

Geological study of the ice-clad Nevado Coropuna volcanic complex (Perú)

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The Nevado Coropuna Volcanic Complex (NCVC), crowns the Western Cordillera near the northern tip of the Central Volcanic Andean Zone. Covering ~350 km² and ~270 km³, NCVC encompass six composite cones and lava domes whose summits (maximum elevation 6,370 m a.s.l.) tower Early Quaternary lava flows to the north and older edifices and ignimbrites to the east and south. Although the ice-clad volcanic complex follows a trend N120° parallel to the Andean Cordillera axis, three groups of edifices straddle a high plateau to the north and the steep flank of the Cordillera to the southeast. The N110° aligned, west and east groups belie an older, deeply eroded edifice in the middle where at least two scars opened to the SSE have been identified. Collapses recorded by debris avalanche deposits reached 22 km on the south flank. The western side of the CVNC is composed of three edifices consisting mostly of aa and block-lava flows with andesitic-to-dacitic compositions (57.1-67.2 wt% SiO₂) in addition to a limited amount of pyroclastic fall and PDC deposits. Lava flows have built up the SW edifice with three stratigraphic groups (SW1, SW2 and SW3), the highest NW edifice with four groups (NW1, NW2, NW3 and NW4) and a small composite cone between those edifices. Three striking non-glaciated stubby lava flows of Late Holocene age protrude from the ice cap towards the WNW, NE and SW flanks. With c. 44.1 km² of glacier ice, NCVC is the most ice-clad volcano in southern Peru and probably in the tropical world. The emplacement of lahars represents the greatest hazard, which may result from the interaction of lava flows and/or pyroclastics with ice and snow. Lahars would be channeled into the south-draining deep valleys ultimately feeding Majes and Camana valleys, thereby threatening the region's ~50,000 inhabitants, infrastructure and irrigated land.