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MORB and boninitic melts parental to mantle chromitites in a single section through the northern Oman ophiolite

H Rollinson

Department of Earth Sciences, Box 36, Sultan Qaboos University, Muscat, Sultanate of OMAN (hrollin@squ.edu.om)

Chromitites from the Wadi Rajmi mantle section through Oman ophiolite are of two different types. Low-cr# chromitites, of MORB affinity are found in the upper part of the section close to the Moho. High cr# chromitites, with arc affinities are found deeper in the mantle. Experimental data are used to recover the compositions of the melts parental to the chromitites and show that the low cr# chromitites were derived from melts with 14.5-15.4 wt % Al_2O_3, with 0.4 to 0.9 wt % TiO_2 and with a maximum possible mg# of 0.76. In contrast the high cr# chromitites were derived from melts with 11.8-12.9 wt % Al_2O_3, 0.2 to 0.35 wt% TiO_2 and a maximum melt mg# of 0.785. Comparison with the published compositions of lavas from the Oman ophiolite shows that the low cr# chromitites may be genetically related to the upper (Lasail, and Alley) pillow lava units and the high cr# chromitites the boninites of the upper pillow lava Alley Unit. The calculated TiO_2-Al_2O_3 compositions of the parental chromitite magmas indicate that the high cr# chromitites were derived from high-Ca boninitic melts, produced by melting of depleted mantle peridotite. The low cr# chromitites were derived from melts which were a mixture of two end-members – one represented by a depleted mantle melt and the other represented by MORB. This mixing probably took place as a result of melt-rock reaction.