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Chronology and Dynamics of Canada's Deadliest Volcanic Eruption: the 1700 CE Eruption of Tseax Volcano, BC.

Monogenetic volcanoes form small-volume volcanic centers with diverse eruptive styles and products. Despite their brief eruptions, they can pose significant risks. The ~1700 CE eruption of Tseax volcano, BC, killed up to 2,000 Nisga'a people and ranks as Canada's second deadliest natural disaster. Nisga'a cultural accounts preserve observations of the eruption.

Tseax volcano is notable for its 32 km-long, 0.5 km³ Fe-, Ti-rich lava flow field covering ~36 km². These basaltic lavas contain plagioclase, olivine, and titanomagnetite phenocrysts, often forming glomerocrysts. Low Mg# values suggest fractionation from a mantle-derived parent magma, with trace elements pointing to melting of the upper asthenosphere. The lavas show no evidence of magma mixing or lithospheric contamination. Phenocryst assemblages indicate rapid ascent of low-viscosity magma to <5.5 km, where brief and rapid partial crystallization occurred before the eruption.

Nisga'a oral history aligns with geological evidence of the eruption's brevity and intensity. It began Hawaiian-style with lava fountains building a spatter rampart and releasing up to 0.20 km³ of low-viscosity lava at 800–1,000 m³/s. This lava reached the Nass Valley, 20 km away, in just 1–3 days, flooding Nisga'a villages and potentially causing fatalities. Eruption rates gradually decreased to 10–200 m³/s, lasting weeks to months.