

First Magnetotelluric imaging of the northern Zagros orogenic belt (Preliminary report on measured data and processing techniques)

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SUMMARY

The Zagros orogenic belt, is a young and active orogen extending from the northwest to southeast in the western half of Iran, which, together with the Iranian plateau hold a record of the long-standing convergence history between Eurasia and Arabia across the Neo-Tethys, from subduction/obduction processes to present-day collision (Agard et al. 2011). On how this collision is accommodated in the northern part, currently there are two seismic models (Rahmani et al. 2019, Motaghi et al. 2017), proposing different geodynamic processes (lithospheric thickening or delamination) within the lithosphere and asthenosphere. An initial 2-D MT study based on these two seismic results indicates MT is a promising method to distinguish between different conductivity models within the lithosphere and upper asthenosphere beneath the Zagros.

To study the lithospheric structure and discriminate between the proposed seismic models in the northern Zagros, an MT survey was carried out at 22 sites (22 long-period and 22 broad-band measurements) along two parallel 450-km profiles in winter and spring 2022, with an approximately northeast and southwest direction from Tehran to Ilan provinces, crossing the Zagros.

Here, we present first results from the acquired data, an electrical conductivity model based on data processing using the robust processing technique implemented in Frankfurt software package, FFMT. The Matlab based programs follow the multi-station approach by Egbert³ (1997) and has been extended to diminish the effects of anthropogenic noise (which so far, has caused challenges to process the data from some of the sites) by using an Eigenwert-criterium for the selection of the time segments (Hering, 2019). It allows for the minimization of coherent and incoherent noise between the field components of the local sites and improves results compared to standard processing approaches.

Keywords: Magnetotelluric, Zagros orogenic belt, Conductivity structure, Magnetotelluric transfer functions

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