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Monitoring the Growth of a Lava Flow Field Using Eruptive Tremor

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Monitoring the change in eruptive style during an eruption, forecasting the height of a plume or distribution of ash or forecasting which areas a lava flow will inundate are important challenges during an eruption. These forecasts are often based on parameters such as effusion rate – which is commonly derived from Spectroradiometer data but also linked to seismic tremor amplitude or energy.
Using a seismic array we analyse and locate eruptive tremor during the Bardarbunga eruption at Holuhraun 2014/15. We observed that two to three seismic tremor sources were active at the same time and that these sources have different underlying physical sources related to (i) shallow processes in the vents, (ii) intrusions at shallow depth and (iii) growing edges of a lava flow field. The clear correlation of tremor sources with the edges of a growing lava flow field is surprising, but does suggest that tremor can be used to monitor the growth of a lava flow field in near real-time.