

# The explosive basaltic Katla eruption in 1918, south Iceland I: Course of events, tephra fall and flood routes

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**Abstract** — The 23-day long eruption of the ice-covered Katla volcano in 1918 began on October 12 and was over by November 4. Seismicity preceding and accompanying the onset had already started by 11:30 on October 12, while the eruption broke through the glacier around 3 PM. The plume rose to 14–15 km on the first day. The eruption caused widespread tephra fall, accompanied by lightning and thunder. Tephra fall from the intense first phase (October 12–14) was reported from Höfn, 200 km east of Katla, Reykjavík, 150 km to the west and Akureyri, 240 km to the north. The initial phase was followed by more sporadic activity for a week, and a second intense phase (October 22–24), with heavy tephra fall in populated areas east and south of the volcano. Skaftártunga (25–35 km east of Katla), was the worst hit farming district, with reported tephra thickness of 6.5–10 cm in total, collecting into drifts tens of cm thick. The Vík village suffered almost continuous tephra fall for 13 hours on October 24 and 25, leaving a 2 to 4 cm thick tephra layer on the ground. Tephra reached Reykjavík four times but minor tephra fallout ( $\ll 1$  mm) occurred. Tephra also reached northern, western and eastern Iceland. In addition to producing the 0.9–1.0 km<sup>3</sup> tephra layer, which may as freshly fallen have been 1.1–1.2 km<sup>3</sup>, the eruption was accompanied by a jökulhlaup that flooded the Mýrdalssandur plain and neighbouring areas. The jökulhlaup on October 12 had two separate phases. The first phase is considered to have flowed supraglacially down the lower parts of the Kötlujökull outlet glacier into the Leirá, Hólmsá and Skálm rivers (northern fork), and the Sandvatn and Múlavísl rivers (southern fork). It was much more widespread than the second phase which emerged from below the glacier snout and was confined to the western part of Mýrdalssandur. That phase carried huge icebergs and massive sediment load onto the sandur plain.

## INTRODUCTION

Volcanism in Iceland is dominated by basaltic eruptions. Environmental factors such as large ice caps, lakes and high groundwater levels within the volcanic zones influence the style of the eruptions (Thordarson and Larsen, 2007). In Iceland explosive basaltic eruptions outnumber the effusive basaltic ones almost by 4 to 1 (Thordarson and Höskuldsson, 2008), and by far the largest number of the explosive basaltic eruptions occur in ice-capped or ice-covered volcanoes (Larsen, 2002). One consequence of eruptions below ice are the often hazardous jökulhlaups (glacial outburst floods) (Gudmundsson *et al.*, 2008).

The central part of the Katla volcano is covered by the 590 km<sup>2</sup> Mýrdalsjökull ice cap (Figure 1) with an ice thickness of 300–750 m within a 100 km<sup>2</sup> caldera (Björnsson *et al.*, 2000). It has erupted at least 300 times during the last 8400 years with an eruption frequency of 2–4 eruptions/century, on average (Ólafsdóttir *et al.*, 2005, 2008). Over the last millennium Katla eruptions have averaged two per century (Thorarinsson, 1975; Larsen, 2000). These can be large events that severely affect the environment through extensive and often heavy tephra fall and catastrophic jökulhlaups (Thorarinsson, 1975; Tómasson, 1996; Larsen, 2000; Gudmundsson *et al.*, 2008).