EXHUMATION OF THE CHUGACH-PRINCE WILLIAM TERRANE, BARANOF ISLAND, SE ALASKA

Kaminski[1], K., Riehl[1], M., Garver[1], J.I., Davidson[2], C.M.,
[1]Union College; NY; [2]Carleton College, MN

The Chugach-Prince William terrane (CPW) is a forearc accretionary complex in southeastern Alaska composed primarily of Maastrichtian to Paleocene deep-water turbidites and volcaniclastics (Plafker et al., 1994). The easternmost part of the belt is well exposed on Baranof Island, where presumed equivilants are mapped as the Sitka Graywacke and the Baranof Schist, which are separated by plutonic rocks of the Crawfish Inlet pluton. U/Pb ages of detrital zircon constrain the depositional age of the Sitka Graywacke to the Albian and Maastrichtian and this unit experienced prehnite-pumpellyite facies metamorphism (Haeussler et al., 2005). To the south, metasediments of the Baranof Schist are inferred to be the metamorphosed equivilant to the Sitka Graywacke (Loney and others, 1975) and these rocks show regional metamorphism of garnet-biotite grade, and then a local andalusite grade contact metamorphism along the margin of the Crawfish Inlet Pluton. The Sitka Graywacke and Baranof Schist are presumed to have been deposited at approximately the same time, and are perhaps the same rock unit, differing only in metamorphic grade. The Crawfish Pluton has been dated with U-Pb on zircon at 49-51 Ma, only about 10 Myr after deposition of the youngest dated rocks of the Baranof schist. A number of previously published K-Ar and Ar-Ar dates on biotite indicate initial cooling of the pluton occurred at 42-48 Ma (Karl et al., in review). Our work investigates cooling that follows deposition, burial, and intrusion of the Crawfish Inlet pluton.

Zircon fission track cooling ages of the Baranof Schist, the Sitka Graywacke, and the Crawfish Inlet pluton were determined from 14 samples collected from Sitka Sound and Whale Bay on Baranof Island. The results show a remarkable uniformity of cooling in Late Eocene (generally between 32-38 Ma). An important finding is that both the high-grade Baranof Schist and the lower-grade Sitka Graywacke give essentially identical cooling ages in this age range, despite the striking differences in metamorphic grade. Thus these consistent cooling ages across metamorphic grade suggests that rock cooling probably occurred at the same depth and the same rate. Tectonic tilting and exhumation of the high-grade rocks of the Baranof Schist, likely occurred immediately after intrusion of the pluton after 50 Ma, perhaps between 42-48 Ma, as indicated by K-Ar and Ar-Ar dates on biotite. After 42 Ma, both the graywacke and schist cooled uniformly through the Late Eocene, which explains similar cooling ages on either side of the Crawfish Pluton. Cooling in the late Eocene may have been driven by erosional exhumation. Deposition of the upper part of the Kootznahoo Formation (Upper Eocene) has garnet-bearing schist clasts that may represent erosional exhumation of the adjacent Baranof block (Ancuta, 2010). Tilting and cooling of the CPW could be related to strike-slip faulting along the northern Cordilleran margin. The vertical movement related to exhumation of the Baranof Schist might have been driven by a transition to strike-slip deformation, perhaps slip on Border Ranges Fault.

REFERENCES:

Ancuta, L., 2010. Fission track ages of detrital zircon from the Paleogene Kootznahoo Formation, SE Alaska. 23rd Keck Geology Symposium, Houston Tx, p. 7-15

Haeussler, P.J., Gehrels, G.E., and Karl, S., 2005, Constraints on the age and provenance of the Chugach terrane accretionary complex from detrital zircons in the Sitka Greywacke, near Sitka, Alaska; U.S. Geological Survey Professional Paper 1709-F, p. 1- 24.

Karl, S.M., Haeussler, P.J., Zumsteg, C.L., Himmelberg, G.R., Layer, P.W., Friedman, R.F., Roeske, S.M., Snee, L.W., 2014. Geologic map of Baranof Island, Southeast Alaska. U.S. Geological Survey Investigations Map, 14-x (in press).

Loney, R.A., Brew, D.A., Muffler, L.P.J., and Pomeroy, J.S., 1975, Reconnaissance geology of Chichagof, Baranof, and Kruzof Islands, southeastern Alaska: U.S. Geological Survey Professional Paper 792, 105p.

Plafker, G., Moore, J.C. and Winkler, G.R. 1994, Geology of the Southern Alaska margin in The geology of Alaska, eds. G. Plafker & H.C. Berg, Geological Society of America, Boulder, CO, United States (USA), pp. 389-449.

Zumsteg, C.L., Himmelberg, G.R., Karl, S.M., Haeussler, P.J., 2003. Metamorphism within the Chugach accretionary complex on southern Barnoff Island, southeastern Alaska. In: Sisson, V.B., Roeske, S.M., Pavlis, T.L. (Eds.), Geology of a Transpressional Orogen Developed During Ridge–Trench Interaction Along the North Pacific Margin. GSA Special Paper, vol. 371, pp. 253–268.