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IT'S ALL ABOUT PERSPECTIVE: USING NON-TRADITIONAL VORTICITY REFERENCE FRAMES TO VIEW QUARTZ CRYSTALLOGRAPHIC PREFERRED ORIENTATIONS

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In quartzofeldspathic mylonites, quartz *c*-axis orientations and microstructural fabrics showing dynamic recrystallization (DRX) are commonly used to infer a range of deformation temperatures. Current best practice is to show quartz *c*-axis Crystallographic Preferred Orientation (CPO) plots in the vorticity normal reference frame, which gives the viewers the perspective of looking down the bulk vorticity axis. In transpressional shear zones where strain geometry is either pure shear or simple shear dominated, the vorticity normal reference frame is either parallel or perpendicular to lineation (respectively) and contained within the foliation plane. However, there is little research on how to interpret the correct CPO reference frame in specimens from shear zones with a more complex deformation history where kinematic geometry is triclinic.

We use microstructural analysis via Electron Backscatter Diffraction (EBSD) on three samples from the southernmost section of the Grebe Shear Zone (GSZ), a Cretaceous, intra-arc, transpressional shear zone located in Fiordland, New Zealand, where U-Pb zircon dates from these samples constrain fabric development over 114.9-122.2 Ma. In all three samples we observe an apparent discrepancy in inferred deformation temperatures, where microstructural fabrics show quartz DRX via grain boundary migration, but quartz *c*-axis CPO plots are consistent with the dominance of basal <*a*> slip. These two observations conventionally indicate deformation temperatures of 500-600ºC and 350-450ºC, respectively. Crystallographic Vorticity Axis (CVA) analysis in all three samples shows that the bulk vorticity axis is parallel to lineation, but when we view the CVA data in single-phase plots, we observe that the quartz vorticity axis plots show a triclinic geometry where the vorticity axes are oblique to both the lineation and the foliation plane.

We present evidence that suggests conventional methods of showing quartz *c*-axis CPO plots can lead to misinterpretation of slip systems and their inferred temperature conditions when the bulk vorticity axis does not the same geometry as the quartz vorticity axis. We additionally show new procedures to rotate CPO plots into the correct vorticity-normal reference frame for samples deformed under triclinic transpression.

Session No. 2

T13. Directly Dating Deformation, Metamorphism, and Metasomatism through Petrochronology I
Tuesday, 15 March 2022: 8:00 AM-12:00 PM

CBC-A 112 (UNLV Classroom Building Complex A)

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