207-4 - THE RHEOLOGY OF PYROXENE-PLAGIOCLASE MYLONITES FROM A TRANSPRESSIONAL LOWER CRUSTAL SHEAR ZONE, FIORDLAND, NEW ZEALAND

Tuesday, 24 September 2019

9:00 AM - 6:30 PM

Phoenix Convention Center - Hall AB, North Building

Booth No. 349

Abstract

We use electron backscatter diffraction (EBSD) analysis and its derivative microstructural and misorientation data to investigate the rheology of the lower crust during the development of a crustal-scale, transpressional shear zone during Cretaceous continental arc magmatism. We examine hornblende pyroxene diorites of the Worsley pluton that are transected by the George Sound Shear Zone, resulting in mylonites that are dominated by orthopyroxene porphyroclasts in a matrix of recrystallized plagioclase. We categorize the shear zone mylonites by relative intensity of strain and strain symmetry (e.g., prolate, oblate), and we focus on two samples, a high strain sample from an oblate S >> L tectonite domain and a lower strain sample from a prolate L >> S tectonite domain. In the high strain sample (S>>L), both plagioclase and orthopyroxene exhibit CPOs. Plagioclase CPO shows alignment of {011} and {010} parallel and subparallel to foliation, respectively, and a girdle of <100> parallel to foliation with a maximum of <100> oriented normal to lineation. Orthopyroxene CPO shows alignment of {100} parallel to foliation, and a maximum of <001> oriented highly oblique to lineation. Misorientation analysis of both plagioclase and orthopyroxene reveals the dominance of tilt-type misorientations that are consistent with the slip systems indicated by the CPOs. In the lower strain sample (L>>S), both plagioclase and orthopyroxene show CPOs. In plagioclase, there is weak alignment of {010} parallel to foliation, and a girdle of <100> axes subparallel to foliation that contains a maximum orthogonal to lineation. In orthopyroxene, there is only a strong maximum of <001> oriented parallel to lineation. Misorientation analysis of both plagioclase and orthopyroxene reveals the dominance of twist-type misorientations that are consistent with the operation of different slip systems than indicated by the CPO. Our results show that the rheology of lower crustal rocks was controlled by dislocation creep of both plagioclase and orthopyroxene. Additionally, the obliquity of the CPO patterns with respect to foliation and lineation is more prominent in the S>>L sample, which is a microstructural consequence of strain symmetry during progressive triclinic transpression.

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