
Audification and sonification of scientific data: listening to pressure records and meteorological data

Arthur Pate^{*1} and Pierre Henry^{†2}

¹Univ. Lille, CNRS, Centrale Lille, Univ. Polytechnique Hauts-de-France, Junia, UMR 8520 - IEMN,
F-59000 Lille, France – Université Catholique de Lille – France

²Aix Marseille Univ, CNRS, IRD, INRAE, CEREGE, Aix-en-Provence – Aix Marseille Université
(Aix-en-Provence) – France

Abstract

”Seiches”, resonant oscillations of the surface of an enclosed sea or a lake, are one of the phenomena useful for understanding the formation of tsunamis. They can be triggered by earthquakes or weather events. Recent deployments in the Sea of Marmara (Turkey) have made it possible to collect seabed pressure recordings at several sites at depths sufficient to overcome wave-related noise, allowing the detection of long-period oscillations (10 at 120 minutes) and of low amplitude ($< 1\text{cm}$) linked to seiches of meteorological origin (<https://www.seanoe.org/data/00677/78928/>). It is a question of analyzing these signals in terms of research of temporal correlations with the variations of the parameters of the events which triggered them: atmospheric pressure, speed and direction of the wind on the surface, shear stress applied by the wind on the surface of the sea. The sonification methods proposed here combine audification (acceleration of pressure recordings at the bottom of the sea), sonification by mapping of given parameters to audio parameters, sound spatialization controlled by the data, acoustic ”zoom” in order to overcome the limits of audification (the waveform acceleration factor being constrained by the need to obtain a sonified signal at audible frequencies) and to be able to change the time scale of analysis, and tests of ’listen.

^{*}Corresponding author: arthur.pate@isen.fr

[†]Speaker