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Magnetotelluric investigation of the Colorado front range thrust fault between Castle Rock and Colorado Springs, Colorado

A magnetotelluric (MT) survey was performed over the Front Range (FR) thrust fault of Colorado between Colorado Springs and Denver by Argonaut Enterprises Inc. for Emerald Exploration Consultants Inc. in 1987. Data was recorded at 20 sites with one site positioned at the Abercrombie State #1 well to provide a resistivity calibration; all other sites were positioned on the FR. Geologists agree that the Precambrian rocks of the FR have been juxtaposed against younger sedimentary rocks along a west dipping fault complex, however the attitude at depth is speculative. The objective of this survey was to determine the frontal fault configuration. The changes associated with the MT data have been interpreted to represent three primary rock units: a low resistivity 5-30 ohm.m unit which correlates with Cretaceous rocks; a mid-resistivity 50-250 ohm.m unit which correlates with Mesozoic and Paleozoic strata; and a high resistivity 500-2,000 ohm.m unit which correlates with Precambrian rocks observed on the surface. Mesozoic and Paleozoic strata have been interpreted to exist in a narrow zone beneath a high angle FR. Except for one site no measurable thickness of low resistivity Cretaceous rocks is present. The interpretation is based upon model studies which have shown that the presence of 5-10 ohm.m Cretaceous rocks would produce a more pronounced low resistivity anomaly than is observed. The models utilized resistivity values of Cretaceous, Mesozoic and Paleozoic sediments which were obtained from wells and prior work. The angle of the FR interpreted from the MT data is relatively high.

Biography

Ernest Berkman graduated from the Colorado School of Mines, Geophysical Engineer, 1958. He worked for Mobil Oil for 20 years and then started EMEX. At EMEX, his experience includes prospect analysis and regional geological/geophysical studies including reflection, gravity, magnetics, magnetotellurics (MT), refraction analysis, in North America and worldwide; plus a lot of shallow seismic for coal mine development and site characterization. Interpretation background includes site characterization, and technical writing, modeling, quality control, project, and team management, industrial teaching, and mentoring. He has been a member of the SEG since 1955. His 30 geological and geophysical papers are available at https://www.researchgate.net/profile/Ernest_Berkman.

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