

Deep crustal studies using magnetotelluric technique

T. HARINARAYANA

Abstrak (Abstract)

Magnetotellurics (MT) — a natural source electromagnetic method — provides information on the subsurface distribution of one of the most important physical properties of the earth's interior namely — the electrical conductivity. The electromagnetic waves generated through solar wind-magnetosphere interaction (0.5 Hz to a few milli Hz) and worldwide thunderstorm activity in the earth's ionospheric cavity (audio-frequency range — 10 Hz to several kHz) constitute the source signals for MT (including AMT) measurements.

MT studies would help to characterize the basic electrical nature of the crust from very shallow levels to as much as several tens of kilometer depth. This facilitates gaining insight into the structure, composition and state of the deep interior. Since the information obtainable from magnetotellurics is also sensitive to lateral changes in the earth's crust, they help in studying the possible existence of lateral heterogeneity that might characterize the subsurface at different depths in the crust/upper mantle. Keeping in view such potential, deep crustal block be investigated through this approach i.e. studying its electrical structure using magnetotellurics.

Two principal factors that make the method attractive are: the availability of a broad band of natural electro-magnetic source signals from about 2×10^4 Hz and 10^{-4} Hz which by virtue of skin depth considerations facilitates probing a wide range of depths. The physical parameter estimated by the magnetotelluric method. Viz., the electrical resistivity can vary over nearly seven orders of magnitude (10^{-1} to 10^6 Ohm.m) thus enhancing the interpretational potential of MT results. The success of the method in investigating deep crustal structure is discussed.

