Geode EM3D

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

GEOMETRICS
Simplify your search

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, or a combination of both (HSAMT). 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, HSAMT 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, phase curves, and other MT parameters** - Detect any acquisition problems as they happen.

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

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 (AMT) uses naturally-occurring electrical sources in the atmosphere. Hybrid-source audio-magnetotellurics (HSAMT) uses both natural and man-made signals.

Frequency Range: 0.1 Hz to 20 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 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: GEM3D receiver L: 24 cm; W: 16 cm; H: 19 cm; Weight: 5.2 kg (6.5x6.5x3.25 in; 183 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%.

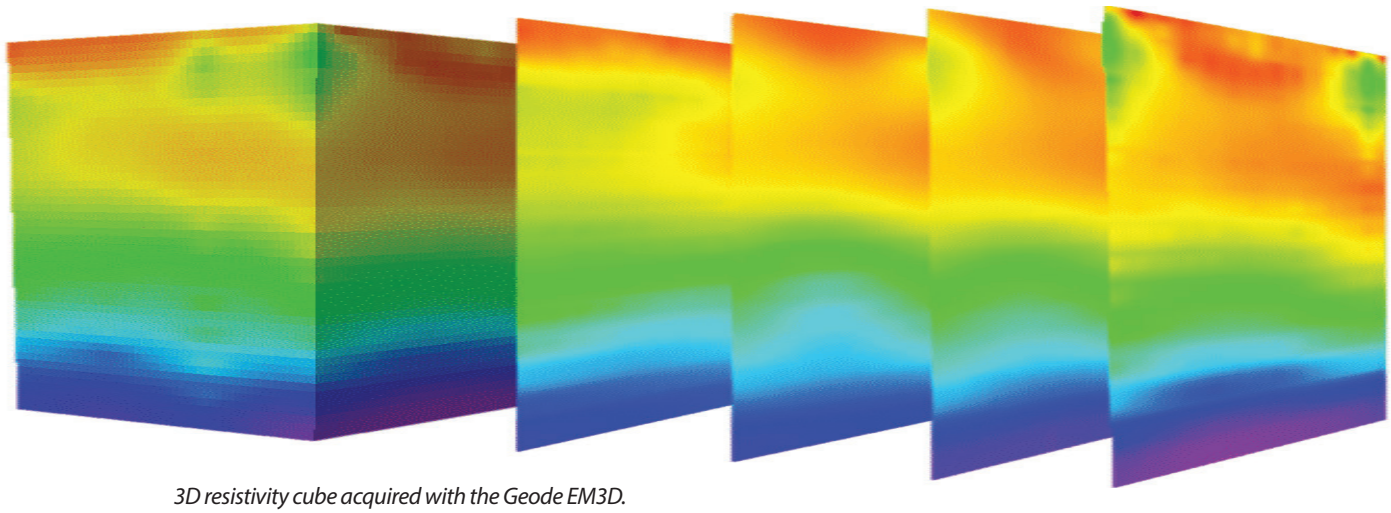
Amplitude Accuracy: 1%.

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.

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