Sound representations and misrepresentations of spatial fields from CMIP5 numerical environmental simulations

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Sonification is a relatively new data representation technique, and consequently, there are few examples of application of it to spatial environmental data. As so, one cannot foresee what would be the impact of its use on the analysis of atmospheric or oceanic phenomena like the North Atlantic Oscillation (NAO) or the El-Nino Oscillation. However, It is known that new representations of the same data may lead to different paths of inquire which in turn my lead to a new understanding of the order underlying the data. But sonification, as visualisation, is a representation tool, which usually, per se, cannot be expected to produce new scientific results. What can be expected is that sonification used in conjugation with visualisation, statistical analysis, and with any other available tool, will enhance our ability to extract useful information from the data.

In this work we undertook "spatial-sonification" of established numerical simulations of environmental data sets (sea surface temperature, atmospheric pressure) in order to explore sonification as a method to improve data analysis. We used both, data over the whole globe and data over the North Atlantic and the El-Nino regions. We discuss the use of data measured on variable-area grids and its impact on the sonification of the annual cycle of pressure and temperature fields. This is a known problem with spatial averages which we need to take into account here in order to produce a scientific accurate sound representation of spatial data. We also show examples of how sonification can misrepresent the North Atlantic oscillation or the annual cycle of the pressure field due to the interference between sound waves (beats) which may produce periodicities not presented in the raw data.