

31-2 - STRUCTURAL EVOLUTION OF SUBDUCTION INITIATION AND EARLY COOLING: INSIGHTS FROM THE EASTON METAMORPHIC SUITE, NORTHWEST WASHINGTON



Friday, May 19, 2023



8:00 AM - 6:00 PM



Cargo Room (The Whitney Peak Hotel)

Booth No. 5

Abstract

Exhumed high pressure/low temperature metamorphic belts provide evidence of subduction processes at depth, but the mechanisms by which subduction zones initiate and evolve to steady thermal state remain contested due to a paucity of recovered subduction infancy rocks. The Easton metamorphic suite in northwest Washington is a Jurassic-Cretaceous subduction complex that preserves a high-grade metamorphic sole inferred to have formed during subduction initiation. Near Gee Point, WA, coherent garnet amphibolite, hornblende-bearing white mica quartzose schist, and underlying garnet blueschist are characterized by their proximity to overlying serpentized peridotite and the presence of blocks and layers of foliated and unfoliated metasomatic rock. These high-grade rocks are exposed in a series of northeast vergent, steeply inclined, tight-isoclinal folds that post-date regional high pressure/low temperature metamorphism. Two shear zones dip steeply to the southwest, concordant to adjacent blueschist-greenschist, quartzose schist, and amphibolite fabrics. Pervasive retrogression from amphibolite to blueschist-greenschist facies from high to low structural levels is documented at the map, outcrop, and micro scale. Amphibolites contain a foliation defined by aligned hornblende, or in places are weakly foliated. Retrogression of amphibolite is associated with a well-developed glaucophane-white mica-chlorite fabric that wraps older garnet and hornblende, with pargasite cores rimmed by glaucophane and chlorite. Both garnet blueschist and quartzose schist preserve at least one younger foliation. Prior $^{40}\text{Ar}/^{39}\text{Ar}$ thermochronology and thermobarometry are consistent with a cooling subduction zone, from amphibolite facies conditions of 760C at >167 Ma to <400C at ~163 Ma. Paired garnet ^{176}Lu - ^{176}Hf geochronology and $^{40}\text{Ar}/^{39}\text{Ar}$ thermochronology samples will elucidate the timing of (1) proposed subduction initiation, (2) early subduction zone cooling rates, and (3) two shear zones that deformed the Easton metamorphic suite.

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