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Proterozoic Os model ages of sulfides in mantle peridotites from the Ronda massif (southern Spain): insights into the evolution of the W European subcontinental lithospheric mantle

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The western part of the Ronda peridotite massif (southern Spain) consists mainly of highly foliated spinel-peridotite tectonites and undeformed granular peridotites that are separated by a recrystallization front. The spinel tectonites are interpreted as volumes of ancient subcontinental lithospheric mantle and the granular peridotites as a portion of lithospheric mantle that underwent partial melting and pervasive percolation of basaltic melts induced by Cenozoic asthenospheric upwelling. The Re-Os isotopic signature of sulfides from the granular domain and the recrystallization front mostly coincides with that of grains in the spinel tectonites. This indicates that the Re-Os radiometric system in sulfides was highly resistant to partial melting and percolation of melts induced by Cenozoic lithospheric thermal erosion. The Re-Os isotopic systematics of sulfides in the Ronda peridotites thus mostly conserve the geochemical memory of ancient magmatic events in the lithospheric mantle. Os model ages record two Proterozoic melting episodes at $\sim$ 1.6-1.8 Ga and 1.2-1.4 Ga, respectively. The emplacement of the massif into the subcontinental lithospheric mantle probably coincided with one of these depletion events. A later metasomatic episode caused the precipitation of a new generation of sulfides at $\sim$ 0.7-0.9 Ga. These Proterozoic Os model ages are consistent with results obtained for several mantle suites in central/western Europe and northern Africa as well as with the Nd model ages of the continental crust of these regions. This suggests that the events recorded in mantle sulfides of the Ronda peridotites reflect different stages of generation of the continental crust in the ancient Gondwana supercontinent