



Seismic unrest at Katla Volcano- southern Iceland

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Katla volcano is located on the propagating Eastern Volcanic Zone (EVZ) in South Iceland. It is located beneath Mýrdalsjökull ice-cap which covers an area of almost 600 km², comprising the summit caldera and the eruption vents. 20 eruptions between 930 and 1918 with intervals of 13-95 years are documented at Katla which is one of the most active subglacial volcanoes in Iceland. Eruptions at Katla are mainly explosive due to the subglacial mode of extrusion and produce high eruption columns and catastrophic melt water floods (jökulhlaups).

The present long Volcanic repose (almost 96 years) at Katla, the general unrest since 1955, and the 2010 eruption of the neighbouring Eyjafjallajökull volcano has prompted concerns among geoscientists about an imminent eruption. Thus, the volcano has been densely monitored by seismologists and volcanologists.

The seismology group of Uppsala University as a partner in the Volcano Anatomy (VA) project in collaboration with the University of Iceland and the Icelandic Meteorological Office (IMO) installed 9 temporary seismic stations on and around the Mýrdalsjökull glacier in 2011. Another 10 permanent seismic stations are operated by IMO around Katla. The project's data collection is now finished and temporary stations were pulled down in August 2013.

According to seismicity maps of the whole recording period, thousands of microearthquakes have occurred within the caldera region. At least three different source areas are active in Katla: the caldera region, the western Godaland region and a small cluster at the southern rim of Mýrdalsjökull near the glacial stream of Hafursarjökull. Seismicity in the southern flank has basically started after June 2011. The caldera events are mainly volcano-tectonic, while western and southern events are mostly long period (lp) and can be related to glacial or magmatic movement. One motivation of the VA Katla project is to better understand the physical mechanism of these lp events.

Changes in seismicity arising from magma movement in the crust are characteristic properties of almost all active volcanoes. Meanwhile the study of the seismicity and propagation of elastic waves through the earth have the potential to give us important information about the internal structure of volcanoes. As very little is known of the 3D structure of Katla volcano and in order to define the 3D velocity structure and the geometry of the possible magma chamber, both P and S-wave travel time data from the most active period of seismicity (July-November 2011) are inverted simultaneously for both hypocenter locations and 3D velocity structure by using Local Earthquake Tomography (LET).