Electromagnetic Tools for Imaging Fluids Underground

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How do we measure conductivity?

- Magnetotellurics
- Controlled Source EM
MT instruments
Shallow Imaging: CSEM
Nearshore Work: CSEM

Mulligan et al., (2007)
Controlled Source EM Method

Diagram showing a ship towing electrodes, tow line, and ocean bottom EM receivers. The spacing between the receivers is 1–10 km.
Receivers
East Coast Survey: New Jersey

- Towed CSEM
- MT Sites
- IODP Sites
- AMCOR Sites
New Jersey
A New System

In Collaboration with Alan Chave (WHOI)

New Towed Streamer System

More receivers (5-10)

Large source dipole (~200A)

Receiver array towed in mid-water column

Real time data retrieval and analysis on board ship
Seafloor morphology and fluids in the crust: Nicaragua

Key et al. (2012)
Resistivity images of fluid inputs

Naif et al. (2015)
Shallow free fluid release

Naif et al. (in press)
Deeper fluid outputs: Using Magnetotellurics

Café Line, Washington State.

McGary et al., (2014)