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Physical volcanology of the prehistoric Hekla 3 and Hekla 4 eruptions, Iceland.

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Hekla is the third most active volcano in Iceland, with 18 eruptions since the island was settled around 871 AD. Furthermore, having produced at least 9 of the 22 most prominent and widely-distributed ash marker layers found in European soils and lakes, it is the primary source of volcanic ash fall within the UK. The Hekla 3 (2879+/-34 14C BP) and Hekla 4 (3826+/-12 14C BP) are the two largest explosive eruptions of the Holocene. Both deposited at least 1 cm tephra over 80% of the surface of Iceland and are important teprochronological markers in Europe.

We present the first results from a modern re-evaluation of the eruptions. New isopach maps give freshly-fallen volumes of 11.2 and 13.3 km3 for Hekla 3 and Hekla 4, respectively. This contrasts with previous estimates of 12 and 9 km3. In general, Hekla 4 tephra is notable for being much finer-grained than that from Hekla 3. Hekla 3 can be divided into 3 phases, whose axes rotate from NE to NW as the eruption proceeds. Hekla 4 is divided into 4 phases. The first three phases were deposited to the N, NE and E of Hekla. The fourth, which represents a less powerful but long-lasting eruption of less-evolved 'gunmetal blue' tephra, is dispersed in all directions around the volcano.

Ongoing analysis will resolve isopachs, isopleths and plume heights for each phase of both eruptions, leading onto calculation of their total deposit grainsize distributions. Some of these results will be included here.