

# Geode EM3D

## 2D and 3D Full-tensor AMT/CSAMT



Modern exploration for minerals, shallow oil and gas, and groundwater requires more high-quality data acquired and processed faster and at a lower cost than traditional EM techniques. Now you can do distributed EM surveys with confidence. The multi-channel Geode EM3D allows simultaneous soundings at up to 160 locations, greatly improving field efficiency. Based on our tried-and-true Geode seismic technology, the Geode EM3D truly revolutionizes AMT data acquisition.

The system uses a controlled-source transmitter for CSAMT or natural field signals for AMT. The defining characteristic of a distributed, networked system is that it is flexible in size. There can be numerous network nodes, each making its own measurements and sending the results back to a central controller computer. The definition of a network node in the Geode EM3D is a single receiver box with up to six channels.

Every node communicates to the other nodes and the Master Node by way of a hardwired Ethernet cable. A single node can be configured to have up to three magnetic coils or up to six electric field dipoles.

The Geode EM 3D is scalable from 6 to 240 channels, so the system can grow with your business.

### FEATURES & BENEFITS

- **Reliable wired Ethernet network** – no problems with GPS dropouts or lost satellites, line of sight communications failures, radio or WiFi communication failures, blocked antennas.
- **Up to 160 simultaneous soundings in a single setup** - Allows economically-feasible high-density sampling.
- **Full-tensor AMT and CSAMT** - Yields a much more accurate model of the subsurface than typical scalar AMT/CSAMT.
- **Ultra-low-noise, low-distortion front end electronics** - Much higher data quality.
- **Real-time on-screen display of impedance and phase curves** - Detect any acquisition problems as they happen.



SPECIFICATIONS | **Geode EM3D** 2D and 3D Full-tensor AMT/CSAMT

**Operating Principle:** Controlled-source audio-frequency magnetotellurics (CSAMT) is a high-resolution electromagnetic sounding technique that uses a fixed, grounded dipole or horizontal loop transmitter. Audio magnetotellurics uses naturally-occurring electrical sources in the atmosphere.

**Frequency Range:** 0.1 Hz to 10 kHz.

**Electric Sensors:** Choice of either porous pot non-polarizing or stainless steel stakes.

**Magnetic Sensors:** Model G20K (0.1 Hz to 20 kHz) magnetic field sensor with 20 meter cables.

**Data Format:** ASCII columnar.

**Data Collection Station GEM3D Receiver**

*Channels: up to 6 channels per station*

(Ex1, Ex2, Ey1, Hx, Hy, Hz)

(Ex1, Ex2, Ex3, Ey1, Hy, Hx)

(Ex1, Ex2, Ex3, Ex4, Ey1, Ey2)

**Sample Interval (SI):** Automatically selected in CSAMT mode.

**Maximum Record length:** 64 K.

**Analog to Digital Conversion:** 24 bits.

**Dynamic Range:** 144 dB (system), 110 dB (instantaneous, measured) at 2 ms, 24 dB.

**Noise floor:**  $10 \text{ nV}/\sqrt{\text{Hz}}_{\text{rms}}$  @ 24 dB.

**Storage Memory:** PC system dependent.

**Gain Settings:** 24 dB, 12 dB, 0 dB, -12 dB.

**Maximum Distance from receiver:** 250 m between receivers, 100 m first receiver to PC.

**Analog Receiver Input Impedance:** > 2.0 MOhm (W/Analog Front end).

**Power source and consumption:** Geode EM3D Receiver 12V external battery, 9 Watts for 6 channels.

**Operating Temperature:** -20°C to +70°C (-4°F to +158°F).

**Physical Dimensions:** EH6 receiver L: 16.5 cm; W: 16.5 cm; H: 8.25 cm; Weight: 2 kg (6.5x6.5x3.25 in; 70.6 oz).

**In-field QC:** Time series, apparent resistivity and phase versus frequency sounding curves with standard deviation or error bar, component operation check, automated contact resistance measurement.

**Maximum signal input voltage:** +/- 12 V peak, +/- 9 V peak before distortion increase.

**Clock Accuracy:** 0.4 ppm over temp range, +/- 2ppm/year without factory calibration.

**Phase Matching:** 1 degree < 1 kHz, 3 degrees < 10 kHz.

**Amplitude-Phase Channel Matching:** 1%.

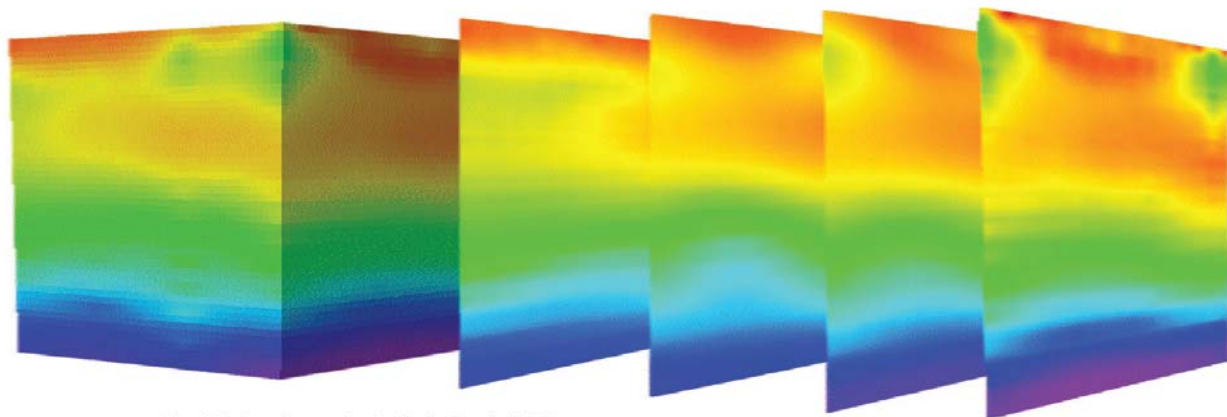
**Amplitude Accuracy:** 1%.

**Distributed System Parameters**

**Maximum Channels:** 240 channels.

**Communication Protocol:** 10 Mbit Ethernet.

**GPS Synchronization:** Synchronized transmitter to acquisition stations.



3D resistivity cube acquired with the Geode EM3D.

Specifications subject to change without notice. Geode EM3D\_v1 (0317)

