
Joint Study, High Central Zagros: Part 1 – A Challenge for Geophysical Integration

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The purpose of a combined geological and geophysical study in the High Central Zagros area near the townships of Lordegan and Yasuj was to find answers to the following main questions:

- Is the High Zagros Fault (HZF) an overthrust fault?
- Are there vertically separated structural / tectonic units in the “Complex” Foreland of the Zagros?
- Are there chances for hydrocarbon exploration targets beyond the HZF ?

A joint study program between NIOC and RWE Dea was conducted in the years 2001 to 2004. The study area exceeds 11.000 km² in size, is characterized by a high complexity in its geological and tectonic setting and is associated by an extremely rugged topography with elevations ranging from 900 to 4450m. The main and most difficult task was to acquire geophysical data that would be of good enough quality to allow a reasonable interpretation and validate the structural concepts in such a complex high mountainous environment. A combination of seismic and potential field geophysical methods was felt to be able to focus on the different depth levels and changes in the structural geology. Key sections were selected for repeated acquisition of Magnetotelluric, WARRP seismic (wide angle reflection refraction profiling) and reflection seismic data, accompanied by detail surface geological analysis, dense area-wide gravity measurements and modern satellite image analyses including construction of a DEM. Magnetotelluric and WARRP were found to complement each other ideally, the first for the shallow parts and the latter for the deeper parts of a section. The combination both methods worked well in complex tectonic terrain such as across the High Zagros Front Thrust where surface geology was integrated in the modelling. Integration of all geological and geophysical results led to a structural 3-D model of the study area, satisfying the measured gravity.
