



Recent developments and applications of a real-time tool to detect magma migration in different volcanic settings

Benoit Taisne (1), Corentin Caudron (1), and Yosuke Aoki (2)

(1) Earth Observatory of Singapore, Nanyang Technological University, Singapore, (2) Earthquake Research Institute, University of Tokyo, Japan

Triggering mechanism of a seismic swarm has to be identified with great confidence in real time. Crisis response will not be the same whether magma is involved or not. The recent developments of the method based on the Seismic Amplitude Ratio Analysis enable a rapid and unambiguous diagnosis to detect migrating micro-seismicity. Combined with other measurements, this migrating seismicity could be linked to complex motions of magma within the volcanic edifice. The beauty of this method lies in the fact that the ratio of seismic energy, recorded at different stations, is independent of the seismic energy radiated at the source and depends only on the location of the source and attenuation of the medium. Since drastic changes in attenuation are unlikely to occur at the time scale of magma intrusion, temporal evolutions in the measured ratio have to be explained by a change in the source location. Based on simple assumptions this technique can be used to assess the potential of existing monitoring seismic network to detect migrating events in real-time. It can also be used to design monitoring seismic network based on the available number of sensors as well as from field constraints. Network capability will depend on the noise level at each station, therefore this noise is used to define the magnitude threshold that can be detected as a function of the distance. A basic set of parameters will be implemented in this tool to tackle magma migration in basaltic systems, as well as acidic ones.