Booth No. 66 SEDIMENT ASSIMILATION EXERTS PRIMARY CONTROL ON HF ISOTOPE RATIOS IN THE PALEOCENE-EOCENE SANAK-BARANOF PLUTONIC BELT, ALASKA

Thursday, May 16, 2019
09:00 AM - 06:00 PM
Oregon Convention Center - Exhibit Hall B

The Paleocene to Eocene Sanak-Baranof plutons are exposed for over 2000 km along the southern Alaska margin. The mostly granitic plutons intrude Upper Cretaceous to Eocene turbidites and interbedded volcanic rocks of the Chugach-Prince William terrane. Crystallization ages of the plutons vary systematically along the margin from 63 Ma on Sanak Island in the west to as young as 47 Ma on Baranof Island in the east. On Baranof Island, the systematic west-to-east time-transgressive nature of the plutons breaks down: a six Myr age range (53-47 Ma) occurs in the 550 km^2 Crawfish Inlet pluton near Sitka. Hf isotope ratios of zircon from the Sanak-Baranof plutons and the rocks they intrude also vary systematically with age and location. In the west, the Sanak Island pluton (eHf=+9.3) intrudes the Upper Cretaceous Shumigan Formation where detrital zircons have average eHf =+6.7. In the middle of the belt, the Aialik Bay (eHf=+5.9) and Hive Island (eHf=+5.1) plutons intrude the Upper Cretaceous Valdez and Paleocene Orca Groups on the Kenai Peninsula with an average eHf =+3.2. In Prince William Sound, the Sheep Bay (eHf=+4.8) and McKinley Peak (eHf=+7.4) plutons intrude the Orca Group turbidites with an average eHf =+1.6. In Southeast Alaska on Baranof Island, eHf varies systematically with age in the Crawfish Inlet pluton from +4.7 in the oldest intrusions (53 Ma) to +13.7 in the youngest parts of the pluton (47 Ma). This composite pluton intrudes the Upper Cretaceous to Paleocene Sitka greywacke and Baranof schist with an average eHf =-1.2. To the first order, the assimilation of crustal material with systematically varying isotopic signatures along strike appears to explain the Hf isotope signatures in the plutons. However, we recognize that subsequent margin-parallel translation, such as along the Fairweather fault system, may have separated and juxtaposed different isotopic patterns. On Baranof Island, the reversal and systematic increase in eHf from +4.7 to +13.7 in the Crawfish Inlet pluton suggests an additional mechanism is at work, and may be due to: 1) a decrease in sediment assimilation with time as the magmatic conduits feeding the pluton mature; 2) the source region for the granitic magmas becomes increasingly dominated by a mantle isotopic signature; and/or 3) the isotopic signature of the mantle component changed with time.

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