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Structural Petrology of the Beni Bousera Peridotite (Betic-Rif Belt, N Morocco)

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The Beni Bousera peridotite massif is the second biggest outcrop ($\sim$ 75 km^2) of subcontinental upper mantle peridotites in the Betic-Rif chain of SW Spain and N Morocco. This massif has been proposed to be the counterpart of the Ronda peridotite in S Spain, that records a variety of mantle structures and processes that reflect tectonic processes in the West Mediterranean mantle during the Alpine orogeny. However, a detailed structural and petrological study of peridotites from the Beni Bousera massif that allows comparing the internal structure of both massifs was still lacking. In this contribution, we present new structural, petrological and lattice preferred orientation (LPO) analyses performed in a comprehensive sampling of the Beni Bousera peridotite massif.

The Beni Bousera massif is mainly composed of lherzolite and, locally, harzburgite and dunite with diffuse boundaries. From SW to NE, three main structural domains can be observed: (1) a 100–200m thick garnet-spinel mylonite zone close to the contact with crustal kinzigites that overlies (2) a porphyroclastic spinel tectonite domain enclosing garnet-bearing pyroxenites and (3) coarser-grained, porphyroclastic to granular spinel peridotites enclosing spinel-bearing pyroxenites. The lineation in the porphyroclastic peridotites, marked by elongation of olivine and pyroxene, is globally NW–SE and consistent with that observed in the garnet-spinel mylonite atop of the massif. Microstructural analysis and EBSD measurements show that both peridotites and pyroxenites deform dominantly by dislocation creep and that the average olivine grain size of peridotite globally increases towards the structurally deeper domains of the massif. Grain coarsening acompanies the transition between Ariegite to Seiland subfacies in pyroxenite. It is more patent in the core of the massif, but is, however, always more gradual than that reported in the recrystallization front of the Ronda peridotite. The observed microstructural and LPO variations are thought to record polybaric deformation under decreasing stress conditions, most likely associated with a temperature gradient with deeper domains being hotter, at quasi-asthenospheric conditions. We will also present new mineral chemistry and whole rock chemistry data of peridotites that will be used to investigate the nature of magmatic processes associated with this heating event, and its relation with mantle processes in the West Mediterranean mantle.