



Seismic Investigation of the Glacier de la Plaine Morte, Switzerland

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Glacier de la Plaine Morte is a plateau glacier along the border between Valais and Berne cantons. It covers a narrow elevation range and is extremely vulnerable to climate change. During snow melt, it feeds three marginal lakes that have experienced sudden subglacial drainage in recent years, thereby causing flooding in the Simme Valley below. Of greatest concern is Lac des Faverges at the southeastern end of the glacier that has drained near the end of July in recent years, with flood levels reaching capacity of flood control systems downstream. The lake levels are carefully monitored but precise prediction has not yet been achieved.

In the search for precursory ice fracturing to the lake drainage to improve forecast, four seismic arrays comprised of five short-period borehole seismometers provided by Eidgenössische Technische Hochschule (ETH), Zürich as well as fifteen 3-component geophones from the Geophysical Instrument Pool Potsdam (GIPP) collected continuous seismic data for about seven weeks during the summer of 2016. We present initial results on discharge dynamics as well as changing noise levels and seismicity before, during and after the drainage of Lac des Faverges.

Compared to previous recent years, the 2016 drainage of Lac des Faverges occurred unusually late on August 28. With an aperture between 100 and 200 m, the small arrays recorded many hundred ice quakes per day. A majority of the events exhibits clearly dispersed, high-frequency Rayleigh waves at about 10 Hz and higher. A wide distribution of events allows us to study azimuthal anisotropy and its relationship with the orientation of glacial crevasses.