



Composer:

Dimitri Voudouris

Composition:

US[EO]

***assimilation.1***

*(12 sound clips) - 12 min 00 sec*

***assimilation.2***

*(9 sound clips) - 06 min 19 sec*

Composed:

[2025]

Elevation data assimilation  
*(ultrasonic to the audible frequency range shifting)*

Omitted data in Eoliaki Opsi from the ultra sonic range (<20 kHz) were assimilated, isolated and shifted into an audible range. The process combines information into one state of analysis, determining an evolving continuous probability density function and understanding the evolution of data distribution.

The continuous density function determines irregularities experienced in the five compositions moments of unexplained silence and the breaking up of sound structures. Analysed data converted to audio frequency due to physiological similarities were split into frequency groups and by applying simple random sampling allowed the process for the creating two new modules.

The data shifting process was realized in Matlab.

### **Matlab:**

Reading audio data from a file, writes audio data to a file and plays audio data.

Fft() - Performs Fast Fourier Transform (FFT) for frequency analysis.

Ifft() -Performs Inverse Fast Fourier Transform (IFFT).

Resamples audio data.

Performs demodulation for frequency shifting.

Generates a spectrogram for visualizing frequency content.

Audio Toolbox - toolbox provides functions for audio signal processing, analysis, and generation.

Signal Processing Techniques – Down-sampling reducing the sampling rate of the ultrasonic signal can effectively shift the higher frequencies down into the audible range.

Frequency Shifting - Multiplying the ultrasonic signal by a sinewave with a frequency within the audible range can shift the signal's spectrum.

Time Expansion - Stretching the time axis of the ultrasonic signal can lower the frequencies, effectively making them audible.

Functions - Sampling Rate- Ensure that the ultrasonic signal is sampled at a high enough rate to capture the high frequencies accurately.

Aliasing - can occur when down-sampling or shifting frequencies, and use appropriate anti-aliasing filters if necessary.

Signal Quality - The quality of the converted signal depends on the quality of the original ultrasonic signal and the chosen conversion method.

Phase Vocoder - used to preserve the time-frequency structure of the signal during the conversion.

Down sampling sound of ultrasonic to the audible range, produced mono audio files  
\*sound with noise, clicks and hums^.

## Live Performance:

2 active speaker monitors  
Subwoofer  
4 channel mixer  
Computer  
Played in darkness

## References

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