

# IAVCEI/IACS Joint Commission for Volcano-ice interactions Newsletter 2010

## Administration and membership

Chair: Mary Chapman (USGS, Flagstaff)  
Vice-Chair: Christian Huggel (University of Zurich)  
Secretary: Hugh Tuffen (Lancaster University, UK)  
Ex-Officio Chair: Chris Waythomas (USGS, Alaska)

## Website, maintained by Ben Edwards:

<http://volcanoes.dickinson.edu/VIWG/index.html>

## Advisory Committee

Ben Edwards (Dickinson College, USA)  
Ron Greeley (Arizona State University, USA)  
Sarah Fagents (University of Hawaii)  
Magnús T. Guðmundsson (University of Iceland)  
Dave McGarvie (Open University, UK)  
Andrés Rivera (Valdivia, Chile)  
John Smellie (British Antarctic Survey, UK)

## 2011 Meeting Announcements

### IUGG 2011 "The State of the Planet". Melbourne, Australia, 28 June - 7 July 2011.

Session V16: *Subglacial and Subaqueous and Volcanism: processes, products and impacts*

Convenors: Sharon Allen, Ben Edwards, Hugh Tuffen, Magnus Gudmundsson.

Website: <http://www.iugg2011.com/program-iaxcei.asp>, abstract submission deadline February 1<sup>st</sup> 2011

### EGU General Assembly, Vienna, Austria, 03-08 April 2011

Session NH2.3/AS4.29/GMPV47: *The 2010 flank and summit eruptions at Eyjafjallajökull volcano (Iceland): History of an eruption from source to the atmosphere*

Convenors: Thor Thordarson, Susan Loughlin, Sigrun Hreinsdottir, Halldór Björnsson, Séverine Moune.

Website: <http://meetingorganizer.copernicus.org/EGU2011/session/7244>, abstract submission closed.

## Commission activities in 2010

Commission members helped convene the following volcano-ice-related sessions:

- EGU General Assembly, Vienna, Austria, May 2010: "*Glaciovolcanism as a climate proxy: progress and problems*", (Ben Edwards and John Smellie); "*Glacial Lake Outburst Floods: Current issues - future concerns*" (John Reynolds, Christian Huggel and Duncan Quincey).
- Fall AGU Meeting, San Francisco, Dec 2010: "*Hazards Associated With Snow and Ice-Capped Volcanoes*" (Ben Edwards, Hugo Delgado Granados, Jessica Larsen, Hugh Tuffen, Christopher Waythomas).

## Funding news and awards

- *Dr. Ian Skilling* (University of Pittsburgh, USA), has received an NSF grant to study the glaciovolcanism history of Askja, Iceland (with Dave McGarvie, Armann Höskuldsson, Alison Graettinger).
- *Dr. John A Stevenson* (Edinburgh University, UK), has received a Royal Society of Edinburgh Research Fellowship for the 5-year project "Explosive silicic eruptions in Iceland: From vents to peat bogs".
- *Dr. Claire Cousins* and colleagues at Birkbeck College, UK have received a Leverhulme Trust grant for the project "Astrobiological studies of volcano-ice interactions on Earth and Mars".
- *Jacqui Owen* (Lancaster University, UK) received the EGU-YSOPP award for best student poster at the 2010 EGU General Assembly, Vienna, Austria for her presentation "The use of magmatic water to reconstruct palaeo-ice thicknesses during subglacial rhyolitic eruptions".



## Special feature: Eyjafjallajökull and other recent events in Iceland

Magnus Guðmundsson, Institute of Earth Sciences, University of Iceland

Iceland experienced a fair bit of volcano-ice interaction in 2010. The explosive eruption in Eyjafjallajökull in April-May was a major event, but interesting observations were also made in the effusive flank eruption that preceded the main eruption. Jökulhlaups from Vatnajökull occurred in the summer and autumn.

Eyjafjallajökull on the south coast of Iceland is a large central volcano with a summit caldera, rising to 1660 m above sea level. The upper slopes and the summit are covered by an 80 km<sup>2</sup> ice cap. The name is long and cumbersome but this cannot be helped. In order to make it more manageable, it is simplest to split it into three parts: Eyja – fjalla – jökull. (Islands – mountains – glacier). The flank eruption that started on 20 March was basaltic and produced 'a'á lava. The lava advanced slowly over steep cliffs into deep canyons, forming spectacular lava falls. The lava progressed through up to 20 m thick perennial firn and ice. Thus, interesting observations were made on lava-snow interactions.

The flank eruption turned out to be an overture to the main eruption that began in the small hours of April 14. This trachyandesite eruption, although never reaching plinian or even subplinian force, turned out to be the most disruptive to air traffic in history. Ash was spread towards Europe by north-westerly winds. The initial phreatomagmatic eruption melted its way through 200 m thick ice in the summit caldera over some hours. Synthetic Aperture Radar (SAR) images from the new Dash 8 aircraft of the Icelandic Coast Guard gave a record of the development of ice cauldrons as well as supraglacial pathways of jökulhlaups and lahars during the first few days of the eruption. Later on, we witnessed the progression of a lava flow down an outlet glacier, notably we saw how the eruption melted the glacier in its path. Several research projects are taking place on various aspects of the eruption by international and local teams. Research in Iceland on the eruption mainly takes place at the Institute of Earth Sciences of the University of Iceland and the Icelandic Meteorological Office.



*The summit caldera of Eyjafjallajökull in June 2010, shortly after the eruption ended. Glacier ice can only been seen in crevasse walls and ice cliffs.*

A number of presentations on various aspects of the eruption, including volcano-ice interaction, were presented at the AGU Fall Meeting in San Francisco in December. An Eyjafjallajökull session will take place in EGU in Vienna in April and invited presentations on volcano-ice interactions and jökulhlaups will be given in sessions at IUGG in Melbourne in July.

In the summer, jökulhlaups issued from underneath the two geothermally-sustained Skaftárkatlar ice-cauldrons in Vatnajökull. These jökulhlaups are regular events, occurring about once every two years. In early November a jökulhlaup from Grímsvötn took place. There was some anticipation that the pressure release on the caldera floor, caused by the lowering of the level of the subglacial lake, would trigger an eruption. This happened in Grímsvötn on 1 November 2004. However, no eruption occurred this time round, even though GPS measurements indicate that magma pressure under the Grímsvötn caldera is now similar to what it was in 2004. We may have to wait a while for the next eruptions in Grímsvötn or Katla but given the level of activity in 2010, we would be quite content with a quiet period for some months or years.

Time will tell.

MTG 31/12/2010

## Selected Volcano-ice Publications from 2010

### Special issues:

'Climate forcing of geological and geomorphological hazards' compiled and edited by Bill McGuire, Richard Betts, Christopher Kilburn, Mark Maslin, David Pyle, John Smellie and David Tappin. Philosophical Transactions of the Royal Society of London A, 368 (1919), 2010.

### Journal articles:

- **Albino**, F; Pinel, V; Sigmundsson, F (2010) Influence of surface load variations on eruption likelihood: application to two Icelandic subglacial volcanoes, Grimsvotn and Katla. *Geophys J Int* 181, 1510-1524.
- **Fagan**, AL; Sakimoto, SEH; Hughes, SS (2010) Formation constraints on Martian north polar volcanic edifices. *J Geophys Res-Planets* 115, Art. No. E07013
- **Flude**, S; McGarvie, DW; Burgess, R, et al. (2010) Rhyolites at Kerlingarfjoll, Iceland: the evolution and lifespan of silicic central volcanoes. *Bull Volcanol* 72, 523-538.
- **Huggel** C et al. (2010) Recent and future warm extreme events and high-mountain slope stability. *Phil. Trans. R. Soc. A* 368:2435-2459.
- **Keszthelyi**, LP; Jaeger, WL; Dundas, CM, et al. (2010) Hydrovolcanic features on Mars: Preliminary observations from the first Mars year of HiRISE imaging. *Icars* 205, 211-229.
- **Marzano**, FS; Barbieri, S; Picciotti, E, et al. (2010) Monitoring Subglacial Volcanic Eruption Using Ground-Based C-Band Radar Imagery. *IEEE Trans Geosci Remote Sensing* 48, 403-414.
- **Pedersen**, GBM; Head, JW; Wilson, L (2010) Formation, erosion and exposure of Early Amazonian dikes, dike swarms and possible subglacial eruptions in the Elysium Rise/Utopia Basin Region, Mars. *Earth Planet Sci Lett* 294, 424-439.
- **Reid**, T.R. and B.W. Brock. 2010. An energy-balance model for debris-covered glaciers including heat conduction through the debris layer. *J Glaciol*, 56, 903-916.
- **Russell**, AJ; Tweed, FS; Roberts, MJ, et al. (2010) An unusual jökulhlaup resulting from subglacial volcanism, Solheimajökull, Iceland. *Quat Sci Rev* 29, 1363-1381.
- **Schmid**, A; Sonder, I; Seegelken, R, et al. (2010) Experiments on the heat discharge at the dynamic magma-water-interface. *Geophys Res Lett* 37, Art No. L20311.
- **Sigmundsson**, F; et al. (2010) Intrusion triggering of the 2010 Eyjafjallajökull explosive eruption. *Nature* 468, 426-430
- **Sigmundsson**, F; et al. (2010) Climate effects on volcanism: influence on magmatic systems of loading and unloading from ice mass variations, with examples from Iceland. *Phil Trans Roy Soc Lond A* 368, 2519-2534.
- **Tormey**, D (2010) Managing the effects of accelerated glacial melting on volcanic collapse and debris flows: Planchon-Peteroa Volcano, Southern Andes. *Global Planetary Change* 74, 82-90.
- **Tuffen**, H (2010) How will melting of ice affect volcanic hazards in the twenty-first century? *Phil Trans Roy Soc Lond A* 368, 2535-2558.
- **Tuffen**, H; Owen, J; Denton, JS (2010) Magma degassing during subglacial eruptions and its use to reconstruct palaeo-ice thicknesses. *Earth Sci Rev* 99, 1-18
- **Warner**, NH; Farmer, JD (2010) Subglacial Hydrothermal Alteration Minerals in Jökulhlaup Deposits of Southern Iceland, with Implications for Detecting Past or Present Habitable Environments on Mars. *Astrobiology* 10, 523-547.

## Other Commission News

### Media coverage

The 2010 Eyjafjallajökull eruptions were featured in countless media stories worldwide due to the unprecedented impact on aviation. It is impossible to list them all here, but this University of Iceland site provide much detailed information: [http://www.earthice.hi.is/page/ies\\_Eyjafjallajokull\\_eruption](http://www.earthice.hi.is/page/ies_Eyjafjallajokull_eruption).

Finally, several commission members are featured in a Science News article on volcano-ice interactions: [http://www.sciencenews.org/view/feature/id/63177/title/Fire\\_%2B&#3B\\_Ice](http://www.sciencenews.org/view/feature/id/63177/title/Fire_%2B&#3B_Ice)

### VII3 conference 2012

Planning for the next international meeting on volcano-ice interactions is underway, and Anchorage in Alaska is a likely location, in June 2012. For updates please check the Commission website later in 2011.

*Hugh Tuffen January 2011*

