



Subduction and orogenic build-up in the Zagros

Philippe Agard (1), Jafar Omrani (2), Laurent Jolivet (3), Hubert Whitechurch (4), Bruno Vrielynck (1), Wim Spakman (5), Patrick Monié (6), Bertrand Meyer (1), and Rinus Wortel (5)

(1) Université Pierre et Marie Curie - Paris 6, ISTEP, UMR UPMC-CNRS 7193, F-75005 Paris, France

(philippe.agard@upmc.fr), (2) Geological Survey of Iran, Tehran, Iran, (3) Univ. Orléans, UMR 6113, ISTO, F-45071, Orléans, France, (4) Univ. Louis Pasteur, Strasbourg, France, (5) Geosciences, Univ. Utrecht, The Netherlands, (6) Géosciences Montpellier, UMR 5573, Univ. Montpellier 2, France

This contribution aims at presenting a synthetic view of the geodynamic evolution of the Zagros orogen. The Zagros orogen and the Iranian plateau preserve a unique record of the long-standing convergence history between Eurasia and Arabia across the Neotethys, from subduction/obduction processes to present-day collision (from \sim 150 to 0 Ma). We herein combine the results obtained on several geodynamic issues, namely the location of the oceanic suture zone, the age of oceanic closure and collision, the magmatic and geochemical evolution of the Eurasian upper plate during convergence (as testified by the successive Sanandaj-Sirjan, Kermanshah and Urumieh-Dokhtar magmatic arcs), the P-T-t history of the few Zagros blueschists, the convergence characteristics across the Neotethys (kinematic velocities, tomographic constraints, subduction zones and obduction processes), together with a survey of recent results gathered by others over the past decade. We provide lithospheric-scale reconstructions of the Zagros orogen from \sim 150 to 0 Ma across two SW-NE transects. This evolution for the Zagros orogen is also compared to those of the nearby Turkish and Himalayan orogens. In our geotectonic scenario for the Zagros convergence, we outline three main periods/regimes: (1) the mid- to late Cretaceous (115-85 Ma) corresponds to a distinctive period of perturbation of subduction processes and interplate mechanical coupling marked by blueschist exhumation and upper-plate fragmentation, (2) the Paleocene-Eocene (60-40 Ma) witnesses slab breakoff, major shifts in arc magmatism, and distributed extension within the upper plate, (3) from the Oligocene onwards (\sim 30-0 Ma), collision develops with a progressive SW migration of deformation and topographic build-up (Sanandaj-Sirjan zone: 20-15 Ma, High Zagros: \sim 12-8 Ma; Simply folded belt: 5-0 Ma) and with partial slab tear at depths (\sim 10 Ma to present). Our reconstructions underline the key role played by subduction throughout the whole convergence history. We finally stress that such a long-lasting subduction system with changing boundary conditions also makes the Zagros orogen an ideal natural laboratory for subduction processes.