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Textures and lattice preferred orientations from the Mid-Atlantic Ridge at 15°N: Results from ODP Leg 209

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One of the aims of Leg 209 was to investigate mantle flow and melt transport processes in the mantle at slow spreading ridges. ODP Leg 209, Site 1274, has drilled into 156 m of mantle peridotite north of the 15°20' N Fracture Zone in the Mid Atlantic Ridge with 35% recovery. The core consists mainly of harzburgite, some dunite and minor gabbro intrusives. Relatively high degrees of alteration make it difficult to identify textures (foliation) at the hand sample scale or from thin section observations. Olivine in the harzburgites appeares fairly undeformed and coarse-grained, orthopyroxene is lobate and patchy. Spinel grains are crenulated and undeformed. The composition of the gabbros suggests relatively deep crystallisation ($>$ 20 km depth) and hence an extensive thermal boundary layer.

Since visually no sign of the expected high temperature fabric due to corner flow is discernible we measured olivine orientations by electron backscatter diffraction (EBSD). A problem for these measurements are the coarse grain size of the olivine (up to 1 cm) and the high degree of alteration, where often only small islands of fresh olivine are surrounded by serpentine. We have therefore employed both automated and hand mapping techniques.

Preliminary results indicate that a lattice preferred orientation of olivine exists throughout the harzburgite in the core of Site 1274, where at least 20% fresh olivine is present. The LPO exhibits patterns that are similar to those produced in deformation experiments and observed in ophiolites with distinct [010] maxima in the horizontal plane. When orientation data from different depth are rotated to a common paleo-North direction, the resulting orientation maxima are similar, indicating that no major rotation of mantle blocks relative to each has taken place on the scale of the core from

Site 1274. Further reconstruction of the data may indicate whether the observed LPO is consistent with models of mantle flow at slow spreading ridges and the seismologically observed anisotropy in the Atlantic.