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Magma discharge and lava flow field growth in the Nornahraun/Bardarbunga eruption Iceland.

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Bardarbunga volcano was reactivated by an intense seismic swarm on 16/8 2014. The seismic swarm originating at the central volcano propagated north out into the associated fissure swarm during following days. As it reached the outwash plains of Jokulsa a fjollum a subaerial eruption began. Three eruptions have taken place on the outwash plane in the event, on the 29/8, 31/8 to present and on 5/9. In this presentation we discuss the second eruption that began on the 31/8 and how we do approach magma discharge parameters by combination of field observation and satellite photogrammetry. The eruption took place at the northern end of the eruptive fissure from AD 1797 and the lava was expelled out onto to relatively flat outwash plains of the glacial river Jokulsa a Fjollum thus access to eruptive products was relatively easy. It was clear from the first moments of the eruption that it had a high initial effusion rate, with lava covering the sandur plains at the rate of 25-30 m2/s. Within the first week the lava flow had covered more than 18 km2. That amounts to an average effusion rate between 195 to 280 m3/s. On the 11/9 the lava flow had grown to 25 km2, at that time effusion rate was between 140 to 247 m3/s, The lava stopped advancing and started to grow sideways and inflating. This reoccurred on the 26/9 and 12/10, with clockwise horizontal stacking of lobes to the south. From mid-November the lava growth has been controlled by tube-fed lava streams, at first generating breakouts close to the vent area and then during the last week before Christmas breaking out at the far NE end of the lava flow. As the eruption proceeded effusion rate gradually decreased and at the time of writing it is down to 9 to 76 m3/s. For assessment of areal extent of the lava field a combination of ground gps tracking and satellite photogrammetry was used. However one of the main challenges in the monitoring of the eruption was to obtain volumetric effusion rates. In the beginning of the eruption it was relatively simple since massive inflation of the lava field had not begun. But once the inflation of the lava field started accurate thickness measurements are required. This was done by combination of direct thickness measurements at the edges of the lava field and theodolite measurements of spots inside the lava field. Thus estimates of effusion rate are assigned with greater uncertainty as the eruption proceeds.