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Paper No. 35-8

Presentation Time: 3:30 PM

**SPATIAL AND TEMPORAL VARIATIONS IN KINEMATIC DEFORMATION GEOMETRY WITHIN A CRUSTAL-SCALE SHEAR ZONE NETWORK: MICRO- TO REGIONAL-SCALE PARTITIONING OF OBLIQUE CONVERGENCE ALONG THE GONDWANA MARGIN, FIORDLAND, NEW ZEALAND (Invited Presentation)****MIRANDA, Elena**<sup>1</sup>, KLEPEIS, Keith A.<sup>2</sup>, SCHWARTZ, Joshua<sup>3</sup>, DIETEL, Matthew<sup>3</sup>, PAGE, Brandon<sup>1</sup> and BROWN, Virginia<sup>1</sup>,

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We use electron backscatter diffraction analysis and its derivative crystallographic vorticity axis (CVA) data to investigate the development of a crustal-scale network of intra-arc, transpressional shear zones during Early Cretaceous arc magmatism in Fiordland, New Zealand, associated with oblique subduction along the Gondwana margin. We examined 6 lower crustal pyroxene and hornblende diorite mylonites from the Worsley Pluton where it is cut by the George Sound Shear Zone (GSSZ), and 6 middle crustal tonalite and granodiorite mylonites from the Puteketeke Pluton, Darran Suite, and Carboniferous host rocks where they are cut by the Grebe Shear Zone (GSZ). Fabric development in this crustal-scale shear zone network overlapped in time. Mylonitic fabrics in the GSSZ at Bligh Sound developed mainly from 115-110 Ma, whereas mylonites in the northern and southern GSZ developed mainly at 125-116 Ma and 122-115 Ma, respectively.

Lower crustal diorite mylonite samples in the widest (~5 km) part of the GSSZ near Bligh Sound show CVA data consistent with monoclinic, simple shear dominated transpression. In the middle crust, CVA data are more complicated. The northern part of the GSZ near Lake Te Anau is anastomosing and distributed over a 20 km-wide zone, and the CVA data from these northern GSZ granodiorite mylonites record a transition from triclinic, simple shear dominated deformation to monoclinic, pure shear dominated deformation. The southern part of the GSZ near Lake Hauko is more localized and narrow in width (1.5 km), and the CVA data from these southern GSZ tonalite and granodiorite mylonites record monoclinic, pure shear dominated transpression. Together, the CVA data show spatial variations in shear zone kinematic deformation geometry that reflect regional tectonic controls on deformation style with crustal depth. The CVA data from the lower crustal GSSZ samples are consistent with dominantly arc-parallel transport, and the CVA data from the middle crustal GSZ samples indicate more partitioned deformation consistent with initial arc-parallel transport followed by arc-normal transport. These results suggest that CVA analysis has recorded the effects of oblique convergence across the Gondwana margin, making it a powerful tool for reconstructing regional events through micro-scale analysis.

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