OWEN EVANS – COLUMBIA UNIVERSITY OF NEW YORK

STATEMENT OF PURPOSE:

The proposed presentation is a demonstration of the authors' recent work on the sonic and visual representation of hurricane data, for single events and large numbers. This work builds on methods, developed by co-author Holtzman and others, for visualizing and sonifying seismic data [1]. The result is a data product with the potential to provoke the researcher to ask new questions of the data, and to reveal new patterns by offering a richer human sensory experience. To quote Frank Oppenheimer, the founder of the Exploratorium in San Francisco: ''Art and science are very different, but they both spring from cultivated perceptual sensitivity. They both rest on a base of acute pattern recognition... [A]rtists and physicists [...] use perceived patterns to create additional patterns that are not directly derived from sensory perception... Eyes and ears enable us to absorb and store the patterns of shape and time that are embodied in our experience. A higher level of perception becomes aware of patterns among these stored patterns... It is such patterns of patterns that reveal new insights."(Oppenheimer, 1979). The intended presentation includes a set of movies that illustrate many hurricane tracks in a short time. These movies include sounds generated by the intensity of any given storm. The final product is a synchronized sonic and visual representation of a dataset that is not inherently sonic nor visual. These movies, involving a drastic compression of time and space, allow a viewer to perceive patterns otherwise inaccessible to their very limited range of sonic and visual perception. They should convey the intersection of weather and climate, the stochastic variability and the emergence of trends in number and intensity. To guide the audience and help develop a sense of the scales and variability living in the data, we have created movies that show both a single event and many events. The first movie shows 13 years of historical data in under a minute. The next set of movies shows the 2005, 2012 and 2017 hurricane seasons, each in under a minute. These movies bring into focus the question of how intense last year's (2017) hurricane season was relative to previous seasons. A movie (including audio) demonstrating all of the above has been submitted as part of this proposal. References: [1] Holtzman, B., Candler, J., Turk, M., and Peter, D. (2014). Seismic Sound Lab: Sights, Sounds and Perception of the Earth as an Acoustic Space. In Sound, Music, and Motion, pages 161–174. Springer International Publishing.

DESCRIPTION OF DATA SETS:

The data used in these animations was taken from the HURDAT2 archive maintained by the United States National Hurricane Center. This dataset provides 6-hourly "best-track'' information on the storm center location (latitude and longitude), an estimate of the maximum wind-speed (intensity), minimum sea-level pressure and storm status (tropical, subtropical or extra-tropical). To visualize the storm size we use the radius of maximum wind (RMW) that is provided by the 'Extended Best Track' (EBT) dataset [1]. In addition to the RMW, the EBT dataset provides supplementary estimates of parameters such as pressure and radius of outermost closed isobar (ROCI), and eye diameter (when available). The generation of sound in our movies is based on the standard Saffir-Simpson scale categorization. Both of these datasets are publicly available online at: HURDAT2: https://www.nhc.noaa.gov/data/#hurdat Extended Best Track: http://rammb.cira.colostate.edu/research/tropical_cyclones/tc_extended_best_track_dataset/ References: [1] Demuth, J., M. DeMaria, and J.A. Knaff, 2006: Improvement of advanced microwave sounder unit tropical cyclone intensity and size estimation algorithms. J. Appl. Meteor., 45, 1573-1581.