



Seismic observations of glacial flooding from the ice cover of Katla volcano, Iceland

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Volcanic eruptions beneath glaciers can engender severe flooding hazards due to the rapid production of meltwater. In Iceland, eruptions of the Katla volcano – overlain by the Mýrdalsjökull ice cap (600 km²) – have caused at least 20 calamitous floods during the last 1,100 years. Zones of enhanced geothermal activity within the Katla volcano are manifest on the surface of Mýrdalsjökull as isolated depressions, known as ice cauldrons; the dimensions of these semi-permanent features is indicative of the volume of water stored at the glacier base. From 2001 to 2003, several ice cauldrons deepened and expanded in connection with a period of magma accumulation within the volcano. Using data from Iceland's national seismic network (<http://hraun.vedur.is/ja/englishweb/>), we document seismic observations of short-lived floods that have drained from the eastern flank of Mýrdalsjökull. In the summer of 2002, over one-hundred icequakes, together with bursts of low-frequency seismic tremor, were detected in the outlet glacier Kötlujökull. This seismicity preceded the onset of detectable flood conditions in the affected river. Using a double-difference re-location method and an improved seismic velocity model, we constrain further the geographic origin of seismicity from Kötlujökull. Additionally, we compare the seismicity with observations of icequakes from elsewhere in Iceland. Besides helping to elucidate floodwater routes and transit times beneath Kötlujökull, our findings provide insight into the relationship between ice-cauldron growth and the occurrence of glacial floods.