

# 199-6 - PRESSURE, TEMPERATURE, AND TIMING OF MAGMA INTRUSION AND METAMORPHISM, GEORGE SOUND NEW ZEALAND



Tuesday, 24 September 2019



9:00 AM - 6:30 PM



Phoenix Convention Center - Hall AB, North Building

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**Booth No. 249**

## Abstract

The effects of deformation on magmatism can lead to a complex heterogeneous crustal architecture, which partially controls the evolution of magmatic arcs through time. Here we present pressure, temperature, and metamorphic age estimates from the Western Fiordland Orthogneiss (WFO) exposed in George Sound, New Zealand to help constrain the crustal architecture of the Fiordland magmatic arc. These preliminary results constrain the emplacement depths and subsequent metamorphic history of plutons emplaced into an Andean-style magmatic arc. We focus on pressure-temperature-time (P-T-t) paths for the Eastern McKerr intrusives (EMI) part of the WFO and George Sound Paragneiss (GSP). The EMI are a suite of variably foliated diorite and monzonite plutons that lack the granulite facies metamorphic minerals observed elsewhere in the WFO. The George Sound Paragneiss is composed of pelitic to semi-pelitic gneissic rocks with subordinate xenoliths and rafts ranging from meters to kilometers in maximum dimensions. The EMI are cut by garnet mylonite of the George Sound Shear Zone along southeastern George Sound. The lack of granulite facies mineral assemblages in the EMI have hindered estimation of emplacement depths and evaluation of the metamorphic history for this part of the WFO.

Published U-Pb zircon ages indicate emplacement of the EMI at 120 to 128 Ma. Zircon rim ages suggest that some or all metamorphism of the GSP occurred ca. 120 Ma. Here we report emplacement pressures for the EMI using hornblende barometry and compare to new and published pressures for metamorphism of the adjacent GSP. Preliminary pressure estimates for the EMI range from 8.0 to 9.6 kbar, indicating emplacement within the middle crust. A preliminary garnet Sm-Nd age of  $124 \pm 16$  Ma for the GSP matches the zircon rim ages metamorphism. Preliminary metamorphic pressure and temperature estimates for the GSP are 580 to 670 °C and approximately 8.6 kbar. Future work will include construction of pseudosections for constraining the P-T and deformation history of both the EMI and GSP. These results will be used to reconstruct the crustal structure and better understand magmatism and deformation within the Fiordland magmatic arc.

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