
31-5 - EVIDENCE FOR ACCRETION AND UNDERPLATING OF DISTINCT UNITS WITHIN REGIONAL BLUESCHISTS OF THE EASTON METAMORPHIC SUITE, NORTHWEST CASCADES WASHINGTON



Friday, May 19, 2023



8:00 AM - 6:00 PM



Cargo Room (The Whitney Peak Hotel)

Booth No. 8

Abstract

The Easton metamorphic suite of the Northwest Cascades thrust system is an exhumed Jurassic-Cretaceous subduction complex that can be used to test models for subduction zone deformation. Regional blueschist and greenschist within the Easton were accreted in a thermally evolving subduction zone between 150 – 136 Ma. Two units of the Easton metamorphic suite, the Darrington phyllite and the Shuksan greenschist, were originally interpreted as a coherent unit that subducted together in a zone of distributed deformation.

The phyllite and greenschist are exposed in a gently SE plunging, steeply inclined, NE vergent, regional synclinorium in the Finney Creek area. New field mapping, microstructural analysis, and thermometry suggest the Darrington phyllite includes a new unit, the Silver phyllite. The Darrington phyllite contains two foliations with the dominant S2 foliation defined by aligned Gr + Ms. The Silver phyllite also preserves two foliations with S1 defined by aligned Ep + Gr in Ab porphyroclasts and relict Ms in fold hinges. The S1 foliation is variably overprinted by the dominant S2 axial planar cleavage of aligned Ms + Chl (148 – 140 Ma) that intensifies with proximity to the greenschist contact. In contrast, the Shuksan greenschist dominantly preserves an S1 foliation (~140 Ma) of aligned Ep + Act/Gln + Ms + Chl that is variably overprinted by a weak S2 (140 – 136 Ma) that is axial planar to tight folds in the greenschist and the regional synclinorium. The contact between Silver phyllite and Shuksan greenschist is marked by a Ms + Chl + Ab mylonite that is parallel to the S2 fabric in both units.

Raman spectroscopy of carbonaceous material (RSCM) suggests the three units have different thermal histories. Graphite in the Darrington phyllite S2 foliation yields temperatures of 374 – 400 C. The Silver phyllite S1 assemblage records RSCM temperatures of 430 – 450 C while previous Chl – Ms thermometry from S2 yielded 310 – 340 C. In contrast, the Shuksan greenschist S1 formed at peak metamorphic conditions of ~360 C. The deformation and thermal history combined with existing Ar/Ar ages suggest that cooling of the Silver phyllite from S1 to S2 was synchronous with prograde metamorphism and formation of S1 in the greenschist during underplating, and that these unit were subducted as discrete tectonic slices rather than as a coherent unit.

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