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Session02: Structure, evolution, and heterogeneity of Antarctica's continental lithosphere

Microstructures of peridotites from the Mount Melbourne, Antarctica

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Microstructures of mantle xenoliths are investigated to understand internal structure and evolution of mantle beneath the Mt. Melbourne, Antarctica. Massive peridotites are characterized by abundant undulose extinction of olivine, bent cleavage traces of orthopyroxene and interstitial spinel. Chemical compositions of spinel and olivine suggest the low degree of melting. The olivine CPOs of six peridotites are acquired by rotation of [100] and [010] to be paralleled to lineation and foliation, respectively, after EBSD analysis. The CPOs of the analyzed olivine in peridotites are subdivided into D- and A-type based on Fabric Index Angle (FIA) methods (Michibayashi et al., 2016, EPSL). Temperature and pressure conditions are calculated as >900 °C and >9 MPa by two-pyroxene thermometer and grain size piezometer, respectively. Absent water content in olivine detected by FTIR is concordant with results of the FIA analysis. Abundant intracrystalline deformation features combined by low degree of melting may suggest the existence of partial melting beneath the West Antarctic Rift System. Therefore the occurrence of low-velocity zone beneath the Mt. Melbourne can be explained by seismic anisotropy of olivine in the massive peridotites.