

Re-Os signature of Mersin ophiolite (S-Turkey): ^{187}Os contribution during the SSZ type oceanic crust and chromitite generation

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The Mersin ophiolite, formed in a supra-subduction zone tectonic setting in the southern branch of the Neo-Tethys ocean in southern Turkey, is composed of mantle peridotites and overlying ultramafic to mafic cumulates and basalts. The multi-stage melting residue of highly depleted and re-fertilized mantle section and the lower part of the ultramafic cumulates from the Mersin ophiolite contain economically important chromite deposits. High-Cr# (0.70 to 0.84) and low TiO_2 contents (<0.27 wt.%) of chromite grains, and negative slope of C1-normalized PGE pattern of chromitites from Os to Pd, with a total PGE contents ranging between 111 to 400 ppb, all suggest crystallization from boninite melt generated by re-melting of already depleted mantle source. Measured $^{187}\text{Os}/^{188}\text{Os}$ ratio of the mantle peridotite (0.12926) is very close to PUM value (0.1296), whereas the ultramafic cumulates (0.13243-0.13885) and mafic cumulates (0.15828-0.26263) are represented by higher $^{187}\text{Os}/^{188}\text{Os}$ ratios. Most of the chromitite samples have $^{187}\text{Os}/^{188}\text{Os}$ ratios (0.12811-0.12949) lower than the PUM value whereas one chromitite sample has higher $^{187}\text{Os}/^{188}\text{Os}$ value of 0.13226. Re-Os isotopic data obtained from the ophiolitic rocks and chromitites yielded and isochron age of 85.8 ± 3.42 Ma (MSWD=3.6) with an initial $^{187}\text{Os}/^{188}\text{Os}$ ratio of 0.12938. Assumption of the 270 Ma for the opening of Neo-Tethys ocean and the depletion of all Re during the related melting of PUM like mantle ($^{187}\text{Os}/^{188}\text{Os}=0.1296$) will result $^{187}\text{Os}/^{188}\text{Os}$ ratio of 0.12827 for the melting residue. The higher calculated initial Os isotopic ratios of the cumulate rocks (0.12898-0.12990) and chromitite samples (0.12796-0.12948) may suggest that a significant amount of ^{187}Os contributed to the SSZ-type melt responsible for the formation of chromitites and cumulate rocks of the Mersin ophiolite.

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