# **ONEONTA**

## Abstract

Data sonification offers a unique perspective to the Earth's systems in an immersive way. Data sonification is the process of converting data into sounds, allowing audiences to understand information through auditory representations. This research aims to provide an artistic sensory experience that complements traditional visual representations by translating weather data into music. I will be taking weather data from the Perna Science Weather Station and mapping this data onto MIDI (Musical Instrument Digital Interface). MIDI is a communication protocol that allows electronic musical instruments and computers to communicate in order to produce sound. By offering an alternative method to interpret and indulge in climate science, data sonification offers value for accessibility needs, scientific analysis, and public engagement. Utilizing data sonification nurtures a space for audiences to develop a deeper connection and appreciation for the Earth through music that represents real raw data points derived from ever-changing environmental systems. Science communication is vital for promoting scientific literacy, building community trust in research, and addressing environmental issues.





## **Perna Science Weather Station Data from** November 1, 2024 – November 8, 2024

Date and Time	Temperature (S- THB 20948565:20858810-	Relative Humidity (S-THB 20948565:20858810-2), %,	Dew Point (S- THB 20948565:20858810- 3) *C Onconta
11/01/24 00:00:00	69	62	55, C, Onconta
11/01/24 06:00:00	67	71	57
11/01/24 12:00:00	63	64	51
11/01/24 18:00:00	52	61	39
11/02/24 00:00:00	48	64	36
11/02/24 06:00:00	41	83	36
11/02/24 12:00:00	45	83	40
11/02/24 18:00:00	40	78	33
11/03/24 00:00:00	31	85	27
11/03/24 06:00:00	26	92	24
11/03/24 12:00:00	41	66	31
11/03/24 18:00:00	43	41	21
11/04/24 00:00:00	29	65	19
11/04/24 06:00:00	30	73	23
11/04/24 12:00:00	50	48	31
11/04/24 18:00:00	50	59	37
11/05/24 00:00:00	49	77	43
11/05/24 06:00:00	52	79	45
11/05/24 12:00:00	66	60	51
11/05/24 18:00:00	71	51	52
11/06/24 00:00:00	63	76	56
11/06/24 06:00:00	63	82	57
11/06/24 12:00:00	69	69	59
11/06/24 18:00:00	67	73	59
11/07/24 00:00:00	59	87	55
11/07/24 06:00:00	56	88	53
11/07/24 12:00:00	54	74	46
11/07/24 18:00:00	49	64	38
11/08/24 00:00:00	40	84	37

The raw data points collected is derived from the Perna Science Weather Station located at SUNY Oneonta, Oneonta, NY. Temperature, relative humidity, dew point, and wind speed was recorded every six hours from November 1, 2024, until November 8th, 2024. The data is rounded to the nearest whole number.



Science communication bridges the gap between scientific research and the public. Data sonification enhances science communication by offering an artistic experience that makes environmental data more engaging and intuitive. Music can empower audiences to interact with scientific issues in an informed course of action by presenting facts in a digestible way (Bornmann, 2024). By sonifying data, patterns, anomalies and trends can be revealed through an auditory perception, that may have been difficult to recognize visually. Music invokes a deeper sensory experience that tables and graphs do not by combining sight and sound. Science literacy allows individuals to make better informed decisions regarding environmental issues and nurtures a space for transparency and public trust within research. Data sonification presents a creative multimodal method of deepening the comprehension of science by appealing to the emotions and senses of audiences.

Rationale

54 random @range 42 127

**button:** Blink and send a ba

- ✤ Wind Speed (orange)- Melody and pitches in the key of F# Major. Instrument: Morpheus
- Temperature (blue)- Cutoff frequency of a High-Cut Low Pass Filter.
- Relative Humidity (red)- Dry/Wet of Reverb.
- Dew Point (green)- Duration of the notes.

Max/MSP is the visual programming language used to convert the raw data points into MIDI that allows for the sonification of weather. The temperature, relative humidity, dew point, and wind speed data recorded are musically promising data types due to the variation in climate trends, and range of data numbers in MIDI 1.0 being 0-127 (7-bit protocol). MIDI is data that is transmitting a series of messages to describe musical events. The 0-127 data range of MIDI makes the weather data conversion efficient by preserving the relationship, relevancy and accuracy between the intervals of all the numbers. The audio is accurate to what the data is displaying.

🗶 🎹 Key – MIDI 48.0 kHz 3 % 🔹 –

Ableton is a digital audio workstation (DAW) software used for producing sound. Each data type is assigned a musical parameter. Sonifying data with MIDI means translating the raw data points from the Perna Science Weather Station onto the 0-127 data range.

The wind speed is controlling the melody and pitches of the audio. It is voiced by the morpheus being hit with mallets in the key of F# Major. The temperature is controlling the parameters of a low pass filter where the cutoff frequency is the key control that determines where the filter starts reducing the high frequencies. The relative humidity is controlling the dryness and wetness of reverberation. Dry refers to the unprocessed, original sound, and wet refers to the sound with reverb applied. Reverb is the natural echo heard when sound reflects off surfaces in a space. The dew point is controlling the length of each note played throughout the piece.