Field Notes: a requiem

Deposits: Duck Harbor

Artist	Gin Stone / Harpy Audio
Data Source	Dr. Katie Castagno
Location	Duck Harbor, Wellfleet, MA
Series	Five sediment cores (DH_VC_3.1 – DH_VC_3.5)

Overview

Field Notes: A Requiem translates scientific environmental data into sound via MIDI. The Deposits series uses sediment core data collected from Duck Harbor on Cape Cod to generate musical compositions that move through geological time. Each core is a physical record of the estuary's history — layers of sand, silt, and organic material compressed into a column of sediment. This process reads those layers as musical events, producing a piece of music that spans from medieval history to the present.

Source Data

Sediment cores were collected from Duck Harbor, Wellfleet, MA, and analyzed for grain size and organic content. Each core was cut into sections for storage; Dr. Castagno's master data file pre-calculates composite depth across all sections so that the depth record is continuous.

Key measurements used:

Grain size (Wentworth classification): Very Fine Sand/Silt, Fine Sand, Medium Sand, Coarse Sand

Loss on Ignition (LOI %): a proxy for organic matter content

Composite Depth (cm): true depth from the sediment surface, stitched across core sections

Age Modeling

Radiocarbon dates (^{14}C, reported as years BP) are converted to calendar years CE using the Bacon age model:

$$year\ CE = 1950 - median\ BP$$

Depth is mapped to year linearly between the oldest dated horizon and the sediment surface (2024 CE).

Core Catalog

Core	Date Range	Total Depth	Duration
DH_VC_3.1	1805 CE — 2024 CE	102 cm	3:09
DH_VC_3.2	1760 CE — 2024 CE	115 cm	3:09
DH_VC_3.3	750 CE — 2024 CE	133 cm	3:09
DH_VC_3.4	610 CE — 2024 CE	97 cm	3:09
DH_VC_3.5	1795 CE — 2024 CE	97 cm	3:09

All five pieces share identical instrumentation and structure. The date ranges differ because each core penetrates a different depth of sediment, and the sedimentation rate at each location varies. A longer core captures a longer span of time.

MIDI Architecture

Each core generates a six-track MIDI file at 60 BPM, 480 ticks per beat, 188 beats total (3:09 with decay).

Track 1 — Very Fine Sand / Silt

Instrument: Toy Glockenspiel C4

Grain size class: Very Fine Sand (63–125 m) and Silt (<63 m). Each sample in this class triggers a sustained low note. Fine-grained, quiet depositional periods — calm water, slow settling — are heard as sustained tones in the lower register.

Track 2 — Fine Sand

Instrument: Egg

Grain size class: Fine Sand (125–250 m). Mid-register sustained tones. Fine sand indicates moderate energy environments.

Track 3 — Medium Sand

Instrument: Mandolin C4

Grain size class: Medium Sand (250–500 m). Upper-mid register. Medium sand reflects higher-energy water movement.

Track 4 — Coarse Sand

Instrument: Bongo Loop

Grain size class: Coarse Sand (500–1000 m). Highest-energy events — storm deposits and major disturbances — heard as accented upper-register notes.

Track 5 — Organic Melody

Instrument: Wood Sticks

Fires only when LOI > 2.0%. High organic content indicates periods of biological productivity, marsh growth, or reduced disturbance. These moments emerge as melodic phrases above the textural grain tracks.

Track 6 — Visual Core Scan

Instrument: Water Bowl B

120 brightness samples taken evenly across the full core image, scanned bottom-to-top (oldest sediment first). Core photographs show the visual record of the sediment — light and dark banding corresponding to compositional changes. Brightness is mapped to pitch across the pentatonic scale, creating a continuous visual-to-audio scan beneath the other tracks.

Tuning and Scale

All six tracks use the gong pentatonic scale: C D E G A. This scale produces no dissonance — every interval is consonant. The choice reflects the source material: the data is not a narrative of conflict but of accumulation. The pentatonic scale allows many simultaneous voices without harmonic tension.

Timing

Each core runs for 188 beats at 60 BPM (3:09 with instrument decay). Time is distributed linearly from the oldest dated depth to the sediment surface. A core spanning 1,500 years and one spanning 400 years both last 3:09; the difference is in the density and distribution of events within that time. The oldest material appears earliest in the piece. The piece always ends at 2024.

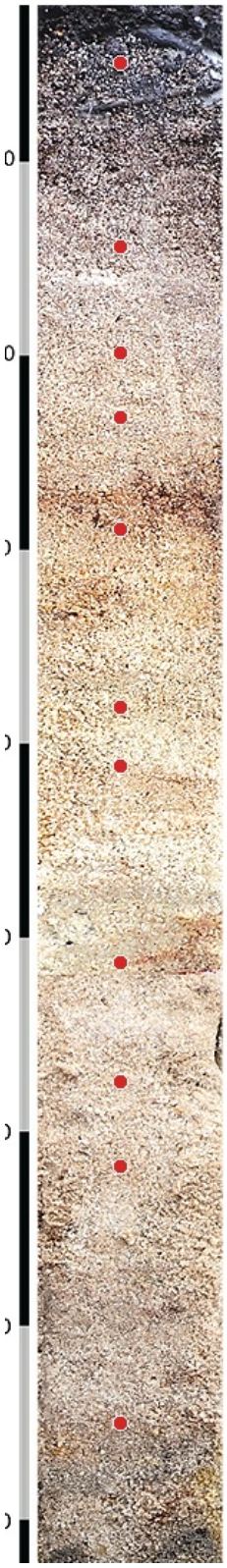
Annotated Core Images

Each core photograph is annotated with a historical timeline. Red dots mark the depth corresponding to each event; labels are distributed evenly for readability and trace back to the true sediment depth for each event.

See following pages.

DH_VC_3.1

2024 CE — 1805 CE



— 2016 — Paris Agreement enters into force

— 1988 — IPCC established

— 1972 — Clean Water Act

— 1962 — Rachel Carson publishes Silent Spring

— 1945 — World War II ends

— 1918 — World War I ends / Spanish Flu

— 1909 — Chequessett Neck Dike built

— 1879 — Edison patents electric light

— 1861 — Civil War begins

— 1848 — California Gold Rush

— 1809 — Abraham Lincoln born

DH_VC_3.2

2024 CE — 1760 CE



— 2016 — Paris Agreement enters into force

— 1988 — IPCC established

— 1972 — Clean Water Act

— 1962 — Rachel Carson publishes Silent Spring

— 1945 — World War II ends

— 1918 — World War I ends / Spanish Flu

— 1909 — Chequessett Neck Dike built

— 1879 — Edison patents electric light

— 1861 — Civil War begins

— 1848 — California Gold Rush

— 1776 — American Revolution

DH_VC_3.3

2024 CE — 750 CE



— 2016 — Paris Agreement enters into force

— 1962 — Rachel Carson publishes Silent Spring

— 1945 — World War II ends

— 1909 — Chequessett Neck Dike built

— 1776 — American Revolution

— 1635 — Hurricane

— 1620 — Pilgrims arrive Plymouth

— 1492 — Colonization of the Americas begins

— 1347 — Black Death begins

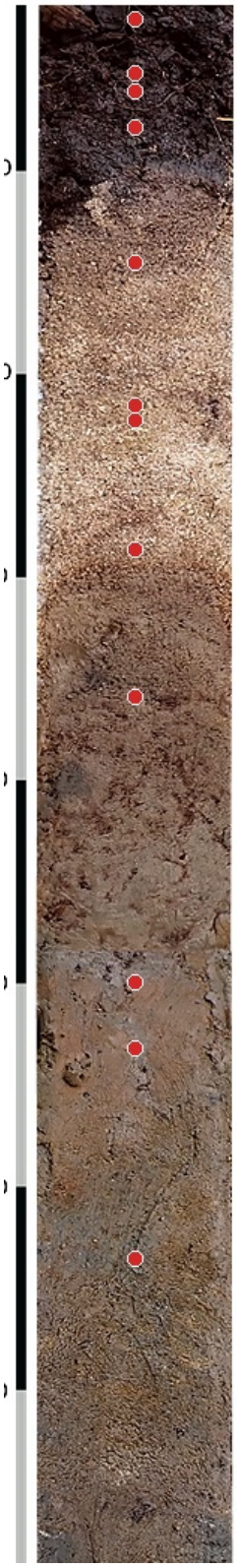
— 1066 — Norman Conquest

— 1000 — Leif Erikson reaches North America

— 800 — Viking Age begins

DH_VC_3.4

2024 CE — 610 CE



— 2016 — Paris Agreement enters into force

— 1962 — Rachel Carson publishes Silent Spring

— 1945 — World War II ends

— 1909 — Chequessett Neck Dike built

— 1776 — American Revolution

— 1635 — Hurricane

— 1620 — Pilgrims arrive Plymouth

— 1492 — Colonization of the Americas begins

— 1347 — Black Death begins

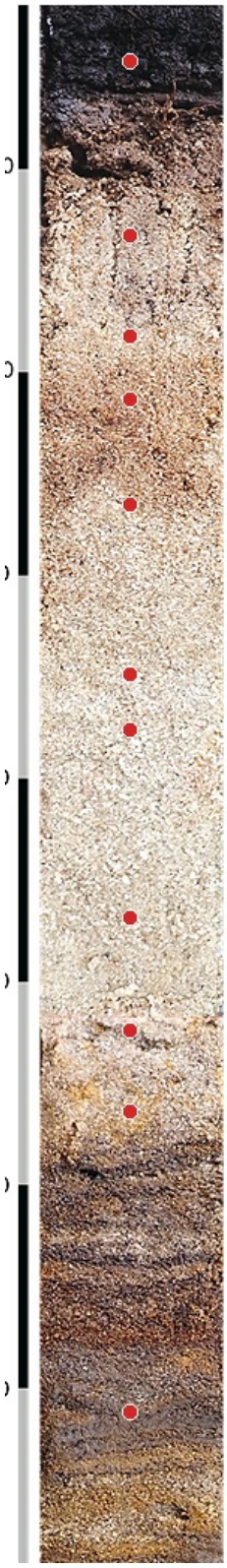
— 1066 — Norman Conquest

— 1000 — Leif Erikson reaches North America

— 793 — Viking Age begins

DH_VC_3.5

2024 CE — 1795 CE



—2016 — Paris Agreement enters into force

—1988 — IPCC established

—1972 — Clean Water Act

—1962 — Rachel Carson publishes Silent Spring

—1945 — World War II ends

—1918 — World War I ends / Spanish Flu

—1909 — Chequessett Neck Dike built

—1879 — Edison patents electric light

—1861 — Civil War begins

—1848 — California Gold Rush

—1800 — Industrial Revolution peaks

Citations and References

Primary data: Castagno, K. (2025). Duck Harbor Vibracore Dataset DH_VC_3.3. Center for Coastal Studies, Provincetown, Massachusetts. Unpublished raw data.

Age modeling: Blaauw, M. and Christen, J.A. (2011). Flexible paleoclimate age-depth models using an autoregressive gamma process. Bayesian Analysis 6(3): 457–474.

Color classification: Munsell Color Chart, 10YR series. Munsell Color, Grand Rapids, Michigan.

Instrument samples: Marberger, Tobias. G-Town Church Sampling Project. Creative Commons license. Grebbestad, Sweden.

Site context: Herring River Restoration Project. herringriver.org.

Historical event: Hurricane of 1635. Confirmed in sediment record by Dr. K. Castagno, 2025. Present in cores 3 and 4 only.