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3D Numerical Lithospheric Modeling Constraint on GPS

Case Study (Zagros, Iran)

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Abstract:

GPS derived velocity field indicate that the Zagros kinematics corresponds to an oblique convergence between a rigid central Iranian plateau and the Arabian plate at 7 mmyr-1 at the longitude of the Persian Gulf. Convergence is almost frontal in the SE Zagros and oblique (45Deg) in the NW part of the range. It has been proposed that internal deformation of the NW Zagros occurs in a partitioned mode. In this paper we find out by distorting a finite element model of Zagros using GPS derived

displacements and nonlinear rheologies. A complex model was constructed using spatially varying crustal thickness, geothermal gradient, and creeping faults. The model was loaded according to 7-year displacements.The mesh covers a rectangular area in the Iran (zagros) with horizontal dimensions of 1500 km$\times$600 km and a depth extent of 120 km. Structural boundaries are derived from the several deep seismic soundings carried out in the area.

Constructed model is first used in the calculation of the thermal and the rheological models and secondly in analysing the deformational conditions with the obtained rheology. The structure of the collision zone and faults will be represented by contact surface with the coulomb friction law.

The calculated surface HFD is about 63mWm-ˆ2 and 32mWmˆ-2 at the base of the upper curst that consistence with young continent.

The minimum brittle–ductile transition (BDT) depth is around 17-20 km in comparison with the focal depth data shows that as most of the earthquakes occur no deeper than the depth of 20 km are they located in the brittle regime.