Sedimentology, Age, and Geologic Context of a Pleistocene Volcaniclastic Succession Near Spurr Volcano, Alaska

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A physiographically prominent ~40 km^2 plateau (~850 m elevation) lies 20 km east of Spurr volcano, northwestern Cook Inlet region, Alaska, and constitutes the erosional remnant of a once larger—at least in areal extent—volcaniclastic succession herein designated Qvc. Although this readily mappable unit has been recognized by many workers during the past five decades, uncertainties regarding its age and origin persisted. Our study indicates Qvc generally comprises sub-horizontally ~north dipping, structureless, thick-bedded, moderately indurated, matrix- to clast-supported granule-boulder conglomerate, pebbly sandstone, and gravelly mudstone. Clasts (up to 4 m) and matrix are dense to vesicular intermediate(?) lava fragments and pumiceous to scoriaceous pyroclasts. The unit is thickest to the north where an ~275-m-thick section discontinuously crops out south of Capps Glacier. Field observations and the mapped surface trace of Qvc's underlying angular unconformity suggest a paleovalley in the subjacent West Foreland and Tyonek formations (Eo-Miocene); however, the paleovalley's orientation is not well constrained. The valley-fill succession is interpreted to largely record volcanogenic debris flows and hyperconcentrated flows (i.e., lahars); texturally and compositionally similar laharic strata are reported elsewhere within several tens of kilometers of continental arc volcanoes, consistent with the plateau's proximity to the modern volcanic arc of upper Cook Inlet. Several observed hectometer-scale exposures of chaotically folded and locally faulted Qvc strata are associated with sandstone dikes and are attributed to soft sediment deformation. These features may attest to liquefaction or fluidization of water-saturated sandy deposits of probable hyperconcentrated flow origin in an environment subject to high instantaneous sedimentation rates, unstable slopes, earthquake induced shaking, or any combination thereof. U-Pb detrital zircon results suggest an ~0.66-0.44 Ma maximum depositional age; $^{40}Ar/^{39}Ar$ results for juvenile clasts are pending. Moraines preliminarily assigned to MIS 4 (~70-55 ka) glaciation locally onlap the plateau's eroded margins. These new age constraints largely limit Qvc sedimentation to Ionian time—a marked improvement over previous estimates that ranged widely from Miocene through Holocene time. Qvc evidently records a thick accumulation of Pleistocene lahar deposits within a volcano-proximal deposystem that was subsequently dismantled by extensive erosion prior to or during MIS 4. The remaining deposits persist as an isolated plateau with no recognized proximal or distal equivalents, although volcaniclastic detritus was likely sourced from the volcanic arc to the west. Further investigation of Qvc will consider a curious Eo-Miocene age gap in the detrital zircon "barcodes" and forthcoming $^{40}Ar/^{39}Ar$ results.