The Timing of Volcano-Ice Interactions in Iceland

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There has been an increase in interest in the formation of Icelandic subglacial volcanoes (tuyas) as a physical record of the thicknesses of the ice sheets into which they erupted. This is because a tuya's summit elevation is controlled by the minimum thickness of the ice sheet at that location and time [1]. However, using the tuyas as land based markers of the ice sheets that once covered Iceland is hindered by the lack of reliable eruption ages.

Our aim is to solve this problem by using the relatively new dating system of U-Th/He. This technique is being applied to obtain ages from olivine found in the basal pillow lavas of the basalt tuyas, in exposures shielded from cosmic rays. Determining a reliable age for the subglacial volcanoes will make it possible to assess whether the timing of volcanism is consistent with previous studies [2] specifying that enhanced volcanic activity is related to the unloading of the ice sheet during deglaciation [3].

Late Quaternary basalts have been sampled from over eighty sites in Iceland; the majority from a transect along the Western and Northern Volcanic Zones. Sampling was directed at obtaining olivine samples from tuyas of different altitude, degrees of erosion and morphological complexity.

The eruption ages obtained by U-Th/He will be compared with ^{3}He exposure age of subaerial capping lavas to enable a reconstruction of the past ice sheet elevation and fluctuations in thickness during glacial-deglacial cycles. This allows an investigation into what extent exposure ages faithfully reflect episodes of ice sheet thinning and how these relate to climate records in the Northern Hemisphere.

This information carries high value as it enables links between global temperature, ice thickness and palaeoclimate to be explored with greater certainty and clarity.

[1] Smellie and Skilling (1994) *Sed. Geo.* **91** 115-129 [2] Maclennan *et al* (2002) *Geochem. Geophys. Geosyst.* **3.11** 1-25 [3] Sigmundsson *et al* (2010) *Phil. Trans. R. Soc.* **368** 2519-2534