

Joint 118th Annual Cordilleran/72nd Annual Rocky Mountain Section Meeting - 2022

Paper No. 1-1

Presentation Time: 9:35 AM

SUBDUCTION COMPLEX ROCKS IN NW WASHINGTON: LINKING THE SUBDUCTION RECORD TO JURASSIC-CRETACEOUS OROGENIC EVENTS

SCHERMER, Elizabeth, MULCAHY, Sean, CORDOVA, Jeremy and LANG, Katherine E., Geology Department, Western Washington University, 516 High St, Bellingham, WA 98225

The impact of Farallon plate subduction on NA Cordilleran orogenesis is widespread and long-lived. Jurassic-Cretaceous metamorphic rocks in the Franciscan complex, CA (FR) and the Easton Suite and San Juan Islands, WA (EA-SJI) record the evolution of the subduction zone from initiation through thermal steady-state and provide constraints on plate interactions across the Cordillera. Our recent and ongoing work in the FR and EA-SJI quantifies the thermal and mechanical evolution of the plate boundary system from ~180 to 80 Ma. In the EA-SJI, metamorphic rocks are stacked in thrust sheets with higher grade rocks above lower grade rocks; ultramafic rocks from the presumed hangingwall are underthrust by amphibolite, high-temperature blueschist, and regional low-grade blueschist composed of metabasalt, metatuff, and predominant metasgreywacke and phyllite. High-temperature (>600-750C) fabrics in the structurally highest amphibolite unit record recrystallization at >167 Ma. High T blueschist fabrics formed during rapid cooling (>500C to <400C) from 165-157 Ma. These high-grade rocks were isolated from deformation after underplating and cooling while younger and structurally lower rocks experienced prolonged and complex ductile and brittle deformation at 350-250C from ~157 - <84 Ma.

Early accretion of predominantly mafic igneous rocks in the EA-SJI suggests subduction erosion dominated prior to 157 Ma. Metamorphic and maximum depositional ages of structurally lower rocks suggest a change to accretion of large swaths of metasediment from ~154-122 Ma, ca. 30 m.y. earlier than the main phase of accretion in the FR. Major events in Cordilleran orogenesis at this time include decreased magmatic flux in the arc and major shortening in the hinterland of the fold and thrust belt. Later underthrusting of metagraywacke at lower structural levels in the EA-SJI between ~125 and ~84 Ma coincided with a period of enhanced sediment accretion also recorded in the FR as well as increased arc magmatism and an eastward jump in retroarc shortening. The transition from subduction erosion to accretion implies a change from decoupled to predominantly coupled east-dipping subduction beneath North America between 154-80 Ma. The increased coupling likely played an important role in Cordilleran tectonic processes in the arc and retroarc.

Session No. 1

[S1. Honorary Session for B. Clark Burchfiel and Gregory A. Davis for Their Seminal Contribution to the Modern Understanding of the North America Cordilleran Orogen I](#)

Tuesday, 15 March 2022: 9:30 AM-12:00 PM

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