3	55.1526	50	1092: Center of Square - Piazza San Marco
784	12/2/2011 6:34	45.4344	12.3391	5	95.1	49.98	50	1093: Immediately infront of Basillica - Piazza San Marco
785	12/2/2011 6:35	45.4339	12.3396	6.7082	127.1	55.0321	50	1094: In front of Doge's Palace - Piazza San Marco
786	12/2/2011 6:37	45.4336	12.3409	3.60555	83.1	53.7994	52	1095: Waterfront near Ponte della Pagila - Piazza San Marco
787	12/2/2011 6:38	45.4333	12.3398	2.82843	236.9	68.5464	57	1096: Waterfront - Piazza San Marco
788	12/2/2011 6:40	45.4329	12.3385	3.60555	240.3	52.2732	50	1097: Western Part of the Waterfront - Piazza San Marco
789	12/2/2011 7:00	45.4337	12.3376	10	0	51.8418	50	1098: West of Square by Camera - Piazza San Marco
790	12/2/2011 7:01	45.4341	12.3382	13.4164	40.1	76.75	75	1099: Center of Square - Piazza San Marco
791	12/2/2011 7:03	45.4344	12.3391	13.4164	130.8	76.0168	73	1100: Immediately infront of Basillica - Piazza San Marco
792	12/2/2011 7:04	45.4337	12.3395	13.4164	169.1	57.8264	52	1101: In front of Doge's Palace - Piazza San Marco
793	12/2/2011 7:06	45.4335	12.3409	4.47214	78.8	56.6279	57	1102: Waterfront near Ponte della Pagila - Piazza San Marco
794	12/2/2011 7:07	45.4333	12.3398	6.7082	288.8	56.2016	54	1103: Waterfront - Piazza San Marco
795	12/2/2011 7:09	45.4329	12.3385	2.82843	233.1	55.8383	56	1104: Western Part of the Waterfront - Piazza San Marco
796	12/2/2011 7:30	45.434	12.3377	17.088	282.8	54.6683	54	1105: West of Square by Camera - Piazza San Marco
797	12/2/2011 7:31	45.4341	12.3382	5	52.7	54.3136	53	1106: Center of Square - Piazza San Marco

798	12/2/2011 7:33	45.4345	12.3392	25.2982	31.5	52.0752	50	1107: Immediately infront of Basillica - Piazza San Marco
799	12/2/2011 7:34	45.4337	12.3394	7.2111	172.7	56.9374	57	1108: In front of Doge's Palace - Piazza San Marco
800	12/2/2011 7:35	45.4335	12.3408	6.7082	256.6	56.4913	57	1109: Waterfront near Ponte della Pagila - Piazza San Marco
801	12/2/2011 7:37	45.4333	12.3397	12.6491	273.8	54.9974	54	1110: Waterfront - Piazza San Marco
802	12/2/2011 7:38	45.4329	12.3386	12.6491	67.2	53.5633	52	1111: Western Part of the Waterfront - Piazza San Marco
803	12/2/2011 8:00	45.4345	12.3397	17.088	30.7	56.3124	58	1112: West of Square by Camera - Piazza San Marco
804	12/2/2011 8:01	45.4339	12.3383	10	40.6	51.16	50	1113: Center of Square - Piazza San Marco
805	12/2/2011 8:03	45.4343	12.3391	12.3693	117.7	53.3189	51	1114: Immediately infront of Basillica - Piazza San Marco
806	12/2/2011 8:04	45.4338	12.3396	7.2111	157.1	60.7562	56	1115: In front of Doge's Palace - Piazza San Marco
807	12/2/2011 8:06	45.4335	12.3408	5	225.6	56.2095	58	1116: Waterfront near Ponte della Pagila - Piazza San Marco
808	12/2/2011 8:07	45.4333	12.3397	6.7082	290.2	56.7918	55	1117: Waterfront - Piazza San Marco
809	12/2/2011 8:09	45.4329	12.3386	4.47214	51.5	54.3326	54	1118: Western Part of the Waterfront - Piazza San Marco
810	12/2/2011 8:30	45.4338	12.3391	33.9411	0	56.3413	61	1119: West of Square by Camera - Piazza San Marco
811	12/2/2011 8:31	45.4339	12.3382	13.4164	22.8	52.5505	51	1120: Center of Square - Piazza San Marco
812	12/2/2011 8:32	45.4343	12.3391	6.7082	13.9	51.1665	50	1121: Immediately infront of Basillica - Piazza San Marco
813	12/2/2011 8:33	45.4338	12.3395	6.7082	164.7	54.2553	53	1122: In front of Doge's Palace - Piazza San Marco
814	12/2/2011 8:35	45.4335	12.3408	8.544	242.5	55.3758	56	1123: Waterfront near Ponte della Pagila - Piazza San Marco
815	12/2/2011 8:36	45.4332	12.3397	4.47214	231	62.6142	59	1124: Waterfront - Piazza San Marco
816	12/2/2011 8:38	45.4328	12.3385	7.2111	194	56.5606	56	1125: Western Part of the Waterfront - Piazza San Marco

817	12/2/2011 9:00	45.4337	12.3374	20	281	57.0244	60	1126: West of Square by Camera - Piazza San Marco
818	12/2/2011 9:01	45.4341	12.3379	8.94427	61.2	75.5728	75	1127: Center of Square - Piazza San Marco
819	12/2/2011 9:02	45.4343	12.339	3.60555	88	75.6726	76	1128: Immediately infront of Basillica - Piazza San Marco
820	12/2/2011 9:03	45.4339	12.3395	8.94427	195	66.3904	61	1129: In front of Doge's Palace - Piazza San Marco
821	12/2/2011 9:05	45.4335	12.3408	4.47214	231	58.0332	57	1130: Waterfront near Ponte della Pagila - Piazza San Marco
822	12/2/2011 9:06	45.4333	12.3397	3.60555	225	61.1189	58	1131: Waterfront - Piazza San Marco
823	12/2/2011 9:08	45.4329	12.3385	5	234.7	55.1181	55	1132: Western Part of the Waterfront - Piazza San Marco
824	12/2/2011 9:30	45.434	12.3377	13.4164	0	55.1651	55	1133: West of Square by Camera - Piazza San Marco
825	12/2/2011 9:31	45.4343	12.3381	8.544	82.8	56.8326	58	1134: Center of Square - Piazza San Marco
826	12/2/2011 9:33	45.4342	12.3392	3.60555	81	62.662	63	1135: Immediately infront of Basillica - Piazza San Marco
827	12/2/2011 9:34	45.434	12.3396	13.4164	141	56.0427	56	1136: In front of Doge's Palace - Piazza San Marco
828	12/2/2011 9:36	45.4335	12.3409	6.7082	45.3	57.3893	59	1137: Waterfront near Ponte della Pagila - Piazza San Marco
829	12/2/2011 9:38	45.4333	12.3397	4.24264	224.1	56.2942	57	1138: Waterfront - Piazza San Marco
830	12/2/2011 9:39	45.4329	12.3385	4.24264	245	57.5687	59	1139: Western Part of the Waterfront - Piazza San Marco
831	12/2/2011 10:00	45.4339	12.3379	20	0	57.0859	61	1140: West of Square by Camera - Piazza San Marco
832	12/2/2011 10:01	45.4341	12.3382	5.65685	69.4	57.0723	59	1141: Center of Square - Piazza San Marco
833	12/2/2011 10:02	45.4343	12.3391	3.60555	45.8	61.0086	62	1142: Immediately infront of Basillica - Piazza San Marco
834	12/2/2011 10:04	45.4336	12.3396	12.6491	141	67.0921	63	1143: In front of Doge's Palace - Piazza San Marco
835	12/2/2011 10:05	45.4334	12.341	6.7082	94.1	57.255	60	1144: Waterfront near Ponte della Pagila - Piazza San Marco

836	12/2/2011 10:07	45.4333	12.3398	3.60555	297.9	60.3862	62	1145: Waterfront - Piazza San Marco
837	12/2/2011 10:09	45.4329	12.3386	3.60555	244.3	55.573	56	1146: Western Part of the Waterfront - Piazza San Marco
838	12/2/2011 10:30	45.4334	12.3375	20	0	55.5402	56	1147: West of Square by Camera - Piazza San Marco
839	12/2/2011 10:31	45.4341	12.3382	6.32456	57.4	58.329	61	1148: Center of Square - Piazza San Marco
840	12/2/2011 10:32	45.4344	12.3391	5	87.9	62.7116	63	1149: Immediately infront of Basillica - Piazza San Marco
841	12/2/2011 10:34	45.4338	12.3396	7.2111	162.1	59.675	60	1150: In front of Doge's Palace - Piazza San Marco
842	12/2/2011 10:35	45.4336	12.3408	4.24264	51.3	56.277	57	1151: Waterfront near Ponte della Pagila - Piazza San Marco
843	12/2/2011 10:37	45.4333	12.3397	3.60555	224	61.8203	61	1152: Waterfront - Piazza San Marco
844	12/2/2011 10:38	45.4329	12.3386	3.60555	263	57.5808	58	1153: Western Part of the Waterfront - Piazza San Marco
845	12/2/2011 11:00	45.4335	12.3376	6.7082	109.1	57.1581	59	1154: West of Square by Camera - Piazza San Marco
846	12/2/2011 11:02	45.434	12.3382	4.24264	88.2	61.837	65	1155: Center of Square - Piazza San Marco
847	12/2/2011 11:03	45.4343	12.3391	3.60555	55.5	72.6017	70	1156: Immediately infront of Basillica - Piazza San Marco
848	12/2/2011 11:04	45.4339	12.3396	5	169.5	63.5683	63	1157: In front of Doge's Palace - Piazza San Marco
849	12/2/2011 11:06	45.4335	12.3408	3.60555	63	57.1301	58	1158: Waterfront near Ponte della Pagila - Piazza San Marco
850	12/2/2011 11:08	45.4333	12.3398	3.60555	243.1	58.701	60	1159: Waterfront - Piazza San Marco
851	12/2/2011 11:09	45.4329	12.3386	2.82843	253.4	55.3922	55	1160: Western Part of the Waterfront - Piazza San Marco
852	12/2/2011 11:30	45.4336	12.3375	6.32456	55.4	55.9614	58	1161: West of Square by Camera - Piazza San Marco
853	12/2/2011 11:32	45.4341	12.3381	2.82843	232.9	58.1535	61	1162: Center of Square - Piazza San Marco
854	12/2/2011 11:34	45.4344	12.3391	5.65685	43.1	63.5797	63	1163: Immediately infront of Basillica - Piazza San Marco

855	12/2/2011 11:35	45.4338	12.3396	2.82843	147.2	58.4826	61	1164: In front of Doge's Palace - Piazza San Marco
856	12/2/2011 11:36	45.4336	12.3408	3.60555	245.4	56.4246	58	1165: Waterfront near Ponte della Pagila - Piazza San Marco
857	12/2/2011 11:38	45.4334	12.3398	2.82843	276	58.454	60	1166: Waterfront - Piazza San Marco
858	12/2/2011 11:39	45.4329	12.3385	3.60555	249.3	54.3708	54	1167: Western Part of the Waterfront - Piazza San Marco
859	12/2/2011 12:00	45.4337	12.3375	10	0	55.5518	56	1168: West of Square by Camera - Piazza San Marco
860	12/2/2011 12:01	45.4341	12.3382	3.60555	28.1	73.4879	74	1169: Center of Square - Piazza San Marco
861	12/2/2011 12:03	45.4344	12.3391	5	73.1	76.1497	74	1170: Immediately infront of Basillica - Piazza San Marco
862	12/2/2011 12:04	45.4338	12.3396	8.94427	153.4	55.9374	57	1171: In front of Doge's Palace - Piazza San Marco
863	12/2/2011 12:06	45.4336	12.3408	7.2111	80.9	55.5085	56	1172: Waterfront near Ponte della Pagila - Piazza San Marco
864	12/2/2011 12:08	45.4333	12.3398	3.60555	264.7	56.9417	57	1173: Waterfront - Piazza San Marco
865	12/2/2011 12:09	45.4329	12.3385	3.60555	262.8	55.0622	55	1174: Western Part of the Waterfront - Piazza San Marco
866	12/2/2011 12:30	45.4337	12.3379	17.8885	289.7	56.0121	58	1175: West of Square by Camera - Piazza San Marco
867	12/2/2011 12:31	45.4341	12.3381	3.60555	90.4	56.519	58	1176: Center of Square - Piazza San Marco
868	12/2/2011 12:32	45.4344	12.3391	2.82843	27.7	61.1497	62	1177: Immediately infront of Basillica - Piazza San Marco
869	12/2/2011 12:33	45.4338	12.3395	6.7082	184.5	56.7714	58	1178: In front of Doge's Palace - Piazza San Marco
870	12/2/2011 12:35	45.4336	12.3409	2.82843	60.3	59.6495	60	1179: Waterfront near Ponte della Pagila - Piazza San Marco
871	12/2/2011 12:36	45.4333	12.3398	2.82843	269.7	56.1906	57	1180: Waterfront - Piazza San Marco
872	12/2/2011 12:38	45.4329	12.3385	2.82843	247.5	58.2859	60	1181: Western Part of the Waterfront - Piazza San Marco
873	12/2/2011 13:00	45.4337	12.3375	5.65685	0	56.0118	57	1182: West of Square by Camera - Piazza San Marco

874	12/2/2011 13:01	45.4342	12.3381	4.24264	79.6	55.4615	56	1183: Center of Square - Piazza San Marco
875	12/2/2011 13:02	45.4344	12.3391	5	50.4	56.8483	60	1184: Immediately infront of Basillica - Piazza San Marco
876	12/2/2011 13:04	45.4338	12.3396	7.2111	169.3	68.0905	65	1185: In front of Doge's Palace - Piazza San Marco
877	12/2/2011 13:06	45.4335	12.3409	3.60555	107.2	62.4411	63	1186: Waterfront near Ponte della Pagila - Piazza San Marco
878	12/2/2011 13:08	45.4333	12.3398	2.82843	271.3	56.5968	57	1187: Waterfront - Piazza San Marco
879	12/2/2011 13:10	45.4328	12.3385	2.82843	270.4	54.6007	54	1188: Western Part of the Waterfront - Piazza San Marco
880	12/2/2011 13:30	45.4336	12.3374	24.7386	320.1	53.9984	54	1189: West of Square by Camera - Piazza San Marco
881	12/2/2011 13:31	45.4341	12.3381	2.82843	45.8	54.5626	55	1190: Center of Square - Piazza San Marco
882	12/2/2011 13:33	45.4343	12.3391	3.60555	49.6	55.5189	57	1191: Immediately infront of Basillica - Piazza San Marco
883	12/2/2011 13:34	45.4338	12.3396	3.60555	163.8	56.3873	57	1192: In front of Doge's Palace - Piazza San Marco
884	12/2/2011 13:35	45.4336	12.3409	2.82843	45.4	57.0701	58	1193: Waterfront near Ponte della Pagila - Piazza San Marco
885	12/2/2011 13:36	45.4333	12.3398	2.82843	247.4	57.8893	58	1194: Waterfront - Piazza San Marco
886	12/2/2011 13:38	45.4329	12.3385	3.60555	250.5	57.7724	59	1195: Western Part of the Waterfront - Piazza San Marco
887	12/2/2011 14:00	45.4337	12.3376	7.2111	96.2	55.4688	57	1196: West of Square by Camera - Piazza San Marco
888	12/2/2011 14:01	45.4341	12.3381	2.82843	49.3	76.8889	76	1197: Center of Square - Piazza San Marco
889	12/2/2011 14:02	45.4343	12.3391	2.82843	171	76.4245	76	1198: Immediately infront of Basillica - Piazza San Marco
890	12/2/2011 14:03	45.4338	12.3396	5	198.8	56.7046	59	1199: In front of Doge's Palace - Piazza San Marco
891	12/2/2011 14:05	45.4336	12.3409	5	80.6	60.9687	62	1200: Waterfront near Ponte della Pagila - Piazza San Marco
892	12/2/2011 14:07	45.4333	12.3398	2.82843	285.4	56.6315	58	1201: Waterfront - Piazza San Marco

893	12/2/2011 14:09	45.4329	12.3385	4.24264	259.8	54.9699	55	1202: Western Part of the Waterfront - Piazza San Marco
894	12/2/2011 14:30	45.4338	12.3377	17.088	0	52.7702	52	1203: West of Square by Camera - Piazza San Marco
895	12/2/2011 14:31	45.4341	12.3381	2.82843	70.9	53.3179	52	1204: Center of Square - Piazza San Marco
896	12/2/2011 14:32	45.4343	12.3391	3.60555	61.4	68.5358	68	1205: Immediately infront of Basillica - Piazza San Marco
897	12/2/2011 14:34	45.4338	12.3396	7.2111	162	60.6337	64	1206: In front of Doge's Palace - Piazza San Marco
898	12/2/2011 14:35	45.4336	12.3409	5.65685	74.6	57.3341	59	1207: Waterfront near Ponte della Pagila - Piazza San Marco
899	12/2/2011 14:37	45.4333	12.3398	2.82843	257.4	56.3083	57	1208: Waterfront - Piazza San Marco
900	12/2/2011 14:38	45.4329	12.3385	4.24264	236.6	55.222	55	1209: Western Part of the Waterfront - Piazza San Marco
901	12/2/2011 15:00	45.4337	12.3375	6.7082	42.8	54.9733	56	1210: West of Square by Camera - Piazza San Marco
902	12/2/2011 15:01	45.4341	12.3382	5	47.4	74.4629	68	1211: Center of Square - Piazza San Marco
903	12/2/2011 15:02	45.4345	12.3392	10	53.7	74.9246	70	1212: Immediately infront of Basillica - Piazza San Marco
904	12/2/2011 15:04	45.4337	12.3393	6.7082	177.4	59.5659	63	1213: In front of Doge's Palace - Piazza San Marco
905	12/2/2011 15:05	45.4336	12.3409	7.2111	102.8	69.8902	65	1214: Waterfront near Ponte della Pagila - Piazza San Marco
906	12/2/2011 15:07	45.4333	12.3398	5	251.5	59.4796	62	1215: Waterfront - Piazza San Marco
907	12/2/2011 15:09	45.4329	12.3386	3.60555	263.1	56.1077	57	1216: Western Part of the Waterfront - Piazza San Marco
908	12/2/2011 15:30	45.4336	12.3377	13.4164	0	56.6568	58	1217: West of Square by Camera - Piazza San Marco
910	12/2/2011 15:31	45.4339	12.3385	6.7082	69.9	55.8133	57	1218: Center of Square - Piazza San Marco
911	12/2/2011 15:32	45.4343	12.3393	8.48528	77.6	55.504	56	1219: Immediately infront of Basillica - Piazza San Marco
912	12/2/2011 15:34	45.4338	12.3395	3.60555	145.9	57.8408	59	1220: In front of Doge's Palace - Piazza San Marco

913	12/2/2011 15:35	45.4336	12.3408	2.82843	63.3	59.2149	61	1221: Waterfront near Ponte della Pagila - Piazza San Marco
914	12/2/2011 15:37	45.4333	12.3397	2.82843	244.7	55.7041	56	1222: Waterfront - Piazza San Marco
915	12/2/2011 15:38	45.4329	12.3385	3.60555	267.5	58.3796	61	1223: Western Part of the Waterfront - Piazza San Marco
916	12/2/2011 16:00	45.4337	12.3378	10	0	54.6648	54	1224: West of Square by Camera - Piazza San Marco
917	12/2/2011 16:01	45.4342	12.3383	8.48528	57.5	58.0258	60	1225: Center of Square - Piazza San Marco
918	12/2/2011 16:02	45.4344	12.3391	5	73.2	56.9923	58	1226: Immediately infront of Basillica - Piazza San Marco
919	12/2/2011 16:04	45.4338	12.3395	4.47214	167.5	56.9842	58	1227: In front of Doge's Palace - Piazza San Marco
920	12/2/2011 16:06	45.4336	12.3409	3.60555	73.7	58.13	68	1228: Waterfront near Ponte della Pagila - Piazza San Marco
921	12/2/2011 16:08	45.4333	12.3398	2.82843	277.8	56.9903	58	1229: Waterfront - Piazza San Marco
922	12/2/2011 16:10	45.4329	12.3385	2.82843	275.1	55.8813	56	1230: Western Part of the Waterfront - Piazza San Marco
923	12/2/2011 16:30	45.4336	12.3374	5	51.9	57.981	60	1231: West of Square by Camera - Piazza San Marco
924	12/2/2011 16:31	45.4341	12.3382	3.60555	70.8	73.725	73	1232: Center of Square - Piazza San Marco
925	12/2/2011 16:32	45.4343	12.339	5	60.4	78.4042	75	1233: Immediately infront of Basillica - Piazza San Marco
926	12/2/2011 16:33	45.4338	12.3395	3.60555	157.2	74.0361	71	1234: In front of Doge's Palace - Piazza San Marco
927	12/2/2011 16:34	45.4336	12.3409	3.60555	60	57.4511	59	1235: Waterfront near Ponte della Pagila - Piazza San Marco
928	12/2/2011 16:35	45.4333	12.3398	2.82843	250.4	58.92	60	1236: Waterfront - Piazza San Marco
929	12/2/2011 16:37	45.4329	12.3385	3.60555	72.6	55.8759	56	1237: Western Part of the Waterfront - Piazza San Marco
930	12/2/2011 17:00	45.4336	12.3376	13.4164	58.5	55.3587	56	1238: West of Square by Camera - Piazza San Marco
931	12/2/2011 17:01	45.4341	12.3381	3.60555	51.9	61.0961	62	1239: Center of Square - Piazza San Marco

932	12/2/2011 17:02	45.4343	12.3391	3.60555	58.8	56.1934	58	1240: Immediately infront of Basillica - Piazza San Marco
933	12/2/2011 17:03	45.4338	12.3395	7.2111	148.5	57.7686	60	1241: In front of Doge's Palace - Piazza San Marco
934	12/2/2011 17:05	45.4336	12.3408	3.60555	84.1	56.3812	57	1242: Waterfront near Ponte della Pagila - Piazza San Marco
935	12/2/2011 17:07	45.4333	12.3398	2.82843	279.3	57.5993	59	1243: Waterfront - Piazza San Marco
936	12/2/2011 17:09	45.4329	12.3385	2.82843	256.8	54.0664	53	1244: Western Part of the Waterfront - Piazza San Marco
937	12/2/2011 17:30	45.4337	12.3374	8.94427	28	54.7474	54	1245: West of Square by Camera - Piazza San Marco
938	12/2/2011 17:31	45.4341	12.3381	2.82843	70.1	53.8068	53	1246: Center of Square - Piazza San Marco
939	12/2/2011 17:32	45.4343	12.3391	4.24264	131	57.9353	60	1247: Immediately infront of Basillica - Piazza San Marco
940	12/2/2011 17:33	45.4338	12.3395	4.24264	154.2	54.4864	54	1248: In front of Doge's Palace - Piazza San Marco
941	12/2/2011 17:35	45.4336	12.3409	2.82843	71.3	58.1024	60	1249: Waterfront near Ponte della Pagila - Piazza San Marco
942	12/2/2011 17:36	45.4333	12.3398	2.82843	318.1	58.0042	60	1250: Waterfront - Piazza San Marco
943	12/2/2011 17:37	45.4329	12.3385	3.60555	245.8	56.128	57	1251: Western Part of the Waterfront - Piazza San Marco
944	12/2/2011 18:00	45.4341	12.338	13.4164	55.1	56.0561	57	1252: West of Square by Camera - Piazza San Marco
945	12/2/2011 18:01	45.4341	12.3381	5	77.6	57.2452	59	1253: Center of Square - Piazza San Marco
946	12/2/2011 18:03	45.4343	12.3391	3.60555	51.9	55.6154	56	1254: Immediately infront of Basillica - Piazza San Marco
947	12/2/2011 18:04	45.4338	12.3395	5	155.3	55.9566	57	1255: In front of Doge's Palace - Piazza San Marco
948	12/2/2011 18:06	45.4336	12.3409	2.82843	83.3	56.8512	59	1256: Waterfront near Ponte della Pagila - Piazza San Marco
949	12/2/2011 18:07	45.4333	12.3398	3.60555	276.5	55.878	56	1257: Waterfront - Piazza San Marco
950	12/2/2011 18:09	45.4328	12.3385	2.82843	247.8	56.8348	58	1258: Western Part of the Waterfront - Piazza San Marco

951	12/2/2011 18:30	45.4343	12.3384	8.48528	257.9	58.2633	61	1259: West of Square by Camera - Piazza San Marco
952	12/2/2011 18:31	45.4343	12.3382	5	58.4	76.4549	78	1260: Center of Square - Piazza San Marco
953	12/2/2011 18:32	45.4344	12.3391	3.60555	43.6	76.4776	77	1261: Immediately infront of Basillica - Piazza San Marco
954	12/2/2011 18:33	45.4338	12.3396	7.2111	161.2	55.6232	56	1262: In front of Doge's Palace - Piazza San Marco
956	12/2/2011 18:35	45.4335	12.3409	3.60555	85.5	56.5336	58	1263: Waterfront near Ponte della Pagila - Piazza San Marco
957	12/2/2011 18:38	45.4328	12.3385	3.60555	254.1	57.0208	60	1264: Waterfront - Piazza San Marco
958	12/2/2011 18:40	45.4333	12.3397	5	339.1	55.7928	59	1265: Western Part of the Waterfront - Piazza San Marco
959	12/2/2011 19:00	45.4336	12.3377	10	177	53.9275	54	1266: West of Square by Camera - Piazza San Marco
960	12/2/2011 19:01	45.4341	12.3382	12.3693	63.1	60.8873	65	1267: Center of Square - Piazza San Marco
961	12/2/2011 19:03	45.4343	12.339	5	357.5	54.6859	54	1268: Immediately infront of Basillica - Piazza San Marco
962	12/2/2011 19:04	45.4339	12.3395	6.32456	158.4	55.2864	56	1269: In front of Doge's Palace - Piazza San Marco
963	12/2/2011 19:06	45.4335	12.3408	3.60555	46.7	54.9217	55	1270: Waterfront near Ponte della Pagila - Piazza San Marco
964	12/2/2011 19:08	45.4333	12.3398	5	258.1	55.7163	56	1271: Waterfront - Piazza San Marco
965	12/2/2011 19:10	45.4329	12.3385	2.82843	238.9	56.3061	57	1272: Western Part of the Waterfront - Piazza San Marco
966	12/2/2011 19:30	45.434	12.3376	10	0	52.2684	51	1273: West of Square by Camera - Piazza San Marco
967	12/2/2011 19:31	45.434	12.3382	2.82843	74.7	54.2867	55	1274: Center of Square - Piazza San Marco
968	12/2/2011 19:32	45.4344	12.3391	4.47214	138.8	55.2123	56	1275: Immediately infront of Basillica - Piazza San Marco
969	12/2/2011 19:33	45.4338	12.3395	5	145.9	52.9435	51	1276: In front of Doge's Palace - Piazza San Marco
970	12/2/2011 19:35	45.4336	12.3408	5	86.8	55.1691	56	1277: Waterfront near Ponte della Pagila - Piazza San Marco

971	12/2/2011 19:37	45.4333	12.3397	3.60555	313.5	54.8262	55	1278: Waterfront - Piazza San Marco
972	12/2/2011 19:39	45.4329	12.3386	3.60555	76.2	55.1712	55	1279: Western Part of the Waterfront - Piazza San Marco
973	12/2/2011 20:00	45.4336	12.3387	25.2982	195.2	57.134	60	1280: West of Square by Camera - Piazza San Marco
974	12/2/2011 20:01	45.4341	12.3381	5	90	62.5721	64	1281: Center of Square - Piazza San Marco
975	12/2/2011 20:03	45.4344	12.3391	6.32456	72.7	54.6884	55	1282: Immediately infront of Basillica - Piazza San Marco
976	12/2/2011 20:04	45.4338	12.3396	5	141.7	54.2826	54	1283: In front of Doge's Palace - Piazza San Marco
977	12/2/2011 20:05	45.4336	12.3408	5	61.8	54.2719	53	1284: Waterfront near Ponte della Pagila - Piazza San Marco
978	12/2/2011 20:07	45.4333	12.3398	2.82843	229.4	53.8518	53	1285: Waterfront - Piazza San Marco
979	12/2/2011 20:08	45.4328	12.3385	2.82843	247.7	53.8883	52	1286: Western Part of the Waterfront - Piazza San Marco
980	12/2/2011 20:30	45.4336	12.3375	4.24264	0	50.399	50	1287: West of Square by Camera - Piazza San Marco
981	12/2/2011 20:31	45.4341	12.3382	3.60555	69.7	55.6247	56	1288: Center of Square - Piazza San Marco
982	12/2/2011 20:32	45.4343	12.3391	5	56.7	53.4724	54	1289: Immediately infront of Basillica - Piazza San Marco
983	12/2/2011 20:33	45.4338	12.3395	5	168.4	52.9087	51	1290: In front of Doge's Palace - Piazza San Marco
984	12/2/2011 20:35	45.4335	12.3409	5	237.4	55.7956	57	1291: Waterfront near Ponte della Pagila - Piazza San Marco
985	12/2/2011 20:36	45.4333	12.3398	3.60555	317.5	53.045	52	1292: Waterfront - Piazza San Marco
986	12/2/2011 20:38	45.4329	12.3385	4.47214	241.4	53.6553	53	1293: Western Part of the Waterfront - Piazza San Marco
987	12/2/2011 21:01	45.4337	12.3376	8.48528	33.3	55.9684	58	1294: West of Square by Camera - Piazza San Marco
988	12/2/2011 21:02	45.4341	12.3382	4.47214	46	54.5028	51	1295: Center of Square - Piazza San Marco
989	12/2/2011 21:03	45.4344	12.3391	6.32456	4.2	51.7748	50	1296: Immediately infront of Basillica - Piazza San Marco

990	12/2/2011 21:05	45.4339	12.3394	7.2111	154	54.2425	52	1297: In front of Doge's Palace - Piazza San Marco
991	12/2/2011 21:07	45.4336	12.3409	2.82843	100	54.8441	54	1298: Waterfront near Ponte della Pagila - Piazza San Marco
992	12/2/2011 21:08	45.4333	12.3398	4.47214	245	55.7022	56	1299: Waterfront - Piazza San Marco
993	12/2/2011 21:10	45.4329	12.3385	4.47214	269.9	54.2346	53	1300: Western Part of the Waterfront - Piazza San Marco
994	12/2/2011 21:30	45.4339	12.3375	13.4164	0	52.8685	53	1301: West of Square by Camera - Piazza San Marco
995	12/2/2011 21:32	45.434	12.3383	12.3693	11.4	51.7864	50	1302: Center of Square - Piazza San Marco
996	12/2/2011 21:33	45.4343	12.3391	6.7082	356.4	53.459	53	1303: Immediately infront of Basillica - Piazza San Marco
997	12/2/2011 21:34	45.434	12.3396	13.4164	168.1	54.6998	54	1304: In front of Doge's Palace - Piazza San Marco
998	12/2/2011 21:36	45.4336	12.3408	4.47214	345.7	51.6545	50	1305: Waterfront near Ponte della Pagila - Piazza San Marco
999	12/2/2011 21:37	45.4333	12.3398	8.544	274.2	54.5058	53	1306: Waterfront - Piazza San Marco
1,000	12/2/2011 21:39	45.4329	12.3386	4.47214	238.5	51.1421	50	1307: Western Part of the Waterfront - Piazza San Marco
1001	12/2/2011 22:00	45.4333	12.3387	26.8328	2.7	51.0762	50	1308: West of Square by Camera - Piazza San Marco
1002	12/2/2011 22:00	45.4341	12.3383	8.94427	51.7	49.6028	50	1309: Center of Square - Piazza San Marco
1003	12/2/2011 22:01	45.4344	12.339	7.2111	71.4	52.1817	51	1310: Immediately infront of Basillica - Piazza San Marco
1004	12/2/2011 22:02	45.4338	12.3397	8.94427	156	54.0938	51	1311: In front of Doge's Palace - Piazza San Marco
1005	12/2/2011 22:04	45.4336	12.3408	3.60555	242.9	54.0973	53	1312: Waterfront near Ponte della Pagila - Piazza San Marco
1006	12/2/2011 22:05	45.4333	12.3397	3.60555	229.1	51.8887	50	1313: Waterfront - Piazza San Marco
1007	12/2/2011 22:06	45.4329	12.3386	3.60555	244.7	53.275	51	1314: Western Part of the Waterfront - Piazza San Marco
1008	12/2/2011 22:30	45.4334	12.3383	26.8328	0	53.2354	52	1315: West of Square by Camera - Piazza San Marco

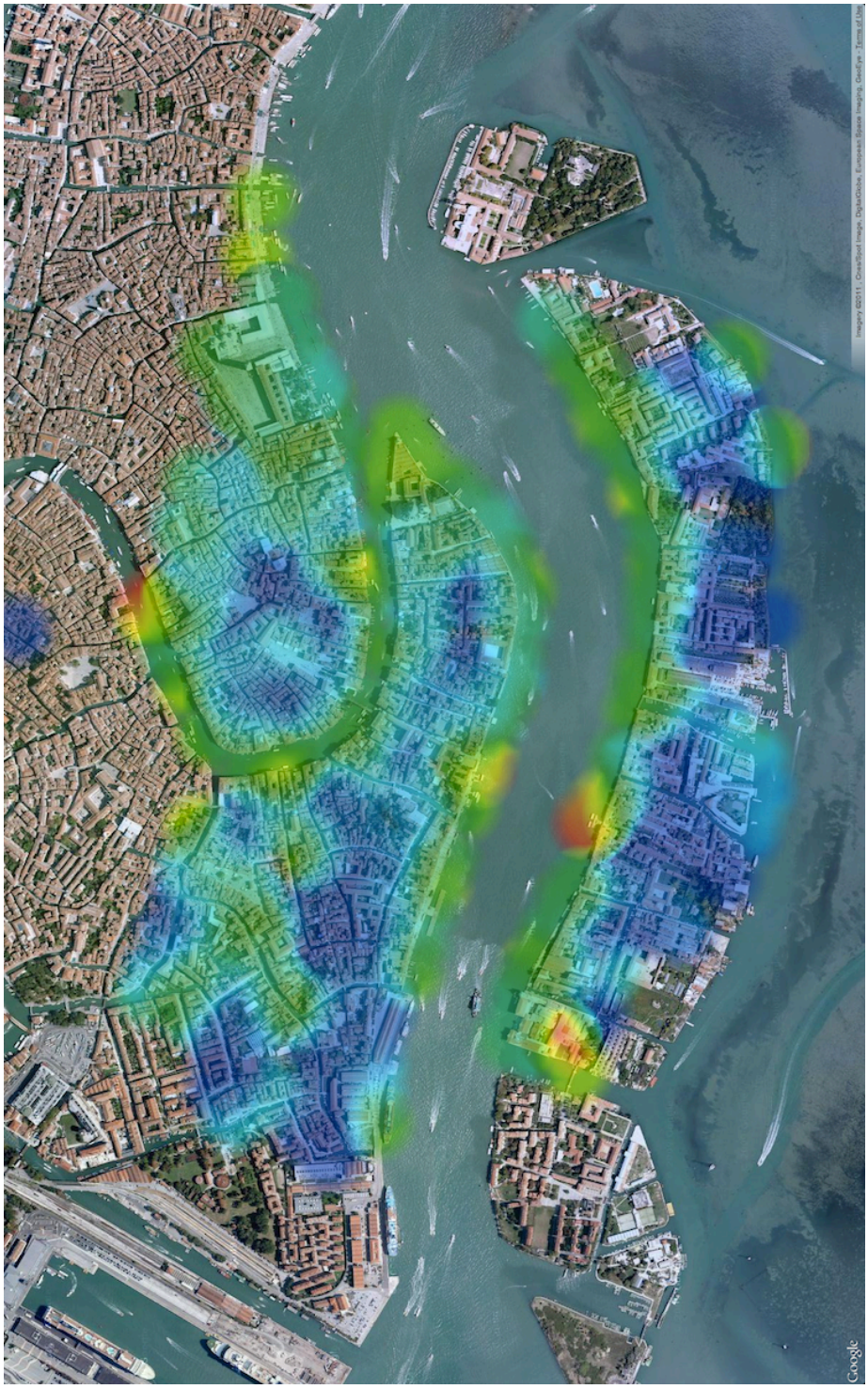
1009	12/2/2011 22:31	45.4341	12.3381	4.24264	46.3	52.8274	52	1316: Center of Square - Piazza San Marco
1010	12/2/2011 22:32	45.4343	12.339	4.24264	12.1	53.8892	53	1317: Immediately infront of Basillica - Piazza San Marco
1011	12/2/2011 22:33	45.4338	12.3397	7.2111	131.4	55.4741	56	1318: In front of Doge's Palace - Piazza San Marco
1012	12/2/2011 22:35	45.4336	12.3409	3.60555	68.1	53.6168	53	1319: Waterfront near Ponte della Pagila - Piazza San Marco
1013	12/2/2011 22:36	45.4333	12.3398	3.60555	292.3	52.9465	52	1320: Waterfront - Piazza San Marco
1014	12/2/2011 22:38	45.4329	12.3385	3.60555	254.4	56.2541	56	1321: Western Part of the Waterfront - Piazza San Marco
1015	12/2/2011 23:00	45.4342	12.3376	35.7771	36.4	54.9455	52	1322: West of Square by Camera - Piazza San Marco
1016	12/2/2011 23:01	45.4341	12.3381	3.60555	59.2	66.5213	65	1323: Center of Square - Piazza San Marco
1017	12/2/2011 23:02	45.4344	12.3391	5.65685	65.7	70.2837	70	1324: Immediately infront of Basillica - Piazza San Marco
1018	12/2/2011 23:03	45.4338	12.3395	7.2111	146.2	52.957	53	1325: In front of Doge's Palace - Piazza San Marco
1019	12/2/2011 23:05	45.4336	12.3409	5	96.5	52.8385	50	1326: Waterfront near Ponte della Pagila - Piazza San Marco
1020	12/2/2011 23:06	45.4333	12.3398	2.82843	260.2	53.947	52	1327: Waterfront - Piazza San Marco
1021	12/2/2011 23:08	45.4329	12.3385	3.60555	245.5	53.3761	51	1328: Western Part of the Waterfront - Piazza San Marco
1022	12/2/2011 23:30	45.4337	12.3378	16.9706	0	51.3766	50	1329: West of Square by Camera - Piazza San Marco
1023	12/2/2011 23:31	45.4342	12.3382	5	59.4	51.9906	51	1330: Center of Square - Piazza San Marco
1024	12/2/2011 23:32	45.4344	12.339	5.65685	74.2	54.1434	53	1331: Immediately infront of Basillica - Piazza San Marco
1025	12/2/2011 23:33	45.4338	12.3395	5	169.3	55.748	52	1332: In front of Doge's Palace - Piazza San Marco
1026	12/2/2011 23:35	45.4336	12.3409	10	72.4	56.2254	57	1333: Waterfront near Ponte della Pagila - Piazza San Marco
1027	12/2/2011 23:36	45.4333	12.3398	8.48528	291.6	53.3118	51	1334: Waterfront - Piazza San Marco

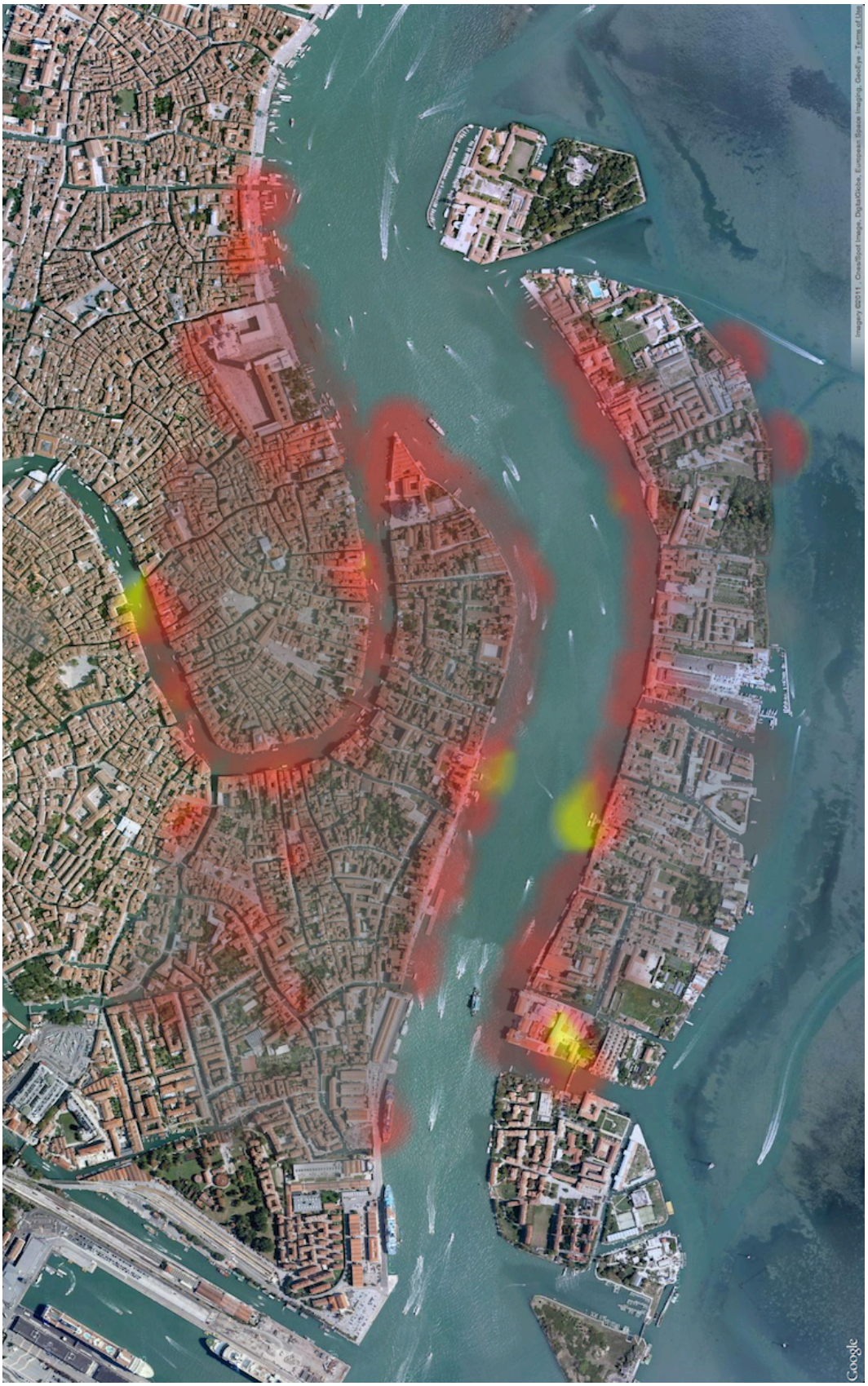
1028	12/2/2011 23:38	45.4329	12.3385	2.82843	229.5	51.949	50	1335: Western Part of the Waterfront - Piazza San Marco
1045	12/5/2011 11:40	45.4268	12.3255	2.82843	0	61.2175	63	1340: People, Boats - Palanca
1046	12/5/2011 12:00	45.4336	12.3374	5.65685	220.4	60.8399	63	1341: West of Square - Piazza San Marco
1047	12/5/2011 12:02	45.4341	12.3381	2.82843	60.6	73.5903	73	1342: Center of Square - Piazza San Marco
1048	12/5/2011 12:05	45.4344	12.3391	2.82843	27	58.0081	62	1343: Immediately infront of Basillica - Piazza San Marco
1049	12/5/2011 12:07	45.4349	12.3394	5.65685	76.3	56.3075	57	1344: Well to right of Basillica - Piazza San Marco
1050	12/5/2011 12:11	45.434	12.3396	7.2111	125.3	56.5004	60	1345: In front of Doge's Palace - Piazza San Marco
1051	12/5/2011 12:14	45.4333	12.3398	2.82843	279.5	56.3768	58	1346: Waterfront - Piazza San Marco
1052	12/5/2011 12:17	45.4329	12.3385	3.60555	225.5	63.3733	64	1347: Western Part of the Waterfront - Piazza San Marco
1053	12/5/2011 12:21	45.4336	12.3408	10	35.8	56.3355	58	1348: Waterfront near Ponte della Pagila - Piazza San Marco
1054	12/5/2011 12:24	45.4339	12.3423	2.82843	114.3	66.4057	67	1349: Waterfront near Ponte del Vin - Piazza San Marco
1055	12/5/2011 12:27	45.4338	12.344	2.82843	164.3	62.322	62	1350: San Zaccaria Boatstop - Piazza San Marco
1061	12/6/2011 12:06	45.4336	12.3375	75	0	57.5145	63	1351: West of Square - Piazza San Marco
1062	12/6/2011 12:08	45.4341	12.3381	3.60555	46.2	57.7277	60	1352: Center of Square - Piazza San Marco
1063	12/6/2011 12:10	45.4344	12.3391	6.7082	65.6	56.2785	58	1353: Immediately infront of Basillica - Piazza San Marco
1064	12/6/2011 12:11	45.4349	12.3394	7.2111	299.9	56.2211	58	1354: Well to right of Basillica - Piazza San Marco
1065	12/6/2011 12:14	45.4339	12.3396	5.65685	147.3	61.6458	60	1355: In front of Doge's Palace - Piazza San Marco
1066	12/6/2011 12:15	45.4333	12.3397	4.24264	165.7	58.3711	61	1356: Waterfront - Piazza San Marco
1067	12/6/2011 12:17	45.4329	12.3384	2.82843	223.2	57.6994	60	1357: Western Part of the Waterfront - Piazza San Marco

1068	12/6/2011 12:21	45.4336	12.3409	5	56.8	56.555	57	1358: Waterfront near Ponte della Pagila - Piazza San Marco
1069	12/6/2011 12:23	45.4339	12.3423	2.82843	128.2	58.3008	59	1359: Waterfront near Ponte del Vin - Piazza San Marco
1070	12/6/2011 12:26	45.4338	12.344	2.82843	83.8	57.9384	60	1360: San Zaccaria Boatstop - Piazza San Marco
1110	12/7/2011 12:05	45.4336	12.3375	0	0	55.883	57	1361: West of Square - Piazza San Marco
1111	12/7/2011 12:13	45.4341	12.3381	0	0	56.7861	61	1362: Center of Square - Piazza San Marco
1112	12/7/2011 12:14	45.4344	12.3391	0	0	62.964	63	1363: Immediately infront of Basillica - Piazza San Marco
1113	12/7/2011 12:16	45.4349	12.3394	0	0	55.1073	57	1364: Well to right of Basillica - Piazza San Marco
1114	12/7/2011 12:18	45.4339	12.3396	0	0	56.9238	60	1365: In front of Doge's Palace - Piazza San Marco
1115	12/7/2011 12:19	45.4333	12.3397	0	0	56.8554	60	1366: Waterfront - Piazza San Marco
1116	12/7/2011 12:21	45.4329	12.3384	0	0	56.6904	60	1367: Western Part of the Waterfront - Piazza San Marco
1117	12/7/2011 12:23	45.4336	12.3409	0	0	57.4219	63	1368: Waterfront near Ponte della Pagila - Piazza San Marco
1118	12/7/2011 12:25	45.4339	12.3423	0	0	56.4171	61	1369: Waterfront near Ponte del Vin - Piazza San Marco
1119	12/7/2011 12:27	45.4338	12.344	0	0	55.5011	59	1370: San Zaccaria Boatstop - Piazza San Marco
1221	12/8/2011 12:00	45.4336	12.3375	0	0	0	69	1371: West of Square - Piazza San Marco
1222	12/8/2011 12:02	45.4341	12.3381	0	0	0	72	1372: Center of Square - Piazza San Marco
1223	12/8/2011 12:05	45.4344	12.3391	0	0	0	83	1373: Immediately infront of Basillica - Piazza San Marco
1224	12/8/2011 12:07	45.4349	12.3394	0	0	0	63	1374: Well to right of Basillica - Piazza San Marco
1225	12/8/2011 12:11	45.4339	12.3396	0	0	0	70	1375: In front of Doge's Palace - Piazza San Marco
1226	12/8/2011 12:14	45.4333	12.3397	0	0	0	65	1376: Waterfront - Piazza San Marco

1227	12/8/2011 12:17	45.4329	12.3384	0	0	0	58	1377: Western Part of the Waterfront - Piazza San Marco
1228	12/8/2011 12:21	45.4336	12.3409	0	0	0	62	1378: Waterfront near Ponte della Pagila - Piazza San Marco
1229	12/8/2011 12:24	45.4339	12.3423	0	0	0	63	1379: Waterfront near Ponte del Vin - Piazza San Marco
1230	12/8/2011 12:27	45.4338	12.344	0	0	0	65	1380: San Zaccaria Boatstop - Piazza San Marco

Appendix G: Heatmaps




Imagery ©2011 , DigitalGlobe, European Space Imaging, GeoEye - Terms of Use
Google


Imagery ©2011 , Cnes/Spot Image, DigitalGlobe, European Space Imaging, GeoEye - Terms of Use
Google


Imagery ©2011 , DigitalGlobe, European Space Imaging, GeoEye - Terms of Use
Google


Imagery ©2011 , CnesSpot Image, DigitalGlobe, European Space Imaging, GeoEye - Terms of Use
Google

Appendix H: Foley Emails

Inquiry About Noise Analysis

Venice Noise [ve11.noise@gmail.com]

Sent: Tuesday, September 27, 2011 7:33 PM
To: Foley, Daniel
Cc: ve11-noise@WPI.EDU; Bianchi, Frederick W.

Professor Foley,
We are an IQP group working with Professor Bianchi and Professor Carrera. We are traveling to Venice this B term doing a project on "The Noises of Venice." Basically our goal is to create a mobile smartphone application that will allow the citizens of Venice to collect noise data to use as grounds for noise complaints. All the data collected using this app will be made available on the Web in a nice map to allow both the government and citizens to see where problem areas for noise occur.

In order to do this we need to somehow analyze the noises we collect via the phone app. Professor Bianchi told us you may be able to point us towards some appropriate software that would allow us to do this?
It has been hard to sort through what is out there and find something that actually does what we need. Ideally, it would be great to be able to use some software server side to analyze the sound files uploaded and add the useful data found to our map. For example, some sort of sound analysis web service or API would be very useful. Right now however, we would be satisfied with something that takes a sound file, analyzes it, and gives us back appropriate data about the sound.

If you have any questions please let us know. Any recommendations are appreciated.
Thank You

--
The Noises of Venice Group
ve11-noise@wpi.edu
https://sites.google.com/site/ve11noise/home

Re: Inquiry About Noise Analysis

Foley, Daniel [dfoley@WPI.EDU]

Sent: Tuesday, September 27, 2011 11:08 PM
To: Venice Noise [ve11.noise@gmail.com]
Cc: ve11-noise@WPI.EDU; Bianchi, Frederick W.

Sorry for not getting back to you the first time but I'm vacationing in CA right now.

Check out a company called Studio Six (www.studiosixdigital.com). They have iPhone apps for acoustic analysis, in particular a real-time one-third-octave analyzer. What I am not sure about is if/how this app will store data. I have the free version but maybe the version that one pays for will offer more functionality.

Studio Six also offers a measurement-quality front-end for many Apple products (iPhone, iPad, etc.) called the iAudioInterface2. This will allow you to use a calibrated measurement microphone so you can accurately measure SPL.

If you intend to write your own sound capturing app, then you can analyze the data using freeware like Audacity in that this application will perform frequency analysis via FFT.

If you do intend to write your own app, you need to compensate for the microphone's frequency response in the Smart Phone. This is not trivial because you need to know the microphone that is used by the Smart Phone manufacturer. In addition, the manufacturer may be using equalization circuitry to further modify the acoustic

signal. Also, the phone's shape and size will impact the frequency response as well. Supposedly Studio Six created some type of compensation filter if the iPhone's internal microphone is used for SPL measurements but the internal microphone was chosen by Apple for voice and not broadband measurements. As such, its frequency response falls off below 100 Hz from what I gather having done some web searches on this topic. To compound matters, the Smart Phone manufacturer can change their microphone design at any time so the compensation filters you develop for one model may be completely wrong when the next model phone is brought to market.
I hope this helps.
Regards,
Dan Foley

Re: Inquiry About Noise Analysis

Venice Noise [ve11.noise@gmail.com]

Sent: Tuesday, October 04, 2011 8:08 PM
To: Foley, Daniel
Cc: Bianchi, Frederick W.; ve11-noise@WPI.EDU

Professor Foley,
Thank you for the very useful information. We knew there might be problems with cell phones but you have shed some light on what the specific problems are. Also your software suggestions have proved very useful.

We do have a few more questions however. What useful "sound identifiers" do you think we could relatively easily, accurately, and reliably get form a cell phone without knowing what microphone it has?
Do you at least think we can get a basic level measurement in decibels? Our app is for recording noise for complaints that hopefully government officials and citizens alike can use. Are there other identifiers you think it would be good to collect?
Thank You
--

RE: Inquiry About Noise Analysis

Foley, Daniel [dfoley@WPI.EDU]

Sent: Thursday, October 06, 2011 1:46 PM
To: Venice Noise [ve11.noise@gmail.com]
Cc: Bianchi, Frederick W.

As far as I know, any microphone in a cell phone/smartphone should have relatively flat frequency response in the 100 Hz - 5 kHz range, maybe even higher. This is because the energy of the human voice is in this frequency range. Also, the A-weighting curve will be used (or at least should be used) for all the measurements and it greatly attenuates sound energy below 80 Hz. Thus measuring SPL using A-weighting means that the microphone's frequency response will not be that critical.

A key factor that needs to be considered is the sensitivity of microphones and their associated preamplifier/amplifier circuitry. Every microphone converts SPL to voltage and this sensitivity factor needs to be known otherwise measurements can be off by several dB. Microphone sensitivity is spec'ed in mV/Pascal where 1 Pascal is 94 dB SPL. You will never see this spec published for a smartphone and even if you did, it still is meaningless because the microphone's output will be fed into a preamplifier stage which may add gain to the signal. So a key aspect of your study is how the user can "calibrate" their phone to measure accurate dB values. Providing an actual acoustic calibration source is impractical. So a challenge you have is to figure out how the user can calibrate their smartphone without having access to a true acoustic calibrator as well as most likely not having any knowledge of acoustic measurements.

One solution may be to have a "calibration station" in

Venice (Police station?) whereby the user could place their smartphone in an acoustic enclosure containing a loudspeaker where a known SPL is generated. This calibration could include generating known SPL at various frequencies which would enable a basic frequency response measurement to be made of the smartphone. This measurement could then be used to correct the frequency data obtained by the app. Ideally what would happen is that the app could create a filter which would be applied to the recorded time-domain data so no correction in the frequency domain would be needed since the raw time-domain data would already be corrected. Studio Six (http://www.studiosixdigital.com) has developed very nice iPhone apps for acoustic measurement. They also have a good write-up on microphones used in the iPhone, iPad, etc. (http://www.studiosixdigital.com/iphone_3gs_microphone.html). Note that the guys at Studio Six have been designing and manufacturing audio test equipment for a long time (they were previously from Terrasonde which offered a very comprehensive hand-held audio analyzer for the live sound and sound contracting market). As such, they have incorporated a lot of "tricks" in their apps such as compensating for the iPhone's microphone characteristics.

Once you can get the calibration issue out of the way, which is not trivial, your app should be able to capture and analyze sound level data quite accurately. As for the SPL metrics to present, the typical ones are A-weighted SPL, Leq (integrated sound level over the duration of the measurement period) and SEL (sound exposure level which normalizes long-duration events to a one-second time period). Most community noise regulations focus on these metrics.

Good luck with this IQP.
Best regards,
Dan Foley

Wav File to Decible Reading Help

Calamari, Elliott Stewart [ecalamari@WPI.EDU]

Sent: Monday, December 05, 2011 9:20 AM
To: Foley, Daniel
Cc: Bianchi, Frederick W.; carrera.fabio@gmail.com; ve11-noise@wpi.edu

Professor Foley,
Professor Bianchi has encouraged us to get back in touch with you. We have been in Venice for about 6 weeks now and have been recording samples using a smartphone (HTC Incredible) and a Sound Pressure Level meter (A Weighted Decibel Scale). Besides the Sound Pressure
Level Readings we have obtained, we are running the samples through an analysis algorithm to obtain a reading from the actual wav file. We take the mean of the digital wav file's points, and run it through a sixth order polynomial to obtain a more or less straight line. Our algorithm is accurate in the range of 50-65 Decibels, and then starts to fall apart as we increase above this, with the algorithm readings essentially flat-lining. We are curious if you have any insight into this.
Thank you,

The Venice 2011 Noise Team
Elliott Calamari
Wesley Ripley
Robert Puishys
Neil Pomerleau

RE: Wav File to Decible Reading Help

Foley, Daniel [dfoley@WPI.EDU]

Sent: Monday, December 05, 2011 9:57 AM
To: Calamari, Elliott Stewart
Cc: Bianchi, Frederick W.; carrera.fabio@gmail.com; ve11-noise@wpi.edu

I'm not sure why this is the case but it may have something to do with the possibility that the smartphone employs some type of compression algorithm. To test this, place the phone about 1 meter in front of a loudspeaker and play a 1

kHz tone at various SPL. You can verify the SPL by placing the sound level meter in the same position as the smartphone. The reason for the 1 kHz tone is that the A-weighting filter has unity gain (0 dB) at this frequency.
I would choose sound pressure levels of 60 , 70, 80, 90, and 100 dB (110 dB if the speaker and amplifier, as well as the Sound Level Meter, can handle it). Record a few-second wav file at each SPL. Since the signal is sinusoidal, the software you use to view the wav file (e.g. Audacity) will show the RMS and peak levels for each SPL range. These should increase by 10 dB assuming the smartphone does not employ any compression and/or the microphone element and its associated electronics do not start to clip. If the levels do not increase by 10 dB and/or you see the sine wave peaks looking flat or distorted, then you know the smartphone cannot measure properly above those levels. I suggest you make these linearity measure outdoors or in a large "dead" room. You do not want room reflections to add to the speaker's SPL output. Also, wear ear plugs!! A 1 kHz tone from 80 dB on up is loud and very annoying.
From what I read about the iPhone, it can only measure to just a bit above 100 dB. Its microphone/preamp circuitry start to compress the signal above this level. Also, the iPhone rolls off below 100 Hz but this shoud not be a big deal in your case as you're wanting to correlate with A-weighted SPL values. The A-weighting filter dramatically rool soff below 100 Hz.
Please let me know if this helps out.
Best regards,
Dan Foley

Appendix I: QR Code for App

Appendix J: App Development

Date	Milestone
4-Oct-11	Start of development
4-Oct-11	First submission to web page from app
5-Oct-11	Added location
15-Oct-11	Added recording audio
25-Oct-11	Added audio recording to submission to web page
25-Oct-11	Changed to record actual WAV files
31-Oct-11	Added photo taking and uploading
4-Nov-11	Added main screen with map
9-Nov-11	Added queue
14-Nov-11	Added App Icon
14-Nov-11	Location changed to being tagged at recording time
15-Nov-11	Upped sample rate for audio files to 44100
18-Nov-11	Added option to refresh map
29-Nov-11	Added saving of application state
3-Dec-11	Major code cleanup, bug fixes, and refactoring
6-Dec-11	App localized for Italian
6-Dec-11	App Available on Android Market, Version 1.0.0
7-Dec-11	Added photo viewing
7-Dec-11	User interface improvements
8-Dec-11	Version 1.1.0 on Android Market
11-Dec-11	Added auto refresh map preference
11-Dec-11	Added WiFi Only preference
14-Dec-11	Added Field Testing mode preference
14-Dec-11	App fully documented in JavaDoc