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386-7: MICROSTRUCTURAL DEVELOPMENT WITHIN A DISTRIBUTED MID-CRUSTAL SHEAR ZONE: A NORTHERN EXTENSION OF THE GREBE MYLONITE ZONE IN FIORDLAND, NEW ZEALAND?

Wednesday, 25 October 2017
09:00 AM - 06:30 PM
Washington State Convention Center - Halls 4EF

We use electron backscatter diffraction (EBSD) to evaluate strain localization processes within strands of a distributed shear zone to evaluate whether it represents the along-strike extension of the Grebe Mylonite Zone (GMZ), previously interpreted to represent a zone of shortening in the middle crust of Fiordland, New Zealand. High-strain zones within the distributed shear zone crop out along the northern coast of South Fiord in Lake Te Anau, and the exposures lie several km along strike to the north of the GMZ, but it is unknown if the zones are coeval and record the same deformation conditions. We present EBSD results from two samples collected from the high-strain zones: a granodiorite mylonite (17NZ42), and a diorite mylonite (17NZ58) that represent the compositional heterogeneity of the shear zone.

Field observations of the distributed shear zone reveal trends in orientation and shear sense. Mylonitic foliations primarily strike SW and dip moderately to steeply NW. We observed predominantly sinistral shear sense indicators within the mylonites, correlating with a component of top-to-the-west, normal-sense of movement in high strain zones of the distributed sinistral shear zone. The mylonitic foliation orientations are similar to those we measure in the GMZ (strike SW, dip steeply NW), and the sense of motion is consistent with our interpretation of kinematic indicators in the GMZ.

EBSD analysis of the mylonites reveals dynamic recrystallization (DRX) of quartz and plagioclase. Quartz grains have Dauphine twins and lobate grain boundaries indicative of GBM DRX, but relict elongate grains and their surrounding recrystallized grains show a host control relationship suggestive of SGR DRX. Quartz has a strong lattice preferred orientation (LPO) consistent with a transition from basal <*a*> to prism <*a*> slip. Together, the quartz microstructures and LPO patterns indicate prograde deformation, with peak temperatures of ~600ºC. Plagioclase shows both SGR and GBM DRX microstructures and has a weak LPO consistent with the {010} <201> and {011} <100> slip systems, also consistent with high temperatures of mylonitic fabric development. Microstructural development appears to be higher temperature relative to that in the GMZ, and we interpret the distributed shear zones as a deeper crustal, northern extension of the GMZ.

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