Geophysical Research Abstracts
Vol. 17, EGU2015-5380, 2015
EGU General Assembly 2015

New paleomagnetic data from the Wadi Abyad crustal section and their implications for the rotation history of the Oman ophiolite

Matthew Meyer (1), Antony Morris (1), Mark Anderson (1), and Chris MacLeod (2)

(1) School of Geography, Earth & Environmental Sciences, Plymouth University, Plymouth, United Kingdom, (2) School of Earth & Ocean Sciences, Cardiff University, Cardiff, United Kingdom

The Oman ophiolite is an important natural laboratory for understanding the construction of oceanic crust at fast spreading axes and its subsequent tectonic evolution. Previous paleomagnetic research in lavas of the northern ophiolitic blocks (Perrin et al., 2000) has demonstrated substantial clockwise intraoceanic tectonic rotations. Paleomagnetic data from lower crustal sequences in the southern blocks, however, have been more equivocal due to complications arising from remagnetization, and have been used to infer that clockwise rotations seen in the north are internal to the ophiolite rather than regionally significant (Weiler, 2000).

Here we demonstrate the importance and advantages of sampling crustal transects in the ophiolite in order to understand the nature and variability in magnetization directions. By systematically sampling the lower crustal sequence exposed in Wadi Abyad (Rustaq block) we resolve for the first time in a single section a pattern of remagnetized lowermost gabbros and retention of earlier magnetizations by uppermost gabbros and the overlying dyke-rooting zone. Results are supported by a positive fold test that shows that remagnetization of lower gabbros occurred prior to the Campanian structural disruption of the Moho. NW-directed remagnetized remanences in the lower units are consistent with those used by Weiler (2000) to infer lack of significant rotation of the southern blocks and to argue, therefore, that rotation of the northern blocks was internal to the ophiolite. In contrast, E/ENE-directed remanences in the uppermost levels of Wadi Abyad imply large, clockwise rotation of the Rustaq block, of a sense and magnitude consistent with intraoceanic rotations inferred from extrusive sections in the northern blocks. We conclude that without the control provided by systematic crustal sampling, the potential for different remanence directions being acquired at different times may lead to erroneous tectonic interpretation.