

Pleistocene age for basalt porphyry on Suemez Island, Southeast Alaska

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Fresh, unaltered basaltic lava overlies volcanic breccia, lapilli tuff, agglomerate, pyroclastic deposits, rhyolite, and obsidian on Suemez Island in Southeast Alaska. Basalt flows are relatively flat lying, and have locally rubbly, weathered surfaces and intercalated fall deposits that indicate subaerial deposition. At Cape Felix, olivine-porphyrific, columnar-jointed basalt intrudes flowbanded rhyolite, obsidian, massive basaltic breccia, and lithic-lapilli tuff. The breccia has basaltic and scoriaceous clasts up to 2.5 cm across. There are at least three cycles of mafic and silicic volcanic rocks on Suemez Island. On Dall Island and in Tlevak Strait, undated flows of basalt with phenocrysts of olivine and labradorite in a groundmass of labradorite microlites, olivine, and subordinate clinopyroxene are thought to be correlative with the Suemez flows. Together, the flows in these three areas define a volcanic field approximately 15 km by 30 km.

The youngest flows, consisting of massive, plagioclase and pyroxene porphyritic basalt with ophitic textures exposed at a ridgetop vent on Suemez Island, yielded a whole rock $^{40}\text{Ar}/^{39}\text{Ar}$ age of 684 ± 18 ka. This age is similar to the age of the oldest basalt at Mt. Edgecumbe, located 240 km to the northwest of Suemez Island. Whole rock K/Ar ages for basalt on Mt. Edgecumbe range from 45 ± 63 ka to 611 ± 74 ka (Riehle, Budahn, Lanphere, and Brew, 1989); peat above and below a rhyolite tephra yielded radiocarbon ages of 4030 ± 90 and 4310 ± 140 ybp, respectively (Riehle and Brew, 1984). Coal seams and basalt reported from a stream on Suemez Island underlie the dated flow. The coal report led Buddington and Chapin (1929) to infer a Tertiary age for the basalt. It is possible that these volcanic rocks on Suemez Island range as old as Tertiary, but the coal locality has not been verified. Volcanic rocks of the Mt. Edziza volcanic field, 300 km to the northeast of Suemez Island, resemble the Suemez volcanic rocks in age and composition. In the Edziza field, there are five cycles of mafic-silicic flows that range in age from 7.5 Ma to 1340 ybp (Souther, Armstrong, and Harakal, 1984).

Although their ages are similar, Suemez and Edgecumbe basalts have different chemical compositions. On trace element plots, the Edgecumbe basalts have element ratios typical of tholeiitic, enriched mid-ocean ridge (E-MORB) basalts. Suemez and Edziza basalts and rhyolitic obsidian have alkaline-peralkaline major and trace element chemistry, typical of within-plate magmas. Mt. Edgecumbe is located adjacent to the Fairweather transform fault that defines the Pacific-North American plate boundary. The Edziza volcanic field is located 300 km east of the plate boundary, and formed in grabens during extensional faulting attributed to transcurrent tectonics at the plate boundary (Souther, Armstrong, and Harakal, 1984). We infer a similar extensional setting for the Suemez volcanic rocks, located 70 km east of the plate boundary.