

Crustal structure, ophiolites and flexure beneath the Oman-UAE mountains

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Previous work suggest the Oman-UAE mountains formed in the Late Cretaceous by obduction of a largely intact thrust sheet of Late Cretaceous oceanic crust and upper mantle (Semail ophiolite), and Tethyan oceanic sedimentary and volcanic rocks onto the eastern margin of the Arabian plate. The geometry of the ophiolite, its extension into the Gulf of Oman and the nature of the underlying crust are, however, unknown.

In this paper we report on the results of an onshore/offshore seismic experiment that addresses these questions by a combination of active and passive seismic techniques, as well as potential field modelling and surface geological mapping. We use the data acquired to constrain the geometry of the ophiolite, the nature of the crust that underlies it and the role that it has played in deforming a pre-existing rifted margin and initiating basin subsidence.

Here we show that the Semail ophiolite forms a high P wave velocity, high density, >15 km thick east-dipping body that during obduction flexed a highly extended rifted continental margin downwards by up to ~10 km, thereby contributing to subsidence of flanking sedimentary basins. The western limit of the ophiolite is defined onshore by the Semail thrust while the eastern limit extends several km offshore, where it is defined seismically by a ~40°, east-dipping, normal fault. We interpret the fault as the margin of an incipient suture zone that currently separates the Arabian plate from *in situ* Gulf of Oman oceanic crust and mantle presently subducting northwards beneath the Eurasian plate at the Makran trench.

Keywords: Oman-UAE mountains, Semail ophiolite, obduction