Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.19738

# Iron and Zinc Isotopic Evidence for Fluid Infiltration in Eclogite Breccias at Monviso, Italy

**SKYLAR FAY BEADLE GOLIBER**[1], PAUL STARR[1], EDWARD INGLIS[2], PHILIPPE AGARD[3], MICHELE LOCATELLI[3], BESIM DRAGOVIC[4], MARINE PAQUET[5], FRÉDÉRIC MOYNIER[6] AND ETHAN F. BAXTER[1]

[1]Boston College
[2]School of Earth and Environmental Sciences, Cardiff University
[3]Sorbonne Université
[4]University of South Carolina
[5]Université de Paris, Institut de physique du globe de Paris, CNRS
[6]Université Paris Cité, Institut de Physique du Globe de Paris, CNRS UMR 7154

Presenting Author: skylar.beadle.goliber@gmail.com

The chemical composition and redox effect of subduction zone fluids carry important implications for arc volcanism and the mobility of economically significant elements. This study uses Fe and Zn isotopic analyses of eclogite-breccias from the Monviso ophiolite, along with Sm-Nd garnet geochronology, to study the composition and redox effects of fluids generated during eclogite facies metamorphism, and to determine the timescales of brecciation and fluid infiltration. Specifically, Fe and Zn isotopic measurements were conducted on four successive generations of breccia matrix (M1-M4), which were formed during the progressive brecciation of the original Fe-Ti gabbros and the influx of both internally and externally derived fluids [1]. The variations in $\delta^{56}$Fe and $\delta^{66}$Zn data display complex patterns from the unbrecciated precursor to M2 with $\delta^{56}$Fe ranging from +0.19 to +0.43 and $\delta^{66}$Zn from -0.27 to -0.60. A strong positive correlation was observed between the M3 matrix followed by metasomatic rind formation (M4), resulting in a decrease in both $\delta^{56}$Fe (from +0.16 to -0.21) and $\delta^{66}$Zn (from -0.67 to -0.82). These data suggest that early brecciation (M1-2) coincided with small-scale, locally sourced fluid flow, whereas late stage metasomatism (M3-4) was facilitated by the infiltration of large amounts of external fluids with strongly negative $\delta^{56}$Fe and $\delta^{66}$Zn values, which may have transported oxidized material into the mantle wedge [2]. Garnet chronology of the M4 matrix generation yielded an age of 41.31± 0.60 Ma. A compilation of age data from Monviso suggests that peak metamorphism and initial brecciation (M1 formation) likely occurred at ~45 Ma. The formation of the M4 matrix, representing the end of eclogite-facies infiltration and brecciation, occurred at ~41 Ma and thus yields a timescale of ~4 Ma for the entire history of brecciation and fluid flux associated with the Monviso eclogite breccias.

[1] Locatelli et al. 2019 Geochemistry, Geophysics, Geosystems

[2] Gerrits et al. 2019 Nature Geoscience