# Sulfides in ophiolitic dunite channels cause Os-isotope decoupling between oceanic crust and mantle

QING XIONG[1,2]*, JIAN-PING ZHENG[1,2], YONG XU[3], JIN-GAO LIU[3], W.L. GRIFFIN[2], SUZANNE Y. O'REILLY[2]

[1] GPMR, China Univ. of Geosciences, Wuhan 430074, China (*correspondence: xiongqing@cug.edu.cn)
[2] CCFS & GEMOC, Macquarie Univ., NSW 2109, Australia
[3] GPMR, China Uni. of Geosciences, Beijing 100083, China

Re-Os isotopic compositions [quartiles of γOs(t) with Q1=+2.3 and Q3=+16.1] of oceanic crust represented by fresh MORB glasses and primitive gabboic cumulates are systematically more radiogenic than the sub-chondritic Os isotopes [quartiles of γOs(t) with Q1= -4.1 and Q3= -0.6] of oceanic mantle, represented by abyssal peridotites and Os-Ir alloys from global ophiolites. Os isotopic decoupling between oceanic crust and mantle has been explained by radiogenic Os contributions from metasomatic sulfides and/or recycled pyroxenites in convective mantle, yet ignored in the role of melt channels that regulate the flow of magmas feeding the oceanic crust at the crust-mantle boundary.

*In situ* Re-Os isotopic compositions of 196 base-metal sulfide grains have been analyzed from the Zedang (South Tibet) ophiolitic low-Cr# [spinel $Cr^{3+}/(Cr^{3+}+Al^{3+})<0.67$] chromitites within dunite lenses, interpreted as interaction products between MORB-like melts and harzburgites. Thirty-eight analyses (mainly sulfide inclusions in chromite) show a wide range of $^{187}Os/^{188}Os$ (t=130 Ma) from 0.1191 to 0.1702 with γOs(t) from -6.4 to +33.8. These are similar to those of the oceanic crust and the Os-rich sulfides from the Oman low-Cr# chromitites. The initial $^{187}Os/^{188}Os$ ratios (0.1281-0.1296) of chromites from the Zedang chromitites are close to the Primitive Upper Mantle, but higher than those of the Zedang and other Yarlung Zangbo ophiolitic peridotites. This suggests that radiogenic Os components from asthenosphere have been added to the unradiogenic Neo-Tethyan oceanic lithospheric mantle during the formation of chromitites and related dunite melt channels. The significant Os isotopic heterogeneity observed in the Zedang and Oman chromitites indicates that the Os-bearing phases were not well mixed, but aggregated together during the precipitation of chromite and monosulfide solid solution grains, when the dunite melt channels were produced in the oceanic crust-mantle transition zone. Such melt channels will affect the Os isotopic compositions of the migrating melts that eventually generate the oceanic crust, and can explain the Os isotopic decoupling between oceanic crust and mantle.