Geophysical Research Abstracts, Vol. 9, 06628, 2007
SRef-ID:
© European Geosciences Union 2007

New petrological and geodynamic constraints for the Zagros orogeny

P. Agard (1), J. Omrani (2), L. Jolivet (1), H. Whitechurch (3), P. Monié (4)

(1) Laboratoire de Tectonique, UMR 7072, Université Paris 6, France, (2) Geological Survey of Iran, Tehran, Iran, (3) EOST, Strasbourg, France (4) Laboratoire Dynamique de la Lithosphère, UMR 5573, Université Montpellier 2, France

The Zagros orogen provides a unique opportunity within the Alpine system to evaluate the interplay between a young Tertiary collision and earlier subduction/obduction processes. We herein present results recently obtained on the following regional geodynamic issues: (1) the location of the oceanic suture zone, the age of oceanic closure in the Zagros and chronological constraints for the Arabia-Eurasia convergence history, (2) the syn-subduction tectonometamorphic evolution and the magmatic and geochemical evolution of the upper plate during convergence (the internal Sanandaj-Sirjan zone and Urumieh-Dokhtar magmatic arc; SSZ, UDMA, hereafter), (3) the P-T equilibrium conditions and age constraints of the restricted SE Zagros blueschists, their relationship to those from nearby Makran and Oman, and with the suture zone itself, and why they are so few and restricted in space, (4) the convergence characteristics across the Neotethys (kinematic velocities, subduction zones, obduction mechanisms, thermomecanical modeling of the whole transect). A geotectonic scenario for the Zagros convergence, from the time of obduction to recent, is proposed. Some of the salient results are briefly listed below: (a) The Main Zagros Thrust (MZT) is deeply rooted, possibly to Moho depths, and the suture zone effectively runs along the MZT. Several major tectonic events take place in the Crush zone (in Lorestan) at the end of the Cretaceous, of the Eocene and from the Mio-Pliocene onwards (ca. $<$ 20-15 Ma). The final resorption of the oceanic domain took place slightly after 35 Ma and collision must have started before ca. 25-23 Ma in northern Zagros. The shortening rate across the Crush zone since the Mid-Miocene (20-15 Ma) is estimated at a minimum 3-4 mm/yr; (b) Rare-earth element (REE) systematics on the SSZ and UDMA magmatic belts show that, despite a marked shift from the SSZ to the UDMA at the

end of the Tertiary, they originated from similar, subduction-related mantle sources from the Mesozoic to the Eocene. In contrast, syn-collision Upper Miocene to Plio-Quaternary magmatic products show a distinctive adakitic trend, whose distribution supports slab-breakoff at depth; (c) BS exhumation (c. 95-85 Ma) coincided with obduction processes in the region and followed a sharp rise of convergence velocities across the Neotethys (from 2-3 to 6 cm/yr). This exhumation was a transient process with respect to the long-lived subduction beneath Iran (approx. 150-35 Ma) that testifies to the existence of a major, regional-scale modification of the plate-slab coupling in the subduction zone during this period. Most Zagros BS equilibrated at around 11 kbars and 520-530˚C along a warm, 15˚C/km gradient, yet some exotic blocks in matrix serpentinite reached 17-18 kbars at c. 500˚C.