

**Author:** Disha Sardana

**Title:** Eclipse Data Sonification

**Program notes:** In this piece, I have attempted to capture the total solar eclipse that occurred on August 21, 2017, through sonification.

**Process:** The motivation behind this piece is to study how natural phenomena can be sonified and understood through sound and spatialization techniques. I procured the eclipse path coordinates from the [NASA website](#) and read this data into MAX/MSP using a 'coll' object. In MAX/MSP, I used 3rd order ambisonics and provided the longitude and latitude coordinates in the eclipse path as azimuth and elevation for the ambisonics-encoder. I used a drone sound file and mapped it to the path of the eclipse. As the eclipse is moving in time from one location to another, so would the sound of the drone move in the same manner. Additionally, since this data belongs to the U.S. sector only, and ambisonics encoding spatializes sound in a 360-degree environment; to exaggerate the spatialization effect, I scaled the data coordinates such that azimuth angles lie between 0 to 180 (in the front), and elevation angles lie between 0 to 15, like stretching a map of U.S. in front.

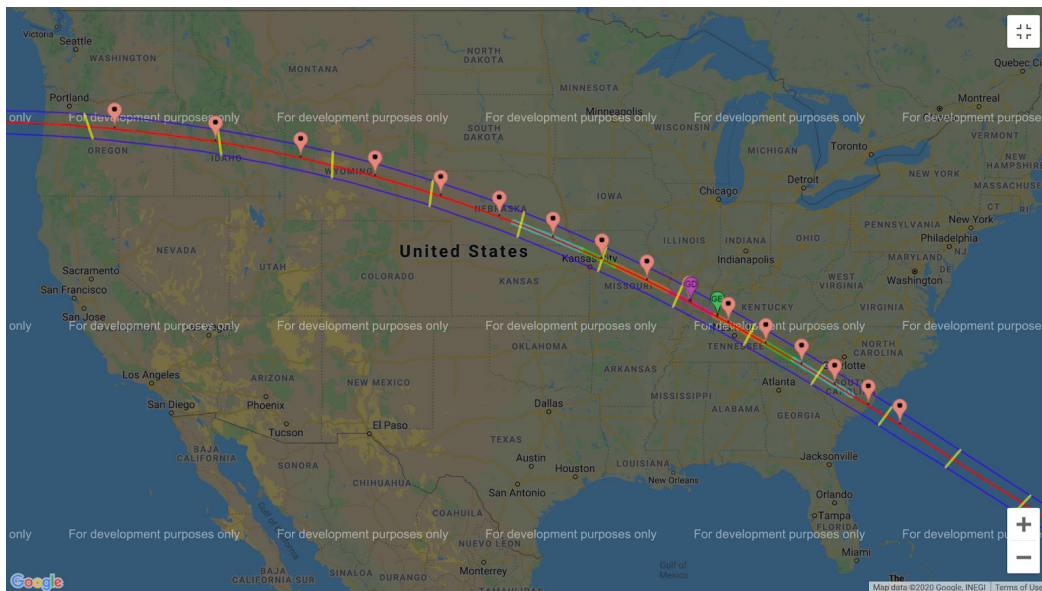


Figure 1: The eclipse path for the total solar eclipse on August 21, 2017

I also sonified the total electron content (TEC) data that is a key indicator of the state of the ionosphere. This value decreases in the ionosphere in the nighttime and increases during the daytime. I used the sound of birds calling mimicking sunset and in this case the eclipse. I acquired this data from the [Madrigal database](#) and mapped the TEC values at various times and

locations over the eclipse path inversely to the distance of the birds' sound. That is, as this TEC value decreases, the sound of the birds would appear closer. This is rather interesting because this value would usually decrease from east to west following a sunset, but since the eclipse path is from west to east, it would do opposite from the usual. So, if a regular day is sonified for the same time and geographical conditions, the effect would be the opposite of what is presented for the period of eclipse (see Figure 2). This sound is also encoded in 3rd order ambisonics in the same manner as described above.

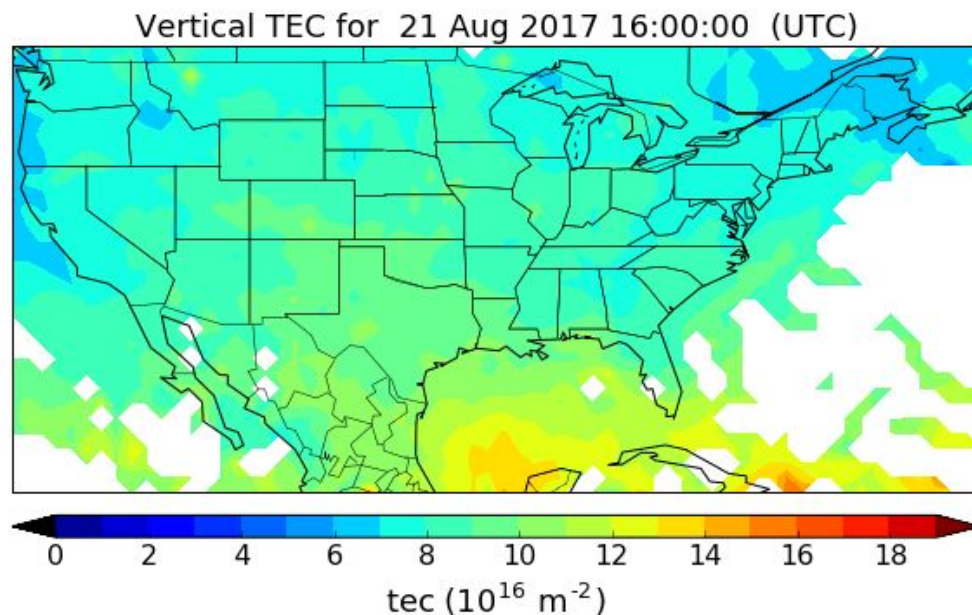


Figure 2: TEC count is shown for the U.S. sector at the start of the eclipse

I finally created a binaural mix of both 16 channel ambisonics-encoded sound files in Reaper using the BinauralDecoder (IEM) plugin.