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MICROKINEMATIC ANALYSIS OF STRAIN GRADIENTS IN THE MIDDLE CRUST OF THE GEORGE SOUND SHEAR ZONE, NEW ZEALAND

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We investigate strain accommodation deep within the continental crust of an intra-arc shear zone by performing microstructural and electron backscatter diffraction (EBSD) analyses on six samples from the George Sound Shear Zone (GSSZ), in Fiordland, New Zealand. The samples come from middle-crustal exposures of the transcrustal GSSZ, where it acts as a rheological boundary between the dioritic Misty Pluton (MP) and granitic host rocks. We present results from the rheology-controlling phases (plagioclase and quartz) in samples taken across the strain gradient of the GSSZ including low-strain and high-strain diorite from the margin of the MP, and low-strain granite which were all deformed during the emplacement of the Western Fiordland Orthogneiss (WFO) 128-114 Ma.

Microstructural observations show that fabrics in the GSSZ developed over amphibolite facies temperatures (T= 500-600°C). Dynamic recrystallization of quartz and plagioclase is apparent in high-strain diorite samples from the MP where quartz displays amoeboid-shaped grains, characteristic of GBM recrystallization; high-temperature deformation is implied by the presence of chessboard extinction. Plagioclase displays core-and-mantle textures indicative of SGR recrystallization. Lower strain samples of diorite and granite contain some relict igneous textures in plagioclase, but also indicate limited crystal-plastic deformation, with plagioclase displaying bulging grain boundaries indicative of BLG recrystallization; GBM recrystallization of quartz in a low-strain granite sample is indicated by amoeboid-shaped grains. Preliminary EBSD observations confirm the microstructures identified with petrographic analysis and show the presence of Dauphiné twinning in quartz grains from low- and high-strain samples, suggesting high-temperature (~600º C) deformation in quartz. Variations in fabric intensity across the strain gradient suggest that dynamic recrystallization of plagioclase is a controlling factor in the development of high strain strands of the GSSZ in the middle crust.

Session No. 29--Booth# 114

T6. Hot Rocks: High-Temperature Microstructures from Mantle to Surface (Posters)
Sunday, 10 October 2021: 9:00 AM-1:00 PM

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