Geochemical structuration of the Oman ophiolite Dunitic Transition Zone

MATHIEU ROSPABE[1], MATHIEU BENOIT[2], MICHAEL THEVENY[1], MARIE CLAVERIE[1], BENEDICTE ABILY[3] AND GEORGES CEULENEER[2]

[1]University Paul Sabatier Toulouse III, Toulouse, France
[2]CNRS, Paris Cedex 16, France
[3]ARC Centre of Excellence for Core to Crust Fluid Systems and GEMOC, Department of Earth and Planetary Sciences, Macquarie University, NSW 2019, Australia

Ophiolites expose gabbroic sections that are generally separated from the mantle section by a dunitic transition zone (DTZ). Our previously published data on the Oman Ophiolite DTZ demonstrated that two main magmatic processes may explain its genesis: 1) reaction melting between a mantle peridotite and a melt under-saturated with orthopyroxene; 2) olivine crystallization from a high-Mg primitive melt.

We present a detailed geochemical, petrological and structural study of a selection of cross sections within the Oman ophiolite DTZ. Dunites have very low trace element contents. For this purpose, we adapted and adjusted specific chemical protocols in order to determine accurately the dunite trace element concentration. Whole rock minor and trace elements distribution, together with mineral chemistry, usefully contribute to distinguish between cumulative and reactional dunites. The structural, petrological and geochemical differences observed from one cross section to the others bear witness to the former thermal structure of the spreading center and to variations in the integrated melt flux percolating in the DTZ. This results in complex hybridization between MORB and melt fraction locally produced by the melt/rock reactions. Combining detailed sampling of numerous cross sections within the DTZ, with high precision trace element determinations is a powerful tool to investigate the processes of oceanic crust formation.