



## **Report on the Activities of the joint IAVCEI-IACS Commission on Volcano–Ice Interactions, 2012-2015**

### **Summary of Commission Goals**

The joint IAVCEI-IACS Commission on Volcano–Ice Interactions (CVII) was established in 2008 and supersedes 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 and glaciological communities, and other societies relevant to this highly transdisciplinary field (e.g. International Glaciological Society, 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 and glaciological communities 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:

## **2012**

**Chair** Hugh Tuffen (Univ. of Lancaster UK)  
**Vice-Chair** Tracy Gregg (Univ. of Buffalo)  
**Secretary** Lucia Capra (UNAM, Mexico)  
**Ex-Officio Chair** Christian Huggel (Univ. of Zurich)

## **2013**

**Chair** Tracy Gregg (Univ. of Buffalo)  
**Vice-Chair** Lucia Capra (UNAM, Mexico)  
**Secretary** Dave McGarvie (Univ. of Lancaster, UK)  
**Ex-Officio Chair** Hugh Tuffen (Univ. of Lancaster UK)

## **2014**

**Chair** Lucia Capra (UNAM, Mexico)  
**Vice-Chair** Dave McGarvie (Univ. of Lancaster, UK)  
**Secretary** Christopher Hamilton (Univ. of Arizona)  
**Ex-Officio Chair** Tracy Gregg (Univ. of Buffalo)

## **2015**

**Chair** Dave McGarvie (Univ. of Lancaster, UK)  
**Vice-Chair** Christopher Hamilton (Univ. of Arizona)  
**Secretary** Hugo Delgado Granado (UNAM, Mexico)  
**Ex-Officio Chair** Lucia Capra (UNAM, Mexico)

**Advisory Committee, 2015:** Ben Edwards (Dickinson College), Ron Greeley (Arizona State 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 2014, 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/viwg/>). 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**



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Comment [1]: Any important event to add?

### **Scientific Meetings**

#### **2012 - EGU General Assembly**

- *GMPV4.10/GM2.7 Spatio-temporal perspectives on volcanological processes and volcanic landforms. Conveners: Hugh Tuffen, D. Karatson, A. Germa, B. Székely*

This session addresses a wide range of issues related to the evolution in time and space of volcanic processes, landforms and environments. By combining perspectives on geomorphology, geochronology and the volcanic lithofacies this session will allow a deep discussion of the processes which shape volcanic landscapes and better constrain the timescales and sequence of activities by which such morphologies are created. A specific focus of the session is magma-water-ice interaction, which can have dramatic impacts on landforms and eruption behaviour over a wide range of timescales.

#### **2013 - 3rd Volcano-Ice Interactions on Earth and Other Planets Conference**

- *Anchorage, Alaska. Organized by: Chris Waythomas, Alaska Volcano Observatory, USGS; Christian Huggel, University of Zurich: Hugh Tuffen, Lancaster University, UK.*

The Third International Conference on Volcano-Ice Interactions on Earth & Other Planets, Anchorage, Alaska, June 18–22, 2012 was sponsored by USGS and IAVCEI. The VII3 conference was held at the U.S. Geological Survey office in Anchorage, Alaska, on the Alaska Pacific University campus. The conference had a three-day oral and poster session meeting format followed by two days for field excursions to the Wrangell volcanic field and Cook Inlet volcanoes. The purpose of the conference was to bring together scientists with a common interest in volcano-ice interactions and to highlight recent studies and eruptions at snow- and ice-clad volcanoes. A total of 26 abstracts were received.

#### **2013 – AGU – Las Americas, Cancun (México)**

- *V08: Volcano-ice interactions in the Cordilleras of the Americas. Conveners: Hugo Delgado Granado, Christian Huggel, Hugh Tuffen, Lucia Capra*

This session analyzed the Volcano-ice interaction processes in the Cordilleran region which are very complex and comprise climate change positive feedback, enhanced explosive eruptive activity and associated hazards. In order to evaluate the contribution of volcanic activity on the reduction of ice masses, it is needed to establish comparisons with glaciers at non-volcanic mountains in order to estimate climatic-factors-related retreat vs. volcanic-related retreat (subglacial heat-flow, eruptive events, gravity driven processes, etc.). On the other hand, volcano-ice interactions are not fully understood and their consequences in terms of associated hazards.

### **2013 – IAVCEI General Assembly, Kagoshima, Japan.**

- 3-12. Volcano-Ice interaction and planetary volcanism. Conveners: Ian Skilling, Rosaly Lopes, Christian Huggel, Alison Graettinger, Hugh Tuffen.

This session encompassed all aspects of planetary volcanism, including cryovolcanism in the outer solar system, with an emphasis on volcano–ice interaction on Earth and Mars. Main topics were:

-Interactions between volcanic systems and ice on Earth including physical processes that control eruption mechanisms, palaeo-ice thickness reconstructions, geochemical studies of magma evolution and degassing, glaciological studies of geothermal impacts on ice sheets, volcano-ice interactions in recent eruptions, hazard mitigation at ice-covered volcanoes and the physical processes that control eruption mechanisms, as recorded in erupted deposits or simulated in models.

-New results from space missions, cryovolcanism as a volcanic process, geophysics of icy satellites of the outer Solar System, magma-ice interaction on Mars, volcanism as thermal and chemical energy sources for potential life, and volcanism and volcanic products as evidence of mantle composition

- 3H. Lava Flow. Conveners: Stephen Self, Susumu Umino, Meagen Pollock, Christopher Hamilton, Ben Edwards, Alex Nichols

This session combined examinations of lava flow dynamics with studies of the interactions between lava and water on Earth and other planetary surfaces. Topics ranged from advanced imaging an analysis of lava flows using visible, thermal, and high-resolution topographic data to petrographic and stratigraphic investigations of subaerial lava flows, lava domes, and pillow lavas emplaced within submarine and subglacial environments.

### **2014. AGU Fall Meeting**

- Physical Volcanology of Eruptions Involving Groundwater, Water or Ice. Conveners: James D. L. White, Rebecca Carey, Magnus Tumi Gudmundsson, and Samuel A. Soule.

Water in oceans, glaciers, lakes, streams and aquifers lies in the path of magma ascending to eruption over the great majority of Earth, and on some other planets as well. This session invites contributions of all aspects of magma's interaction with water en route to the surface and during eruption. We anticipate contributions on submarine volcanism, volcanism in lakes, phreatomagmatic eruptions, subglacial volcanism, subsurface interactions of dikes and conduits with country rock groundwater.

- The Role of Volcanism In Atmospheric Phenomena. Conveners: Kimberly D. Genareau, Sonja A. Behnke, and Corrado Cimarelli.

This session focuses on studies that attempt to unite the fields of volcanism and atmospheric

dynamics and the complex interplay between the two. We welcome contributions that utilize field observations, laboratory experiments, remote sensing, and modeling, focusing on the aforementioned phenomena and the influence that volcanic ash and gas emissions may have on modifying physical and chemical equilibria in the atmosphere.

#### **2015 – 26<sup>th</sup> IUGG General Assembly, Prague.**

- *VS33. Understanding Volcano-Climate Feedbacks. Conveners: Lucia Capra (Queretaro, México), Christian Huggel (Zurich, Switzerland), Hugh Tuffen (Lancaster, U.K.). This symposium is co-sponsored by IACS.*

While our understanding of volcano-climate linkages is still developing, increasingly studies are showing feedbacks between them at a variety of time-scales. On one hand many historic eruptions have had documented impacts on short term global temperatures (e.g., Tambora 1815), and on the other local climate events (heavy rains) are now thought to be able to trigger eruptions (e.g., Soufriere Hills). This is especially true for glaciovolcanism, for which it has been argued that rapid deglaciation can trigger changes to asthenospheric melting and increased rates of volcanism, as well as having local effects at glacierized stratovolcanoes (edifice failure due to deglaciation). At the same time, damage done to glaciers by large-scale eruptions can hasten rates of melting and ice retreat, even as increased rates of volcanic gas emissions during deglaciation could either mitigate (e.g., SO<sub>2</sub>) or enhance (e.g., CO<sub>2</sub>) cyclic climatic warming. We invite contributions to this symposium that investigate the feedback frontiers between volcanism and climate change.

- *VS02. Lava Flows. Christopher Hamilton (Tucson, USA), Steve Self (Milton Keynes, U.K.)*

This session focuses on advances that have been made in the imaging and analysis of active lava flows and those preserved within the geologic record of Earth and other planetary bodies, including subaqueous lavas. We particularly invite contributions relating to Light Detection And Ranging (LiDAR) observations obtained from field-based, airborne, and spaceborne platforms to quantify lava flow morphology, emplacement dynamics, and paleo-environments. We also encourage results from studies that explore submarine lavas, integration of LiDAR and Forward Looking Infrared Radiometer (FLIR) data, and alternative remote sensing approaches to understanding lava flows and dynamic volcanic topography.

#### **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 more than 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.

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 mentioning is that CVII will contribute to the next IAVCEI General Assembly 2015 at the IUGG in Prague, and to the IAVCEI Scientific Assembly in Portland in 2017, with special sessions and field trip.