TECTONIC EVOLUTION OF THE CHUGACH-PRINCE WILLIAM TERRANE, ALASKA: CONSTRAINTS FROM SEWARD AND BARANOF ISLAND

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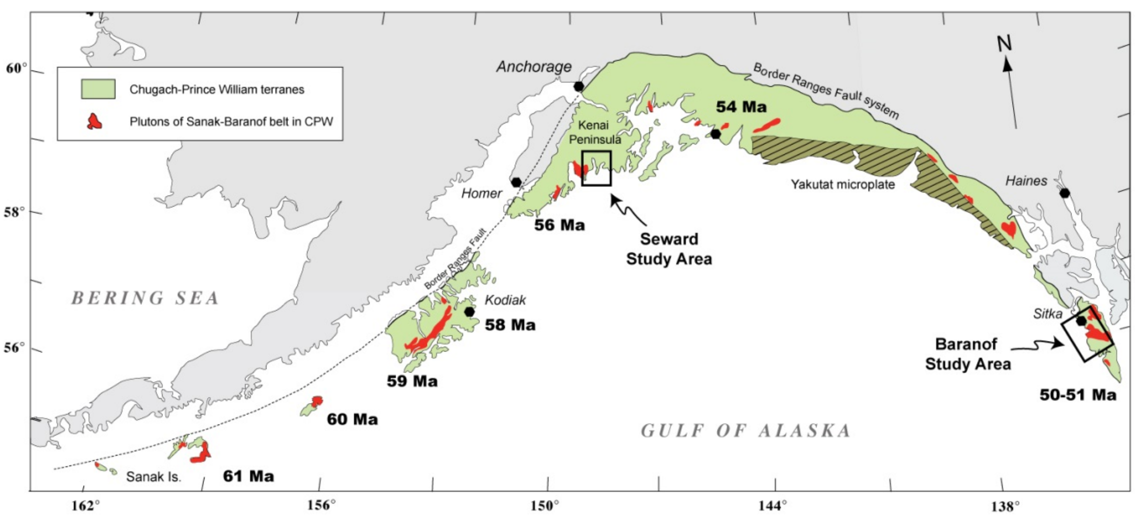
The Chugach-Prince William (CPW) terrane in southern and southeast Alaska is mainly composed of thick imbricated flysch (most are Maastrichtian to Paleocene) intruded by diachronous near-trench plutons of the Sanak-Baranof belt (Paleocene to Eocene). The sequence is interpreted to represent a thick accretionary complex where turbidites from an adjacent arc and metaplutonuc basement were deposited, accreted, buried, and then intruded by plutons over a short period of time. Our research team has been focused on scientific problems that surround the provenance and age of the flysch (Rick et al., this volume), the burial, metamorphic, and cooling history (Kaminski et al., this volume), and the nature of near-trench plutons (Wackett et al., this volume).



The flysch is very thick and compositionally uniform, and volume estimates of several million km^3 suggest that it was fed by a single evolving deeply exhumed source terrain. All sandstones in the belt are dominated by detrital zircons that are close to the age of deposition, and hence it is clear that that source region supported an active and long-lived volcanic arc. The metaplutonic basement that supported this arc is mainly made of rocks that produce Mesozoic zircon (mainly Jurassic), with a minor fraction of Paleozoic (mainly Devonian) and Precambrian grains. Our work builds on a number of previous studies that suggests the most likely candidate source is the Coast Mountains Orogen, which currently represents the spine of the BC Coast Range. Thus a small amount of translation is required to restore it to be adjacent to its likely source.

The Sanak-Baranof belt (SBB) is a series of mainly granodiorite plutons that intrude the CPW along the 2000 km long belt. The oldest plutons are in the west (61-62 Ma on Sanak and the Shumagin Islands) and the youngest plutons are in the east (47-53 Ma on Baranof Island). It has long been inferred that these plutons represent near-trench intrusions related to slab window effects caused by ridge-trench interaction. It has been assumed in the literature that that the adjacent ridge that drove this plutonism was a major plate boundary in the Pacific, and it was either the Pacific-

Kula or the Pacific-Resurrection ridge. The latter boundary requires consideration of a new oceanic plate in the NE pacific, which is not represented by marine magnetic anomalies and would have been wholly subducted by now.

Slabs of ocean crust as tectonic slices in the CPW may represent this offshore ridge. Near Seward Alaska (close to the center of the belt), the CPW terrane has two large ophiolite complexes, the Resurrection Peninsula and Knight Island ophiolites, which have been structurally incorporated into the imbricated flysch. The upper stratigraphy of both ophiolites is distinctive because the pillow basalts are interbedded with clastic sediment that is now thought to be identical to the flysch of the CPW, thus the process that resulted in ophiolite creation must have occurred where turbidites were deposited. The provenance of this interbedded and overlying flysch provides a critical constraint on the age of the ophiolites and the source area that was nearby.

Controversy exists where accretion and intrusion occurred along the North American margin: in one option the accretion and plutonism occurred in the north (Alaska-BC) in relatively close proximity to the present location, and in another option it occurred to the south (BC-WA and all points south) and strike-slip faulting and margin-parallel translation is required to bring these rocks to the north.

Major questions addressed by detrital zircon U/Pb dating are focused on basic questions of the age of the flysch, continuity of accreted belts in the flysch, and the nature of the source rocks revealed in older zircon. Our recent work shows that the clastic cover to the Resurrection ophiolite in the Seward area is definitively Paleocene (~57-60 Ma or younger) and thus allied with the Orca Group, and not the older Valdez Group. On Baranof Island, new detrital zircon dates indicate that what is traditionally viewed as the Baranof Schist appears to be largely Paleocene in age, and not Cretaceous (young belt is 64 to 60 Ma or younger) (see Rick et al., this volume). These findings have important implications as to the timing of deposition, accretion, and intrusion between ~60 and 50 Ma.

The belt has a distinctive thermal history and almost all rocks of the CPW experienced prehnite-pumpellyite or higher metamorphism soon after deposition and accretion. Cooling following this thermal event is mainly about 50 Ma in the western part of the belt, but younger in the east. This cooling pattern is likely related to strike-slip deformation and local plutonism that affects rocks in Prince William Sound and to the east, but not rocks to the west. ZFT dates from the CPW rocks on Baranof Island are relatively uniform and mainly between 30 and 40 Ma, which may indicate detachment and exhumation as strike-slip faults reworked the outer BC margin in the mid Tertiary (Kaminski et al., this volume).

The plutons of the Sanak-Baranof belt punctuate the tectonic processes that built the CPW wedge. The easternmost part of the CPW is intruded by the Crawfish Inlet and allied plutons on Baranof Island. New U/Pb dates across the Crawfish pluton, geochemistry, and oxygen isotopes suggest a more protracted history of intrusion (47-53 Ma) that was driven by at least two distinct types of mantle melts mixing with sedimentary material most likely derived from the accretionary wedge (Wackett et al., this volume).

The history of the CPW undoubtedly involves margin-parallel translation, but the amount of displacement is controversial. In some scenarios, displacements of 1000 km or less are entertained based mainly on potential geologic ties; however, displacement of nearly 3000 km are required if paleomagnetic data and key geological observations are considered. Hence in our analysis of the CPW and SBB plutons we are focused on building an integrated geologic history along the belt where robust data sets can be used to constrain or refute mutually exclusive hypotheses on the origin and original disposition of these rocks.