

Magma-ice Interactions at Hoodoo Mountain Volcano, Canada

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Hoodoo Mountain volcano, a Quaternary composite volcano in northwestern British Columbia, is a well-exposed example of peralkaline, phonolitic ice-contact volcanism. Its distinctive morphology and unique volcanic deposits are indicative of subglacial volcanic eruption. Distinct ice-contact deposits result from three different types of lava-ice interaction: i) vertical cliffs of lava, which feature finely joined flow fronts and are up to 200 m in height, result from lava flows being dammed and ponding against thick masses of ice; ii) pervasively-jointed, dense lava flows, lobate intrusions, and domes associated with mantling deposits of non-vesiculated breccia derive from volcanic eruptions contained beneath relatively thick ice; and iii) an association of pervasively-jointed, highly-vesicular lava flows or dykes encased by vesicular hyaloclastite of identical composition formed by eruption under and/or through relatively thin ice.

The distribution of these three deposit types largely explains the distinctive morphology of Hoodoo Mountain and can be used to reconstruct variations in ice thickness surrounding the volcano since 85 ka. Our analysis suggests that since before 85 ka vents on Hoodoo Mountain have erupted beneath the levels of local/regional ice at least twice.