

Glaciology and volcanology on the centenary of Sigurður Þórarinnsson's birth: a special issue

The year 2012 marks the centenary of the birth of the late Sigurður Þórarinnsson, the first professor of geology at the University of Iceland. His legacy is widely recognized in the international geoscientific community and the highest award of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI), the Thorarinsson Medal, is awarded to scientists for outstanding contributions to volcanology. Sigurður's influence on Icelandic geoscientists was immense both through his university teaching and scientific collaborations. Although his research spanned a broad range of geosciences, including e.g. physical geography, geomorphology, periglacial features, and studies of interglacial sediments and tectonic earthquakes, his main fields of research were glaciology and volcanology in a broad context. Sigurður was president of the Iceland Glaciological Society from 1969 till his death, leader of most of its annual expeditions to Vatnajökull from 1953, and co-editor and frequent contributor to its scientific journal *Jökull*. This special issue of *Jökull* is dedicated to Sigurður's contribution to geosciences and long-lasting influence on research in glaciology and volcanology in Iceland.

This special issue contains an overview of Sigurður Þórarinnsson's life and scientific career by Sigurður Steinþórsson, ten peer-reviewed papers on different aspects of glaciology, glacial geomorphology and volcanology, Sigurður's principal research fields and three society documentaries by two of Sigurður's travel companions.

Sigurður developed tephrochronology, an offspring of volcanology, as a tool for studying eruption history and as a dating method which he applied widely on archaeological problems and exploration of environmental processes, such as soil erosion

and glacier fluctuations. This is reflected by papers dealing with tephrochronology and, thus, expanding its foundation laid by Sigurður in 1944. Óladóttir *et al.* show how terrestrial tephra layers record eruption mechanism and frequency, depth of magma storage, and the behaviour of volcanic systems, all of which are relevant for assessments and predictions of future volcanic activity. Dugmore and Newton discuss how analyses of poorly-identified, un-provenanced and remobilised tephtras can advance understanding of geomorphological processes and human-environment interaction and identify shifts in landscape stability and land use. Guðmundsdóttir *et al.* review the Holocene marine tephrochronology on the shelf around Iceland, correlate it to the terrestrial record, and discuss the potentials in using marine tephrochronology for dating purposes, estimations of ocean reservoir age, and reconstructions of the past activity of Icelandic volcanoes. Finally, Wastegård and Boyle provide a brief overview on the distal tephrochronology of Scandinavia where 16 tephra layers have been identified in lakes and bogs in Sweden, at least 13 of which originate from Icelandic volcanoes.

Following are six papers dealing with glaciology and glacial geomorphology that relate to Sigurður Þórarinnsson's interest in the history, behaviour, and surges of Icelandic glaciers. Pálsson *et al.* discuss mass and volume changes of the Langjökull ice cap from 1890 to 2009 and its sensitivity to climate change. Guðmundsson *et al.* describe the volume loss of the Kotárjökull glacier since the Little Ice Age and contrasting responses of the lower and upper parts of the glacier to the 20th century climate warming. Recent and Late Holocene changes of the Sólheimajökull glacier are discussed by Schomacker *et al.*, who suggest a major advance around 1.9 ka BP

and rapid thinning of the glacier front during recent decades. Based on radio-echo soundings of the ice-covered Öraefajökull volcano, Magnússon *et al.* calculate ice volumes and provide a view of the bedrock topography and subglacial troughs that might act as routes of potential jökulhlaups during future eruptions. Brynjólfsson *et al.* provide a new model for the geomorphological fingerprinting of surge-type cirque glaciers based on two examples in North-Iceland, and Benediktsson discusses the polyphase structural evolution of conspicuous end moraines formed in Kringilsárrani during the last day of the 1890 surge of Brúarjökull.

This special issue has been prepared not only in memory of Sigurður Þórarinnsson, but also in connection with two international events held in Iceland in

2012 that were dedicated to Sigurður and focused, in particular, on his tephrochronological legacy; the 30th Nordic Geological Winter Meeting in Reykjavík and the Nordvulk Summer School on Tephra Studies in Leirubakki and Kirkjubæjarklaustur.

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