



Monitoring multiple subglacial floods using seismic arrays and GPS instruments

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Floods from subglacial lakes or glacier-dammed lakes are common in geothermally or volcanically active regions such as Iceland. They threaten not only people but also livestock and infrastructure and create a need for effective early-warning. In the past, these reoccurring floods in Iceland were mainly monitored using hydrological instruments in the affected rivers. These instruments measure the water height and conductivity in the river, but detect a flood merely once it reached the glacial river leaving very little early-warning.

As some floods travel more than 40 km beneath a glacier, the installation of GPS instruments on top of the subglacial lake and its flood path in 2013 promised to increase the early-warning. In fact, the slow onset of one of the largest floods in south-east Iceland was detected in September 2015 with an early-warning of about 3.5 days, before the flood reached the first hydrological station.

This flood was in addition recorded by a seismic network of single stations and two seismic arrays. This unique and pioneering setup allowed studying the ground vibrations excited by the flood in detail. We will present multi-disciplinary data to constrain the seismic observations and show what information can be gained from the seismic record and how this can be used for early-warning of smaller subglacial floods.