Geophysical Research Abstracts
Vol. 20, EGU2018-5249, 2018
EGU General Assembly 2018

Seamount subduction at seismogenic depths: structural and metamorphic evidence from the Zagros suture zone

Guillaume Bonnet (1), Philippe Agard (1), Samuel Angiboust (2), Marc Fournier (1), and Jafar Omrani (3)

(1) Institut des Sciences de la Terre de Paris, Sorbonne Universités, Paris, France, (2) Institut de Physique du Globe de Paris, Sorbonne Paris Cité, Paris, France, (3) Geological Survey of Iran, Tehran, Iran

Large-scale seafloor topographic features, such as seamounts, are for the most part subducted with the downgoing oceanic plate. They are expected to critically impact the seismogenic and mechanic behavior of subduction zones, but their exact role is strongly debated (i.e. as to whether they represent barriers to propagation or asperities promoting nucleation).
Rare natural examples of metamorphosed seamounts, which got sliced off the slab along the plate interface and escaped recycling into the mantle, are therefore precious witnesses to document processes operating at depths of 0-30 km.
We herein report the existence of a large-scale oceanic topographic structure sandwiched in the Zagros suture zone (Siah Kuh unit), most probably a former seamount, along with other blueschist units (Angiboust et al., EPSL 2016). The main criteria for identifying this seamount are its:
(1) shape: the Siah Kuh unit is a minimum 1.5-2 km thick (up to ∼3-4 km thick), rounded-shaped body with a 15-20 km diameter,
(2) lithologies: it is made mainly of a regular succession of massive basaltic flows, commonly as pillow basalts, minor ophiolite-type gabbros and serpentinite, together with subordinate more differenciated volcanic and plutonic rocks.
(3) sedimentary cover: basalts are overlain by shallowly deposited reef limestone and deepening-up sediments with the occurrence of cherts and pelagic limestones (which points to possibly flexural subsidence).
(4) geochemistry: mafic rocks show an evolution trend from calc-alkaline IAB to calc-alkaline MORB, felsic rocks (including plagiogranite) have an oceanic signature. This is proof for formation in an arc to back-arc setting.
HP-LT minerals (lawsonite, aragonite veins, blue amphibole) found across the whole structure, particularly in zones of localized compressive deformation, indicate that this seamount was shallowly subducted at ∼20 km. This deformation, interpreted to be syn-subduction, is assisted by décollement rooting in serpentinite and/or oceanic metasediments and is associated with rare cataclase in magmatic rocks. We interpret these structures as related to the internal slicing of the seamount in subduction. The presence of these soft layers may prevent seismogenic deformation, since no pseudotachylites have been found. The Siah Kuh unit is also a perfect target to investigate subduction processes such as mechanical coupling, fluid/tectonic overpressure and the nature of subduction fluids.