The effects of metasomatic sulphide on mantle Re-Os systematics: Unravelling melt depletion and secondary processes

JASON HARVEY[1]*, ABDELMOUHCINE GANNOUN[1,2], KEVIN BURTON[1,3] AND PIERRE SCHIANO[2]

[1]Department of Earth and Environmental Sciences, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK (*correspondence: j.harvey@open.ac.uk)
[2]Laboratoire 'Magmas et Volcans', Université Blaise Pascal, 5 Rue Kessler, 63000 Clermont-Ferrand, France
[3]Department of Earth Sciences, University of Oxford, Parks Road, Oxford, OX1 3PR, UK

Spinel lherzolite xenoliths from Mont Briançon, French Massif Central, retain evidence of several metasomatic events. Many individual xenoliths contain interstitial glasses and melt inclusions that are not in equilibrium with the major primary minerals [1-2]. Incompatible trace element mass balance calculations demonstrate that metasomatic components comprise a significant proportion of the bulk rock budget for these elements (e.g. <25% Nd; <40% Sr) [1]. Critically, for Re-Os geochronology, metasomatism within these xenoliths is accompanied by the mobilisation of sulphide. Evidence for prior melt depletion is still preserved in the co-variation of bulk rock, major elements (MgO 38.7–46.1 wt %; CaO 0.9–3.6 wt %), and many samples yield unradiogenic bulk rock Os isotope ratios ($^{187}Os/^{188}Os$ = 0.11541-0.12626). However, the subsequent metasomatism means that bulk rock isotope measurements, whether using lithophile (e.g. Rb-Sr, Sm-Nd) or siderophile (Re-Os) based isotope systems, will only yield a homogenised average of multiple events.

Os mass balance calculations demonstrate that >95% of bulk rock Os in peridotite is hosted within 2 populations of sulphide grain: (i) interstitial, metasomatic sulphide with low [Os] and radiogenic $^{187}Os/^{188}Os$, and (ii) primary sulphides with high [Os] and unradiogenic $^{187}Os/^{188}Os$, which have been preserved within host silicate grains and shielded from interaction with transient melts and fluid [3]. The latter often preserve geochronological information of the melt that they originally precipitated from as an immiscible liquid [e.g. 4]. T_{RD} ages of individual primary sulphide grains preserve evidence for melt depletion beneath the Massif Central from at least 1.8 Gyr ago [1].

[1] Harvey *et al.* submitted to *Geochim. Cosmochim. Acta* [2] Schiano & Clocciatti (1994) *Nature* **368** 622-624 [3] Alard *et al.* (2002) *Earth Plan. Sci. Lett* **203** 651-633. [4] Harvey *et al.* (2006) *Earth Plan. Sci. Lett* **244** 606-621.

Magmatic evolution of the northwestern edge of Tauride-Anatolide Platform: Geochronological and isotopic implications

A. HASOZBEK[1,2]*, M. SATIR[2], B. ERDOGAN[3], E. AKAY[3] AND W. SIEBEL[2]

[1]DEU, Marble Programme, Torbalı-Izmir-Turkey (*correspondence: altug.hasozbek@deu.edu.tr)
[2]Institute of Geoscience, University Tübingen, Germany
[3]DEU, Geology Engineering, Tınaztepe-Izmir-Turkey

In the study region between Alacam Mountains and Emet, the northwestern edge of the Tauride-Anatolide platform is observed as laterally continuous tectonic zones which were experienced different history of metamorphism. These tectonic zones are; Menderes Massif, Afyon Zone, Tavşanlı Zone, İzmir-Ankara Zone stacked as nap packages in ascending structural order from the south to the north. These tectonic zones were assembled together by the collision of the Sakarya Continent and the Tauride-Anatolide platform.

In this study, we newly mapped various parts of these nap packages to understand their order of evolution. Geochronological and isotopic studies were performed on various magmatic suites of the Menderes and the Afyon Zones.

U-Pb zircon and $^{207}Pb/^{206}Pb$ evaporation ages indicate 550-600 Ma for the gneissic rocks of the Menderes Massif. Carboniferous age is determined for a magmatic suite of the Afyon Zone. From the syntectonic granites, emplaced during the Main Menderes Metamorphism, 30.04 ± 0.56 Ma were determined.

Tectonically assembled nap packages of the Menderes Massif, the Afyon Zone and Izmir-Ankara Zone are cut by Early Miocene granitic plutons. Their ages are determined as 21.7 ± 1.0 Ma, 19.3 ± 4.4 Ma, 20.0 ± 3.7 Ma by U-Pb isotopic dilution method. These granitic bodies are post-collisional and shallow seated. They are aligned to form a NE-SW trending magmatic belt.

The map patterns, radiogenic ages and petrologic characteristics indicate that these young granites were formed by melting of abnormally thick continental crust. The interpretations of their being related to detachment tectonics as put forward in some recent literatures [1, 2, 3] are not valid.

[1] Işık *et al.* (2004) *J Asian Earth Sci* **23/4**, 555-566. [2] Ring and Collins (2005) *J Geological Soc Lond* **162,** 289-298. [3] Thomson and Ring (2006) *Tectonics* **25,** 1-20.