

# Subglacial and intraglacial volcanic formations in Iceland

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**Abstract** — *Landforms created in eruptions within glaciers are conspicuous features of the volcanic zones in Iceland and eruptions occur frequently under present-day glaciers. The subglacially and intraglacially created landforms include volcanic structures like tuyas, tindars, móberg sheets, and a variety of proximal sedimentary beds. These landforms constitute a prominent part of the Móberg Formation, a term used for rocks generated during the Brunhes geomagnetic epoch to the end of the Pleistocene (0.78–0.01 Ma). Subglacial and intraglacial rocks of the Móberg Formation cover about 11,200 km<sup>2</sup> of the presently ice free areas. These rocks are predominantly basaltic and the main units of the volcanoes are pillow lava, hyaloclastite tuffs, flow-foot breccias, cap lavas and minor intrusions. Recent eruptions within glaciers have generated tindars and mounds, lead to the formation of widespread basaltic tephra layers, and caused major jökulhlaups. No intraglacial tuya-forming eruptions have been observed. Much of the basaltic glass formed in subglacial eruptions during the Pleistocene has been altered to palagonite, forming consolidated edifices resistant to glacier erosion. Data from recent submarine and subglacial eruptions (Surtsey 1963–1967, Gjálp 1996) indicate that palagonitization and consolidation takes place during the first years after eruption driven by mild hydrothermal activity in the interior parts of the edifices. On the outer slopes of the volcanoes the alteration of the hyaloclastites is dominantly diagenetic. The height of tuyas and tindar in Iceland indicates that they were formed within a glacier that was considerably less than 1 km thick and probably smaller than the Weichselian ice sheet at its maximum. A possible explanation for this might be that tuya-forming eruptions in Iceland were linked to increased magma generation caused by declining pressure in the mantle under a decreasing ice sheet.*