

40Ar-39Ar age constraints and stratigraphy of 83 Pleistocene formations within the Western Volcanic zone, Iceland

Birgir V. Óskarsson (1), Magnús T. Guðmundsson (2), Robert A. Duncan (3), Sveinn P. Jakobsson (1,4)

(1) Icelandic Institute of Natural History, Gardabaer, Iceland, (2) Nordvulk, Institute of Earth Sciences, University of Iceland,
(3) College of Earth, Ocean and Atmospheric Sciences, Oregon State University, (4) Deceased, 2016

Studies on the accretionary history of Pleistocene volcanic formations in Iceland have been limited by lack of stratigraphic and age control. The Pleistocene is a period of repeated and at times extensive ice cover in Iceland, with glaciovolcanic formations in some areas a dominant part of the stratigraphy. We provide 40Ar-39Ar datings and new stratigraphic relationships for 83 volcanic formations within the northern segment of the Western Volcanic Zone, part of an extensive study led by Dr. Sveinn P. Jakobsson (deceased, 2016). The material and ideas presented are therefore to a large extent that of the late Dr. Jakobsson. The age series span the Brunhes magnetic period to the Matuyama (age range from 0.03 – 2 Ma) and include age constraints for prominent formations in the area. Despite the challenges of dating young volcanic rocks with low potassium contents, there is reasonable agreement, with a few exceptions, of the 40Ar-39Ar ages with other relative age estimates, such as from stratigraphy, degree of erosion and fault displacement, which substantiates their use. The new age series portray an accretionary history of volcanism more evenly distributed throughout the Pleistocene than previously thought, with scattered volcanism following narrow 3-6 x 5-20 km zones and producing edifices in the range of <1 – 50 km³. Zones with repeated activity are seen to develop central volcanoes with intermediate and silicic products. Morphological characteristics of these formations provide links into paleoenvironmental conditions of glacial, intraglacial and interglacial stages. This study adds significant insight into the development history of the Western Volcanic Zone in Iceland, with potential comparisons with the well-established volcanic activity of the Holocene period and the Eastern and Northern volcanic zones.