



## Using Seismic Wavefields to Monitor Geological Targets

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**Summary:** A method to image geological mediums using seismic wavefields

**Description:** Researchers at the Colorado School of Mines have found a way to use seismic wavefields to monitor geological targets. These wavefields can be focused at known positions and times in a heterogeneous medium. Seismoelectric conversion occurs if the acoustic focus point coincides with a heterogeneity in the properties of the porous material (porosity, permeability, fluid properties, etc.), thus generating a source current density. This current in turn generates an electrical field, which can be observed remotely (at most 1 km away) by an array of monitoring electrodes. Since the acoustic wavefield is precisely located at a position and time, this electrical source behaves like a controlled virtual electrode whose properties depend on the strength of the acoustic wavefield and on the medium properties. This procedure can be used to increase the robustness and resolutions of electrical resistivity and seismic tomographies and to identify hydrological parameters at various points in the medium by scanning the medium by changing the position of the acoustic focus point. The seismoelectric effect is sensitive to the presence of fluids in rock pores, thus providing a rare opportunity to characterize fluid saturation, rock permeability, and other phenomena that cannot be observed just with elastic waves.

**Main Advantages of this Invention:**

- Increases accuracy of underground monitoring compared to current methods
- Can be used up to 1 km away
- Procedure is inexpensive

**Potential Areas of Application:**

- Oil fracking and exploration
- Geological monitoring for environmental purposes
- Groundwater exploration

**ID number:** 13009

**Intellectual Property Status:** US utility patent pending (application #14/055,574)

**Opportunity:** We are seeking an exclusive or non-exclusive licensee for implementation of this technology.

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