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1D and 2D interpretation of the CSTMT data to detect the fracture zone of Talkhab fault in Haftad Ghole, Arak, Iran.

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The considerable contrast between fractured zones and surrounding environment leads us to use Controlled Source Tensor Magnetotelluric (CSTMT) methods as a strong device to detect faults. The CSTMT is an electromagnetic method used for shallow studies. It aims mapping of shallow subsurface resistivity structures. Depending on the porosity, fluids and clay minerals there in, geological structures have different responses to the electromagnetic waves

Haftad Ghole is a western south subzone of Central Iran zone which is devided to three subzones: Haftad Ghole, Central and Eastern North subzones and Talkhab fault is the boundry of Central subzone and Haftad Ghole subzone which is hidden under Quaternary alluviums. The lithology of the study area is mainly categorized to 3 divisions, young terraces, old terraces and unconsolidated pyroclastics and volcanic conglomerate.

In July 2006, a CSTMT survey was conducted to detect Talkhab fault in the area. Data were collected along an East-West profile (40 stations, 100-200m sepration) using EnviroMT system from Uppsala University, Sweden.

Time series collected in the frequency range 1-25 KHz are transformed into frequency domain, and cross power spectra are computed to estimate the impedance tensor as a function of frequency.

Using a joint application of TE and TM modes, apparent resistivities and phases are computed as inputs of inversion programs. A 1D inversion approach (Pedersen, 2004) was applied on the determinant, TE and TM mode data. For 2D inversion, a code from Siripunvaraporn and Egbert (2000) was used.

1D and 2D models of the CSTMT data across the profile indicate a relatively resistive zone. The resolved resistive zone is interpreted due to dry nature of the fractures in the region because of dry climate indeed. The CSTMT field measurements resolved well the resistivity contrasts of the zone fault with an extention of about 100m at shallow subsurface.