

Gold Exploration Using MT (Magnetotelluric) Imaging of Deep Tectonic Faults.

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- MT regional surveys carried out over a number of years in shield areas of Ukraine and Russia clearly show the conductivity structure of crystalline rocks of the consolidated crust is highly variable, ranging from 10 Sm to 10000 Sm.
- Conductivity arises from (1) ionic fluids in pore spaces, (2) electrically conductive minerals such as carbon or metallic sulfides, (3) brecciation and related porosity and permeability along tectonic faults. Most such tectonic faults are vertical or subvertical, although some have shallower inclinations. These faults act as conduits for movement of hot fluids, which may produce economic deposits of gold and other metals.
- 3-D MT surveys clearly map conductive faults in various directions and provide estimates of fault width and conductivity.
- Most gold deposits in the Archaean and Proterozoic Ukrainian Shield, as well as in the Paleozoic metamorphosed sediments of the Donbass, and in the Alpien sediments of the Carpathians are situated at the intersections of 3 systems of faults with azimuths of approx. 0-270, 15-285, and 45-315 degrees. In the Yeniseiski Kryazh (up lift) in Siberia, gold deposits were found to lie on two conductive faults discovered later by MT surveys. New high productivity, low cost 3-D MT instrumentation permits cost-effective regional fault surveys as a new gold exploration technique.