

# Redox state of mantle wedge above subducting slab inferred from the mantle section of Oman ophiolite

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The mantle wedge at subduction zone is believed to be more oxidized relative to the oceanic mantle because the fluid liberated from subducted slab oxidizes the mantle wedge [1]. However, these arguments are based on the mantle xenoliths that only represent the uppermost part of the mantle wedge. The mantle section of the northern Oman ophiolite widely exposes itself from the crust-mantle boundary (Moho) to the basal thrust where the peridotites contact to the thermally metamorphosed subducted oceanic crust. Thus, the Oman mantle section is suitable for testing the redox state of mantle wedge. In this study, we present the spatial distribution of oxygen fugacity in the Fizh mantle section of the Oman ophiolite as an analog for the redox state of mantle wedge.

The  $\Delta\log fO_2$  relative to FMQ buffer for harzburgites and dunites were calculated following the method of Ballhaus et al. (1991) [2]. The values range from -3.3 to +1.8 and tend to decrease from the Moho to the basal part of the mantle section. Dunites are more oxidized than harzburgites. The  $Fe^{3+}/\Sigma Fe$  ratio of spinel were evaluated by Mössbauer spectroscopy. The calculated  $Fe^{3+}/\Sigma Fe$  ratio assuming spinel stoichiometry is slightly lower than those obtained by Mössbauer spectroscopy but the difference is negligible compared to the whole range. Moreover, the V/Sc ratios of whole rock peridotites show a strong negative correlation with  $\Delta\log fO_2$  (FMQ) indicating the observed variation and tendency of  $\Delta\log fO_2$  (FMQ) are real. Reduced signature in the basal part of mantle section may indicate a reaction with a reduced melt/fluid derived from subducted sediment. This hypothesis is supported by presence of methane peak in Raman spectrum for fluid/melt inclusions in olivine from the basal peridotites whereas no methane peak is observed in the peridotites from the upper most part of the mantle section.

[1] Parkinson & Arculus (1999) Chem. Geol., 160, 409-423. [2] Ballhaus et al. (1991) CMP, 107, 27-40.