

Plagioclase-dunites from the Dinarides: a link to experiments

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Processes in the mantle such as the generation of melt can not be observed directly, but are interrogated experimentally as well as by studying natural occurrences of mantle rocks at the Earth's surface. We examined plagioclase-dunites from the Krivaja peridotite massif in Bosnia and Herzegovina where they occur as massive outcrops with an area of several tens of square kilometres. They contain about 80% olivine, a few % spinel, with a remainder of interstitial plagioclase and clinopyroxene. They are underlain by lherzolites that contain interstitial plagioclase patches indicative of melt migration. Up section, these lherzolites are progressively depleted of pyroxene, and cross-cut by gabbro veins.

Mg# and high Ni contents of olivine in the plagioclase-dunites, as well as their lattice preferred orientation suggest that olivine is of mantle origin and that these rocks are formed by pervasive infiltration and migration of melt. Their microstructure indicates that melt froze in place, resulting in an interstitial melt geometry similar to that in experiments on much more fine-grained samples. Experimentally, slow cooling of initially partially molten samples results in cpx replacing interstitial melt with more rounded cusps, similar to microstructures found in cpx in plagioclase dunites. Thus these rocks form an important link between experiments, direct observations in the field and indirect methods of observation such as seismic imaging of partially molten regions.