
Revised Structure of the Oman Mountains Based on New Structural Mapping and Geophysical Data

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Classic structure of the Oman Mountains has been 1) a stacked series of thrust-nappes including the Samail Ophiolite and Hawasina nappes overlying a para-autochthonous platform carbonate succession, 2) a series of domal culminations including the Hawasina, Jabal Akhdar and Saih Hatat windows related to inferred subsurface ramps, and 3) a series of frontal folds and thrusts that affect the Tertiary units. Implicit in this geometry was a NE-dipping shear system required by popular Oman-type supra-subduction models involving subduction of the margin beneath Neotethys followed by overthrusting (obduction) of the oceanic lithosphere. New structural and geophysical data from the Oman Mountains presented as four new structural profiles necessitate revision of the general structural relationships and the crustal architecture of this part of the Arabian margin. The revised profiles cross Saih Hatat, Jabal Akhdar, the Hawasina window and Bani Hamid to the Musandam. Major changes in the Saih Hatat profile relate to the presence of a major NE-vergent fold-nappe in the Paleozoic platform sequence and a SW-dipping shear zone that dips beneath the mountains as inferred from a new geophysical MT resistivity image. The new geometry requires, firstly major underthrusting of the continental margin, and secondly post-ophiolite emplacement backthrusting and oceanwards vergent fold-nappe development, that have to be part of Samail ophiolite obduction geodynamics. Major changes in the Jabal Akhdar profile relate to the presence of a crustal root and the NE-directed asymmetry of the anticline. No NE-dipping, ramp-flat systems have been identified in the subsurface beneath the Oman Mountains.
