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# Genesis of high-Al chromitites in Wadi Rajmi, northern Oman: constraints from mineralogy and geochemistry

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The Oman ophiolite is located on the northeastern margin of the Arabian plate. It is one of the largest and best-exposed ophiolites in the world hosting over 450 chromite deposits. Here we report a new chromite deposit in Wadi Rajmi (named Rajmi-1 Cr-deposit) within the Fizh massif in the Semail ophiolite of Oman. The deposit occurs as a layer within dunites surrounded by harzburgites. The deposit consists of massive chromite in the center and graduates into disseminated type at the margin. Petrology, mineralogy, and geochemical studies show that the surrounding peridotites of this deposit are relatively depleted with a high (>20%) degree of partial melting. However, these peridotites are also characterized by enrichments of light rare earth elements (LREEs), indicating that they are not simply partial melting remnants, but may have undergone metasomatism by melts/fluids. These peridotites also show geochemical affinities with those of the Izu-Bonin-Mariana (IBM) forearc peridotites The chromitites in the Rajmi-1 chromite, are characterized by relatively low Cr# values (52.5-61.5) and are classified as high-Al chromitites. However, several previous studies of chromite deposits in Wadi Rajmi showed that most of these chromitites are of high Cr- type. Chromites of the high-Al chromitites generally show comparable compositions with those crystallized from a mid-ocean ridge basalt (MORB), while the calculated parental melt of this deposit shows affinity with MORB magma. The studied chromites contain various, hydrous silicate inclusions, such as amphiboles, and micas, indicating a typical MORB nature of the parental magma. Combined with the tectonic setting of the surrounding peridotites, we conclude that the parental melt of the Rajmi high-Al chromitites within the Fizh massif is a MORB-like magma formed in a nascent forearc mantle in a supra-subduction zone environment. Considering the characteristics of the occurrence and the boninitic nature of the parental magma of high-Cr chromitites in the Wadi Rajmi, we believe that the high-Al and high-Cr chromitites in the Wadi Rajmi are the products of the progressively evolving magmas in a forearc tectonic setting.