



Report on the Activities of the joint IAVCEI-IACS Commission on Volcano–Ice Interactions, June 2011

Summary of Commission Goals

The joint IAVCEI-IACS Commission on Volcano–Ice Interactions (CVII) was established in 2008 and supercedes the former Volcano-Ice Interactions Working Group that functioned from 2006-2008. The activities of the initial working group began in earnest in January 2006 when a full complement of officers was elected. Since the full establishment as a commission, CVII has relied on a solid structure and a significant range of activities.

The goals of the CVII are to:

1. Foster the study of terrestrial and extraterrestrial volcano-ice interactions;
2. Promote internationally the exchange of ideas, results and collaborative research opportunities within the volcanological community and with non-volcanological societies relevant to this highly transdisciplinary field (e.g., International Glaciological Society, International Commission on Snow and Ice, International Permafrost Association);
3. Provide a recognized point of contact for issues relevant to volcano–ice interactions.

Since inception, the working group has been a vigorous presence within the volcanological community and has made substantial progress on many of its objectives. This report summarizes the activities of the Commission.

Leadership

The CVII leadership consists of an elected chair, vice-chair, and secretary, as well as an advisory committee of permanent members. As described in the Commission charter (attached), elected officers serve for three years, spending a 1-year term in each of the positions of Secretary, Vice-Chair and Chair in order to ensure continuity. The elected officers are chosen to represent a balance between the sub-disciplines of (i) field-based interpretations of glaciovolcanic lithofacies, (ii) glacier physics, hydrology and hazards of observed eruptions, and (iii) extra-terrestrial volcano-ice interactions. For each cycle of election of commission officers an open process takes place during which each member of the Commission is contacted to suggest candidates and then to vote on the nominees. Since 2008 the working group leadership has consisted of the following members:

2008

Chair	Magnus Tumi Gudmundsson (University of Iceland)
Vice-Chair	Chris Waythomas (USGS)
Secretary	Mary Chapman (USGS)
Ex-Officio Chair	Sarah Fagents (Univ. Hawaii)

2009

Chair	Chris Waythomas (USGS)
Vice-Chair	Mary Chapman (USGS)
Secretary	Christian Huggel (Univ. of Zurich)
Ex-Officio Chair	Magnus Tumi Gudmundsson (University of Iceland)

2010

Chair	Mary Chapman (USGS)
Vice-Chair	Christian Huggel (Univ. of Zurich)
Secretary	Hugh Tuffen (Univ. of Lancaster UK)
Ex-Officio Chair	Chris Waythomas (USGS)

2011

Chair	Christian Huggel (Univ. of Zurich)
Vice-Chair	Hugh Tuffen (Univ. of Lancaster UK)
Secretary	Tracy Gregg (Univ. of Buffalo)
Ex-Officio Chair	Mary Chapman (USGS)

Advisory Committee, 2011: Ben Edwards (Dickinson College), Ron Greeley (Arizona State Univ.), Dave McGarvie (Open Univ.), C. Waythomas (USGS), Andres Rivera (Centro de Estudios Cienticos), John Smellie (Univ. Of Leicester), Sarah Fagents (Univ. Of Hawaii), Magnus Gudmundsson (University of Iceland), Mary Chapman (USGS).

As of 2011, the member list of the Commission contains close to 100 experts from different interdisciplinary fields of research related to the areas of the Commission.

Commission Website (<http://volcanoes.dickinson.edu/VIWG>)

The Commission website is the main communication and information dissemination forum.

The website hosts information related to the group's activities, and promotes communication with the working group membership and broader volcanological community. The Commission website contains:

- A summary statement of the goals of the Commission
- Details of the Commission charter and administration
- Details of upcoming and past events related to volcano-ice interactions (meetings, special sessions, symposia, etc.)

- Contact information for members of the Commission
- Links to other sites of relevance to the membership
- A database of images related to volcano-ice interactions (see below)

Over the years of the existence of the Commission the website has been highly appreciated and will continue to be developed as a useful tool for promoting collaboration and communication amongst volcano-ice researchers.

Volcano-Ice Interactions Image Database

The CVII has established a database of digital images of features and landforms produced as a result of volcano-ice interactions (<http://icon.dickinson.edu/viwig/>). The purpose of this database is to provide a suite of useful images to the broader volcanological community for educational and scientific use, such as giving lectures, writing grant proposals, etc. The database is searchable by keyword, feature type, eruption type, volcano type, country, or composition. So far there are some 100 images available. The Commission members are encouraged to submit their own images to this growing database.

Public and Scientific Outreach and Media Coverage

2010 Eyjafjallajokull Eruption, Iceland

The 2010 eruption at Eyjafjallajokull in southern Iceland created global media interest in volcano-ice interactions with respect to ash-aviation interactions. Several members of the Commission were interviewed by local, national, and international media outlets to provide background information on the volcano, the eruption, and the role of volcano-ice interaction in making the eruption so disruptive to air traffic. As an estimated 10 million people were directly affected by the temporary closure of European airspace, the public at large has a new appreciation for understanding the role of volcano-ice interactions.

Scientific Meetings

2008 IAVCEI General Assembly, Reykjavik, Iceland

A session on glaciovolcanism was sponsored by the CVII and allowed Commission members and interested experts to exchange research results and extend the volcano-ice interaction network.

Climate Forcing of Geological and Geomorphological Hazards, London, Sept. 2009

Several sessions at this conference were held on areas related to CVII and with active participation of CVII members. A special issue produced on the basis of this conference in the Philosophical Transactions of the Royal Society A produced a particularly large interest in the international press and media.

International Workshop on Glacier Hazards, Permafrost Hazards and GLOFs in Mountain Areas: Processes, Assessment, Prevention, Mitigation, Vienna, November 2009

Co-sponsored by CVII, this workshop attracted large interest among geoscientists working in high mountain areas. Volcano-ice interactions were among the keynote talks of the workshop. A report on the workshop was published in EOS in 2010.

2010 EGU General Assembly: CVII Session Glaciovolcanism as a climate proxy: progress and problems

Conveners: Ben Edwards, John Smellie

This session at EGU was organized by CVII and attracted contributions from field, analytical and/or theoretical studies using glaciovolcanism as a climate or environmental proxy.

AGU 2010: NH-11B CVII Session Magma-Ice-Meltwater Interactions: Physical Processes and Implications for Volcanic Hazards, and Hazards Associated With Snow- and Ice-Capped Volcanoes

This session was jointly sponsored by the Natural Hazards and Volcanology divisions of AGU, and covered physical processes of volcano-ice interactions as well as the hazards resulting from those processes.

2011 EGU General Assembly: The 2010 flank and summit eruptions at Eyjafjallajökull volcano (Iceland): History of an eruption from source to the atmosphere

Convener: Thorvaldur Thordarson

Co-Conveners: Susan Loughlin, Sigrun Hreinsdottir, Halldór Björnsson, Séverine Moune

Co-sponsored by CVII, this session attracted enormous interest by a wide geosciences community as well as by the international media. It followed from activities and recent studies performed by several members of CVII.

The 2010 flank and summit eruptions at Eyjafjallajökull volcano (Iceland) produced a wealth of data that are providing new avenues in volcanological research across several disciplines, such as in volcano seismology and deformation, geochemistry and petrology of mixed magmas, physical volcanology (i.e. conduit processes, volcano-ice interactions, eruption column dynamics and plume dispersal), volcano-environment interactions and hazard mitigation.

2011 IUGG General Assembly, Australia.

These IUGG sessions were co-organized by CVII or with participation of CVII members.

Subglacial and Subaqueous and Volcanism: processes, products and impact

Lead Conveners: Sharon Allen (Australia), Ben Edwards (United States of America), Hugh Tuffen (United Kingdom), Magnus Gudmundsson (Iceland)

The session brings together researchers within the fields of submarine/sublacustrine/subglacial effusive and explosive volcanism where confining pressure and ambient conditions influence the eruption processes. Particular emphasis will be on eruption dynamics, transport mechanisms, and hazards. The April 2010 eruption of Eyjafjallajökull, related volcano-ice interaction processes and continental-scale impacts are on the agenda of the session.

Subaerial and Subaqueous Lava flows

Lead Convenors: Thor Thordarsson (United Kingdom), Andy Harris (France), Sonia Calvari (Italy)

The session invites contributions on effusive eruptions at active volcanoes, in particular those with high recurrence intervals of such events, that have played a key role in linking flow field architecture, flow structures and magma rheology to the emplacement modes and mechanisms characteristic of individual lava types. Such studies also facilitate assessments of the hazard and risks posed by lava flows to populated areas and demonstrate the need for near-real time forecasting of lava flow length and path in order to protect the public.

Summer School on Volcano–Ice Interactions 2009

In June/July 2009, a 10 day long summer school on volcano–ice interactions was organized by CVII, in cooperation with the Nordic Volcanological Center at the Univ. of Iceland. This has provided students and researchers entering or working in the field of volcano–ice interactions to interact, and with an intensive introduction the subject area, through lectures and fieldtrips. Topics addressed included: terminology, methods of studying glaciovolcanic deposits, heat transfer processes, ice mechanics, glacial hydrology, and associated hazards. Funds to support this summer school were available from Nordic countries cooperation funds, National Science Foundation, the American Geophysical Union, and other sources.

Concluding Comments

Since its establishment as a joint commission of IAVCEI and IACS in 2008 the CVII has been able to rely on a solid structure and organization. The leadership structure with three elected officers and an Advisory Committee has proven to allow CVII to develop and maintain a high level of activity and exert a considerable leadership in the field. Evidence of the success of the CVII are the now nearly 100 members.

The Commission website and the Volcano-Ice Interactions Image Database are important resources that are being made available to the scientific community or other interested institutions. The CVII has had a continuously high amount of sponsored and co-sponsored meetings, sessions and workshops that have contributed to promote the research field and foster research collaborations.

The 2010 Iceland Eyjafjallajökull volcano eruption and crisis was the most prominent event in relation with volcano-ice interactions over the past 4 years. It had a tremendous impact on Europe, and correspondingly the media coverage was particularly high over the globe.

However, a series of other important volcano-ice interactions events have taken place over this period and similarly had important impacts on a local or national scale.

For the next term, the CVII is committed to maintain the high level of activity in different fields, including scientific meetings, outreach and education. The Commission will furthermore continue to strain for successfully linking IAVCEI and IACS and promote collaborative, interdisciplinary research.

Particularly worth to mention is that CVII is currently preparing for the Third Conference on Volcano-Ice Interactions on Earth and Mars(VI13), to be held in Anchorage, Alaska, USA, around July 2012.

Volcano–Ice Interactions Working Group Charter

Note: The working group charter is based on the original proposal for an IAVCEI Commission on Volcano–Ice Interactions, which was formally submitted to IAVCEI executive committee January 2005, and accepted by IAVCEI in May 2005. However, rather than granting commission status, the IAVCEI executive committee approved the formation of a Working Group. As of March 2008, the working group was granted commission status as a joint venture with the International Association of Cryospheric Sciences. The original proposal to establish a commission is included below as originally written.

The proposal was submitted by an Adhoc Steering Committee established and elected on 18 November 2004. Committee Members: Ben Edwards, Ron Greeley, Magnus T. Gudmundsson, Christian Huggel, John Smellie, and Chris Waythomas

Statement of Need for a Commission

Because many volcanoes exist at high latitudes and/or extend to high altitudes and are at least seasonally covered with snow and ice, volcano-ice interactions play a key role for understanding eruption dynamics, the evolution of volcanic landforms, and many types of mass-flow hazards. The importance of volcano-ice interactions during glacial periods when ice covered many volcanic regions has become increasingly apparent as well. Such interactions between ancient and modern volcanoes and ice (including subsequently produced liquid and vapor) are a rapidly expanding area of interest among volcanologists, glaciologists, and paleoclimatologists.

For example:

- A recent email to solicit interest in this topic to the volcano listserv received responses from >40 scientists worldwide;
- >70 geoscientists participated in the first volcano-ice interactions conference in Iceland, August 2000;
- ~5% of the scientists attending the 2004 IAVCEI meeting in Pucon, Chile, expressed an interest in participating in a commission on volcano-ice interactions, and voted unanimously to establish such a commission on 18 Nov 2004; and
- A special session on volcano-ice hazards is scheduled for EUG 2005 (Vienna) and an IGS thematic meeting on terrestrial and extraterrestrial glacier volcano/geothermal interactions is being planned for 2006 (Reykjavik).

Scope and Purpose of an IAVCEI Commission on Volcano-Ice Interactions

The commission will focus on

4. Fostering the study of terrestrial and extraterrestrial volcano-ice interactions,
5. Promoting internationally the exchange of ideas, results and collaborative research opportunities within the volcanological community and with non-volcanological societies relevant to this highly transdisciplinary field (e.g., International Glaciological Society, International Commission on Snow and Ice, International Permafrost Association), and
6. Providing a recognized point of contact for issues relevant to volcano-ice interactions.

These goals will be met through venues such as workshops, field trips, special topical sessions at international meetings, and the establishment of relevant electronic databases open to the scientific community.

In addition to raising awareness in the geoscience and political communities, the commission will work to promote and encourage research aimed at improving our understanding of the terrestrial and extra-terrestrial interactions between volcanoes and ice in order to:

- Better assess hazards at active volcanoes mantled by ice,
- Better understand past changes in regional and global climates,
- Facilitate better-informed comparisons between volcano-ice processes on Earth and other planetary bodies, and
- Assist and improve identification of particularly promising off-Earth sites in the hunt for exobiology.

Organizational Structure

The commission officers will include a chair, vice-chair, and secretary, each with 3-year terms on a staggered basis [NOTE: for the first two elections, the staggering of terms means that the first Chair will only hold office for 1 year, and the first Vice-Chair will only hold office for 2 years]. At the start of a new year, the current chair will step down and become ex officio, the vice-chair will assume the chair, the secretary will assume the vice-chair, and a new person will be elected to assume the secretary position. This will enable a clear continuity in the organization.

Duties will include but not be limited to the following:

- Chair: overall responsibility for meeting/making progress on the Commission goal(s);
- Vice-Chair: responsible for identifying the coming year's program of meetings and helping to promote and advertise those meetings;
- Secretary: responsible for communicating information about commission activities with the members via a newsletter / email / webpage and for fostering communications between subcommittees.

Election of commission leadership will be through nominations from the commission members with guidance from existing leadership. Such guidance will be aimed at maintaining a broad scientific and geographic expertise among the commission leadership. For example, the leadership should strive to represent each of the 3 main "sub-branches" of volcano-ice researchers: 1) those principally concerned with interpreting lithofacies, 2) those concerned with glacier physics, hydrology and hazards of observed eruptions, and 3) those focused on extra-terrestrial volcano-ice interactions. Additionally, the leadership should attempt to maintain a diverse geographic representation to facilitate participation of commission officers at international venues.

For any given symposium / workshop / activity, an ad hoc committee will be formed, which will be either chaired (or participated in) by one of the officers.

Subcommittees will emerge as proposed by the members at large. Proposals for the formation of subcommittees will be circulated by the Secretary via the commission newsletter and advertisements in other appropriate venues to all IAVCEI members and other geoscientists (e.g., IAVCEI newsletter, EOS, Astrobiology Institute newsletter). Subcommittees will have a finite lifetime (two or three years) with a specific "sunset clause" that will dissolve them, unless proposed for renewal.

Preliminary List of Tasks Designed to Achieve Commission Purpose

1. Actively solicit commission members to initiate special sessions at relevant national and

international meetings. [ongoing]

2. Plan, sponsor and facilitate a second Volcano-Ice Interactions conference during the summer of 2007 (and possibly beyond). [to begin as soon as commission is formally approved]
3. Design and implement a method of communication among commission members including, but not limited to, a listserv or web page or tri-monthly report on the progress of the commission. [to be started within 3 months after official notification of commission approval]
4. Establish the use of glaciovolcanic sequences as important proxies for paleoclimatic reconstructions. [ongoing]
5. Form subcommittees to organize the specific interest groups, which might include the following:
 - Formation of mass flows and volcanic hazards generated by volcano-ice interactions;
 - Development of terminology for describing and interpreting glaciovolcanic features;
 - Documentation of differing styles of glaciovolcanism at stratovolcanoes;
 - Region specific interest groups (e.g., Antarctica, Iceland, Mars).
6. Organize and give short courses designed to train new researchers entering the field and their students on terminology and methods used to study glaciovolcanic deposits, heat transfer / ice mechanics / glacier hydrology, and /or assess hazards related to ice-clad volcanoes.
7. Organize an international symposium to focus on developing synergy between volcanologists and glaciologists/Pleistocene geologists, which could be the culmination of the commission's work, after which members will be able to assess the further need for the existence of the commission.