

199-13 - PRELIMINARY GARNET GROWTH AGES FROM THE ANITA SHEAR ZONE AND ADJACENT ROCKS, NORTHERN FIORDLAND, NEW ZEALAND



Tuesday, 24 September 2019

9:00 AM - 6:30 PM

Phoenix Convention Center - Hall AB, North Building

Booth No. 256

Abstract

Fiordland, New Zealand is composed of middle and lower crustal rocks of a Cretaceous magmatic arc and its Paleozoic cover sequence, making it an excellent place to study processes related to the arc's thermal and structural architecture. The Anita Shear Zone (ASZ) is a 4 - 5 km wide and 30 km long zone of intensely deformed amphibolite- facies rocks, which runs subparallel to the Alpine Fault and separates the Western Fiordland Orthogneiss (WFO) and Arthur River Complex (ARC) from rocks of the Tuhua Sequence to the west. The ASZ contains evidence for two amphibolite facies mylonitic deformation events, D₂ and D₃. D₂ peak metamorphic conditions were 11.9 ± 1.1 kbar and $580 \pm 35^\circ\text{C}$, and peak metamorphic conditions during D₃ were 8.7 ± 1.2 kbar and $590 \pm 40^\circ\text{C}$. Garnet Sm-Nd ages from the ASZ, Pembroke Granulite, and ARC record the thermal history in northern Fiordland.

We present preliminary P, T, and age data from the ASZ along Milford Sound in order to determine if garnet growth in the ASZ reflects young (<110 Ma) garnet ages in adjacent rocks. Preliminary P-T results indicate garnet core growth was at 9.2 – 10.1 kbar and ca. 850 °C (Grt-Bt-Hbl-Plag) and garnet rim equilibration was at similar pressures and temperatures ca. 775 °C (pseudosection), followed by a final T of <700 °C (pseudosection) for matrix equilibration. Garnet Sm-Nd ages indicate isotopic equilibration at 100.8 ± 5.7 Ma (5 pts., 2s, MSWD 2.9). Initial garnet growth in the Pembroke Granulite, which intruded older ARC rocks 8 km east of the ASZ, was at 126 - 123 Ma. This Pembroke garnet growth was synchronous with initial emplacement of the WFO to the south 125 – 115 Ma.

Garnet Sm- Nd results from south and east of the ASZ also record <110 Ma ages. Garnet from the ARC, 5 km east of the ASZ, is 69.8 ± 5.6 Ma. The youngest garnet age recorded in Pembroke rocks is 108.9 ± 5.6 Ma. In addition, garnet in the Mt Edgar Diorite 15 km south of Milford Sound grew ca. 102 Ma. Our preliminary ASZ garnet age of ca. 100 Ma could result from garnet growth or diffusional re-equilibration. High metamorphic temperatures and Mn zoning, which we infer to reflect diffusion, are compatible with diffusional re-equilibration of Sm and Nd until ca. 100 Ma or a late stage reheating event. We tentatively conclude that the northernmost Fiordland crust was ca. 850°C before ca. 110 Ma allowing REE diffusion in

garnet.

Geological Society of America Abstracts with Programs.
doi: 10.1130/abs/2019AM-340485

Vol. 51, No. 5, ISSN 0016-7592

© Copyright 2019 The Geological Society of America (GSA), all rights reserved.

Authors

[Hannah Dickson](#)

University of Alabama

[Harold H. Stowell](#)

University of Alabama

[Elizabeth M. Bollen](#)

University of Alabama

[Joshua J. Schwartz](#)

California State University, Northridge

[Keith A. Klepeis](#)

University of Vermont, Trinity Campus

[Elena A. Miranda](#)

California State University Northridge

View Related

Session

[199: T23. Metamorphism and Orogenesis at Convergent Plate Margins \(Posters\)](#)

Richard M. Palin, Department of Geology and Geological Engineering, Colorado School of Mines, Golden, CO and **Kyle T. Ashley**, Department of Geology and Environmental Science, University of Pittsburgh, Pittsburgh, PA



Tuesday, 24 September 2019



9:00 AM - 6:30 PM



Phoenix Convention Center - Hall AB, North Building

[Topical Sessions](#) >

[Technical Programs](#)

Similar

[GARNET SM-ND AND LU-HF AGES FROM THE PICURIS OROGENY: UNDERSTANDING THEIR MEANING USING TRACE ELEMENT ZONING](#)