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DISTINGUISHING MULTIPHASE AND NON-STEADY DEFORMATION HISTORIES IN LARGE SEISMOGENIC FAULTS AND SHEAR ZONES (Invited Presentation)

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Throughout her career, Professor Sharon Mosher has been a pioneer in the structural analysis of polydeformed rocks and regions. Her work on the evolution of superposed rock fabrics in complexly deformed areas, for example, has greatly improved our ability to determine how faults, shear zones, and orogens evolve over time. Traditionally, sequences of foliations, mineral lineations, folds, and other structural elements have been interpreted in terms of discrete, multiphase deformation events. However, alternative interpretations where structural sequences result from a single, progressive event also are common, especially where changes in stress fields or flow parameters result in non-steady deformation. Here, in honor of Professor Mosher, we present examples of three different types of structural sequences that formed in large seismogenic faults and shear zones in SW New Zealand and southern California. These examples illustrate the different ways in which multiple generations and styles of rock fabrics develop and become preserved in zones of localized deformation. The first example is from a large fault zone located inboard of the Puysegur subduction zone in Fiordland, New Zealand. This zone displays several generations of superposed fabrics that record a history of repeated reactivations over a few tens of millions of years. A second set of examples, from both Fiordland and southern California, illustrates how non-steady deformation can result in parallel ductile and brittle fabrics, including veins of pseudotachylyte, that formed during a single, progressive shearing event. The third example, also from Fiordland, shows how parallel rock fabrics in a large, lower crustal shear zone formed diachronously across a large region as the inboard and outboard belts of the Mesozoic Median batholith converged. Each of these examples displays different structural relationships among rock fabrics in the field. To decipher their histories, we combined structural data with $^{40}Ar/^{39}Ar$ and U-Pb (zircon, titanite) geochronology. The examples illustrate the utility of combining field observations with both direct and indirect isotopic dating techniques to distinguish between superposed rock fabrics that formed during progressive deformation and those that represent distinct tectonic events.

Session No. 147

T29. Structural Analysis of Polyphase Deformation from Orogen to Thin Section I: A Special Session in Honor of Sharon Mosher
Tuesday, 11 October 2022: 8:00 AM-12:00 PM

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