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Distribution of ultramafic layers in the mantle section of the Oman ophiolite: early magma genesis at spreading centre

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Ultramafic dykes concordant to their host foliation (layerings) are frequently observed at various level of the mantle section of the Oman ophiolite. They generally crop out as series of 3 to about ten parallel veins, a few mm (one crystal) to a ten of cm wide, a few cm spaced out. Their host is usually harzburgite showing, in one third of the cases, increasing Opx content when approaching the layer and, in the two other third of the cases, no variation of the Opx content. Locally concordant dunite may appear in association with pyroxene-rich layerings as thin (a few mm to a few cm) parallel vein in contact with the layer or not. We present here a compilation of the data obtained on about 240 samples taken all over the mantle section of the Oman ophiolite. Their modal composition cover a wide part of the ultramafic domain with rare clinopyroxenite, dunite or wehrlite, abundant orthopyroxenite and websterite, and scarcer clinopyroxene-bearing harzburgite and lherzolite. The distribution map shows that layerings appear at any level in the mantle section, close to the basis as well as a few tens of meters below the Moho. Layerings are abundant only in the northernmost part of the ophiolite, from the Wuqbah to the Fizh blocks with exceptionally low abundance in the Hilti block. They are rare or even non-existent in the south-eastern massifs (Maqsad, Wadi Tayin, etc.) suggesting that condition for their genesis or preservation were reunited only in some specific places in the mantle before obduction. Their major elements chemistry is generally in equilibrium with their host peridotite and their pyroxenes and olivines compositions stay within the peridotite chemical domain with no specific rim-core evolution. However, Cpx trace elements content shows compositions richer in REE than the classical Oman harzburgite with chondrite normalised profiles slightly dipping in the HREE suggesting a magmatic origin with possible magma generation in the garnet peridotites field. Two-pyroxenes geothermometer show equilibrium temperatures between 950 and 1100^{o}C, suggesting high temperature transposition and equilibration. The high abundance of layerings observed close to the Moho transition zone in the Fizh and Wuqbah blocks show that these features and their transposition are not related to the obduction but to early magmatic process below the Omanese spreading centre followed by mantle flow at high temperature.

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