The Oskjuvatn caldera North Iceland revealed by detailed bathymetric study

Armann Hoskuldsson, Thor Thordarson

University of Iceland, NORVOL, Institute of Earth sciences, Iceland

E-mail: armh@hi.is

The Dyngjufjoll volcanic complex has an area of some 400 km2 with a maximum elevation of 1,516 m a.s.l., rising 600 to 800 m above the surrounding highland plateau. The oldest exposed parts of the centre, dominantly basaltic in composition, were formed in subglacial and subaquatic eruptions and deposited as hyaloclastites forming the elevated topography. The volcanic centre is surrounded and partially covered by extensive Holocene lava flows erupted from fissures striking NE-SW. There are at least 4 if not 5 calderas that have developed within the volcanic complex during the past 700 ka. By far the largest and most prominent one is the 45-km2 Askja caldera centrally located within the Dyngjufjoll massive, thought to have formed some 10 ka ago. The floor of the caldera is covered with Holocene lavas which issued from fissures mostly along the caldera rims. The youngest caldera is the nested Oskjuvatn caldera formed in the southeast corner of the main Askja caldera during and after the 1875 A.D. eruption. The Oskujvatn caldera is a lake-filled caldera, which has hampered its geological observation up to now. The caldera is 5 km in diameter (area, 18 km2). The maximum depth of the caldera lake is 205 m in the western half of the caldera. Rims of the caldera rise >60 m above the lake surface, indicating a total depth of no less than 260 m for the structure. Maps made by a Danish expedition in 1876 show that location of the deepest part of the caldera has changed. We also observe several eruptive vents that are unaccounted for, both along the main ring fault and within the eastern half of the caldera. Several large geothermal areas are observed on the bottom of the caldera, one in the west below the Myvetningahraun lava flow and the other in the east in relation to, until know, unknown volcanic vent. Analysis of historical accounts shows that the Oskjuvatn caldera was not fully developed until 1932 (Hartley and Thordarson, 2012), while internal unconformities in the 28-29 March 1875 tephra deposit indicate that the initiation of the collapse coincides with onset of the eruption. This suggests that the formation of the Oskjuvatn caldera took more than 50 years. These observations along with the new bathymetric map of the Oskjuvatn caldera will be presented and discussed.