Abundant upper mantle (peridotite and pyroxenite) xenoliths occur in Miocene basaltic diatreme pipes and Quaternary lava flows on the Hyblean Plateau (Sicily, Southern Italy). Peridotites are spinel-facies protogranular-textured harzburgites and lherzolites (Fo$_{90}$, En$_{89}$, Cr-diopside, Cr-rich spinel), that equilibrated at temperatures between 950 and 1050°C. Even the freshest Hyblean peridotites exhibit some serpentine content. Major-element distribution and abundance reflect depletion (high MgO, low Al$_2$O$_3$) related to one or more melt extraction events, but evidence of modal and cryptic metaso-
matism does exist. For instance, phlogopite of metasomatic origin occurs rarely in these peridotites. Geochemical evidences of metasomatism includes Light Rare Earth Element (LREE) (e.g. La/Yb ratio ≈ 9-19), Sr-Nd and He isotopic signatures are also consistent with the referetilization of the lithospheric peridotite matrix (full descriptions in Sapienza and Scribano, 2000, Sapienza et al., 2005 and references therein).

To better define the metasomatic reservoir, we performed in situ Os isotope analyses on sulphides from mantle peridotite collected from Valle Guuffari Miocene diatreme. Eight peridotite xenoliths were cut in blocks, stuck on thin section glasses and polished on one side. Sulfides were imaged using a Cameca SX-100 electron microprobe. Then, Os isotope analyses were performed using a Merchantek LUV266 nm laser ablation microprobe (LAM) attached to a Nu Plasma multi-collector ICP (MC-ICP). The laser spot size was ~60 mm. Only 4 peridotite samples contain measurable sulfides, resulting in 11 analyses. Analytical details are in Pearson et al. (2002).

Sulfides in the Hyblean peridotites are Ni-rich, often Fe-rich, and enclose a Cu-rich phase (Fig. 1). Their shape is variable, from spheroidal to irregularly shaped, usually displaying curvilinear margins (Fig. 1). The grainsize ranges from tens to ~250 mm. Sulfides are mainly related to the serpentinite network. A few sulfides are olivine-enclosed but are too small to be analysed.

$^{187}$Os/$^{188}$Os ratios range from 0.110408 to 0.124398, which correspond to sub-chondritic values. $^{187}$Re/$^{188}$Os ratios range from 0.0296463 to 1.41346, i.e. supra- to sub-chondritic values (Fig. 2). Five out of 6 sulfides from one sample (GE12) show similar $^{187}$Os/$^{188}$Os but different $^{187}$Re/$^{188}$Os, while the remaining sulfide and the other samples all align along an oblique array showing a negative correlation between $^{187}$Os/$^{188}$Os and $^{187}$Re/$^{188}$Os. Assuming the $^{187}$Re decay constant after Smoliar et al. (1996), $^{187}$Re/$^{188}$Os ratio assumes that the considered mantle portion remains in closed-system conditions through time (Walker et al., 1989). Low $^{187}$Os/$^{188}$Os sulfides from peridotite GE12 show Paleoproterozoic to Archean $^{187}$Re ages, while the other sulfides are Neo- and Mesoproterozoic. $^{187}$Re yields meaningless age (future or even older than the Earth’s formation), reflecting recent disturbance of the Re/Os ratio.

GE12 sulfides show the same unradiogenic $^{187}$Os/$^{188}$Os composition (except for one sulfide) but $^{187}$Re/$^{188}$Os ranging from 0.8-1.4 (Fig. 2). This indicates that Os isotope composition does not depend on time-integrated in situ $^{187}$Re, but rather suggests the metasomatic effects with Re addition probably occurring shortly prior the eruption. The negative correlation between $^{187}$Os/$^{188}$Os and $^{187}$Re/$^{188}$Os in the other samples also supports the metasomatic origin of Re, and rather suggests mixing between two reservoirs with different Re-Os signatures (Wang et al., 2003; Fig. 2).

Thus, the Hyblean peridotites we have studied experienced melt extraction event(s) – which would remove Re from the system - and underwent later metasomatic Re-enriching event(s). Although these preliminary Re-Os data - and the large associated uncertainties - on peridotite sulfides do not allow the calculation of a very detailed ages, $^{187}$Re ages are realistic and require a Proterozoic-Archean minimum age for these portions of the Hyblean lithospheric mantle. Most sulfides in peridotite GE12 testify to recent Re addition, while the other peridotite sulfides and one GE12 sulfide seem to the results of mixing between two metasomatic end-members. The low $^{187}$Os/$^{188}$Os sulfides in sample GE12 may be representative of the low $^{187}$Os/$^{188}$Os end-member. The occurrence of sulfides with different Os isotope signatures in sample GE12 confirms the importance of using in situ technique in such petrological study.

**REFERENCES**


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Fig. 2 - Re-Os isotope diagram for sulfides hosted in peridotite xenoliths from Hyblean Plateau. Primitive Upper Mantle (PUM) values after.

**REFERENCES**


