

# IAVCEI News 2001 No: 1

INTERNATIONAL ASSOCIATION OF VOLCANOLOGY AND CHEMISTRY OF THE EARTH'S INTERIOR

## Message from the Secretary General

IAVCEI ended the year strong and healthy, with nearly 700 individual members, the most we have had yet. This is a good time to invite all members to renew for the year 2001. Applications have been mailed, and it is also possible to obtain information on the web site [www.iavcei.org](http://www.iavcei.org). The web page has recently been redesigned and updated. We understand that the volcano listserver administered by Arizona State University has over 2000 people listed, which far exceeds the IAVCEI membership, so we invite all interested people to participate and to join IAVCEI.

The highlight of the last year was the highly successful IAVCEI General Assembly. Approximately 500 volcanologists attended the meeting from July 18-22, 2000 in Bali, Indonesia. The five-day meeting brought together volcanologists from around the globe to discuss all aspects of volcanology as well as to visit some of the world's most famous and destructive volcanoes. The meeting was well organized by the Volcanological Society of Indonesia (VSI), assisted by the Directorate General Geology & Mineral Resources (DGGMR), the Indonesian Geologists' Association (IGA), the Institute of Technology of Bandung (ITB), and the Department of Mining and Energy (DME).

The General Assembly consisted of 490 abstracts presented in twelve theme sessions:

- Structure of Island Arcs
- Volcano Seismology
- Volcano Geophysics
- Magmatic Processes
- Magmatic related mineralization
- Volcanogenic Sediments
- Hazard Mitigation
- Volcanic gases
- Crater Lakes
- Physical Volcanology
- Utilization of Energy and other volcanic resources
- Surtseyan Volcanism

Midway through the five-day meeting, the participants traveled to Batur caldera and one of VSI's volcano observatories. There were also two workshops and six field trips held in association with the meeting.

The next General Assembly is tentatively scheduled for November-December 2004 in Chile. Over the next few years, IAVCEI will focus its efforts on several smaller meetings, including Cities on Volcanoes 2 (Feb. 2001, New Zealand), a Penrose conference (June 2001, California), and the IAVCEI 1902 Centennial Workshop (May 2002, Martinique). We expect a strong showing for volcanology at the July 2003 IUGG meeting in Sapporo, Japan, as well as excellent field trips.

The IAVCEI Executive Committee met in Bali and will be meeting again in New Zealand at the Cities on Volcanoes 2 conference. A report will appear in the next issue of IAVCEI News.



Steve Sparks, President

Finally, elsewhere in this newsletter are two reports of cases in which volcanologists were killed or injured while working at active volcanoes. The IAVCEI Executive Committee expresses its deep sympathies to the families of the victims, and an admonishment to members to stay vigilant regarding safety as they conduct their research.

Steve McNutt

## EUG Meeting on Volcanology

The EUG meeting will be held this year from April 8-12 in Strasbourg. This year's meeting has quite a lot of volcanology in it. See the website <http://eost.u-strasbg.fr/EUG>

There are sessions on:

- A. Fluid and Mass Flux
- B. Biogeosciences
- C. Climate Change
- D. Environment and Oceanography
- E. Rifted Continental Margins
- F. Mantle Structure, Composition and Dynamics
- G. Lithosphere Structure and Tectonics
- H. Volcanic and Plutonic Processes and Products
- H1: Thermodynamic, structural and physical properties of fluids and hydrous melts
- H2: Non-linear and chaotic dynamics in igneous petrology
- H3: Growth of volcanic structures in the oceans, from ridge crests to the plate interiors
- H4: What is a magma chamber?
- H5: Rates of melting and melt extraction in the mantle and continental crust
- H6: Volcanic hazards: monitoring, prediction and mitigation

The abstract deadline has passed, however, it is still possible to register.

Hazel Rymer, Open University



Steve McNutt, Secretary General

Continued on page 2



## Volcano-Logic: Reasoning Research in Volcanology

### *Purpose:*

The investigation of scientific reasoning in volcanology is necessary for the following reasons.

1. The study of volcanology involves making statements based on;
  - (i) observations in the field,
  - (ii) geologic background (known or hypothetical),
  - (iii) laws of physics and chemistry,
  - (iv) modelling, including experimental results.

Any natural object has an infinite number of properties, whereas any observation is formulated as a finite set of propositions. For this reason, our understanding of the geological background is always incomplete and, in fact, is strongly based on imagination and interpretation. How adequate is this? Perceived laws of physics and chemistry might change with time, and therefore, when we think that natural phenomena behave according to these laws we make an assumption of unknown reliability. Any kind of modelling implies substitution of an infinite set of properties with a finite one, so the reliability of modelling results applied to a real system needs formal determination too. Finally, the relative reliability of statements obtained from such diverse sources may be different and requires evaluation.

2. As we know from psychology, belief bias strongly influences any conclusion people make (Halpern, 1996). The more descriptive a science is, the greater is the possibility to wrap ideas in descriptions and, therefore, the stronger belief bias becomes. Thus, describing a pyroclastic sequence in unanimously accepted terms (see, e.g., Fisher and Schmincke, 1984, Chapters 5 - 10), a volcanologist actually interprets it at the same time. Thus it is necessary to identify clearly the premises provided by data on a given object, those provided by inductive reasoning based on numerous objects studied before, and those deductively provided by general belief when interpreting an object or forecasting its behavior.

3. As science evolves, the volume of suggested ideas becomes difficult for an individual researcher to comprehend. For example, the discussion of genesis of rocks of transitional lava to pyroclastic types has continued for about 150 years, and new results make it progressively more complicated. Naturally, as rapid accumulation of data has led to the creation of databases and a tendency toward unification of their format, the development of concepts requires a tool to bring the concepts together and formulate them in similar language. In general, this tool should outline the structure of the field of knowledge, be this field volcanology in general or a part of it, with or without concepts from other fields. A particular object of study (a volcano or volcanic terrain, a large ignimbrite accumulation or an individual flow unit, seismic swarm or sulfur oxides cloud in the atmosphere, etc.) can be comprehended as a field of knowledge as well. In particular, this tool should highlight

- (i) the areas of relatively well substantiated and self-consistent concepts in the field of knowledge and
- (ii) contradictions and uncertainties between individual concepts and/or their context.

### *Methodology*

These tasks are completely within the field of competence of logic. Since Aristotle, logic has been understood as the study of correct reasoning. First, the concepts (and newly acquired data on particular object) should be put in the form of explicit propositions and processed by first order logic. Even at this stage concept analysis can be performed in the field of knowledge with the aim of fulfilling these two tasks. Then, other logical calculi and models, including non-monotonous and fuzzy, can be applied to optimize the concept analysis. Moreover, it is quite possible that an additional development of logical tools will be needed.

After the logical formalization of a field of knowledge is complete, the application of knowledge management technologies can be discussed. This cannot be done before, because such technologies were created for other tasks, so they can be applied correctly in volcanology only once the volcanological task is put in to the universal terms of formal logic.

### *Expected Results*

The main theoretical result of reasoning research should be clear, explicit and structured knowledge in a given field. We believe that the derived framework of concepts, formulated in terms of the most appropriate logical theory, will:

- (i) indicate the weakest places in the existing knowledge and thus automatically formulate most urgent tasks of further research,
- (ii) be helpful in volcanological education by providing an overview of the entire field of knowledge,
- (iii) serve itself as the basis for making decisions with incomplete information or insufficient time, e.g., during volcanic crises,
- (iv) allow the application of automatic task-solving methods to the best elaborated areas of volcanology.

Ultimate results may include software helping scientists to navigate within the space of concepts, and special websites or web-rings on particular fields of volcanology (magma ascent and fragmentation, magma-water interaction, pyroclastic flows, rocks of transitional lava-pyroclastic, pyroclastic-lahar, pyroclastic-redeposited and other forms, etc.).

### *References:*

- Halpern, D.F., 1996, *Thought and Knowledge: An Introduction to Critical Thinking*: Lawrence Erlbaum Associates, Publishers, Mahwah, New Jersey.
- Fisher R.V., Schmincke H.-U. (1984) *Pyroclastic rocks*. Springer-Verlag, Berlin-Heidelberg.

### *Acknowledgments*

*The authors are deeply obliged to Dr. Stephen Henley for fruitful discussion, valuable comments and editing the text of this article in English.*

**Cyril A. Pshenichny,**  
Petrography Dept., Faculty of Geology, St. Petersburg  
State University, Russia,  
email : pshenich@kp1306.spb.edu

**Victor P. Moukhachyov,**  
Logic Dept., Faculty of Philosophy, St. Petersburg  
State University, Russia



## A Graduate Student Perspective on the 2000 IAVCEI General Assembly July 18-22, 2000



*Photo of Batur volcano, an active stratovolcano inside Batur caldera, Central Bali. The IAVCEI participants travelled here during a meeting field trip.*

Approximately 500 volcanologists attended the General Assembly of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) this past July in Bali, Indonesia. The five-day meeting brought together volcanologists from around the globe to discuss all aspects of volcanology as well as to visit some of the world's most famous and destructive volcanoes. The meeting was well organized by the Volcanological Society of Indonesia (VSI).

Midway through the five-day meeting, the participants traveled to Batur caldera and one of VSI's volcano observatories.

For students, the meeting was the focal point of a month-long trip sponsored by IAVCEI, NSF, and AGU. Twelve U.S. graduate students were selected not only to attend the meeting, but to travel to other circum-Pacific volcanoes as an educational field trip. The week prior to the meeting was spent on the big island of Hawaii, where members of the Hawaii Volcano Observatory led trips to Kilauea and Mauna Loa. After the meeting our group split and attended various IAVCEI-sponsored field trips. I spent three days at Krakatau off the Western coast of Java while Darren visited several East Java volcanoes. The final week of the trip reunited our group in the Philippines, where we were guided by several scientists as we studied the deposits of the 1991 eruption of Mount Pinatubo. Overall, the trip went quite well, mostly due to the efforts of Bill Rose (Michigan Tech) and many others who helped organize and instruct along the way.

**Michelle Coombs**

### **Bruno Martinelli**

It is with great sadness that we received word that Bruno Martinelli died December 4, 2000, from a heart attack. Bruno was the Secretary of the Working Group on Volcanoes and Earthquakes of the European Seismological Commission from its beginning through 1997. Based on his strong physical background he made it his role to remind us at working group meetings that only the understanding of physical models and concepts will shed further light on volcanic processes.

We will remember Bruno as a very warm-hearted person with a nice sense of humour, with whom it was fun to talk and work. All of us will miss him greatly.

**Jurgen Neuberg**  
Chairman of WG 'Volcanoes & Earthquakes'

Order IAVCEI Videos from NWIA, 3029 Spirit Lake Highway, Castle Rock, WA 98611, USA Phone: +1 360 274 2125 Fax: +1 360 274 2101  
US\$19.95 each; US\$34.95 for two; postage - US\$5 in USA, Canada & Mexico, other countries US\$ 13.05 for airmail or US\$5.55 for surface mail



## Tragedy on Semeru Volcano, Indonesia

On Wednesday July 26, 2000 a group of American and Indonesian volcanologists hiked to the summit of Semeru Volcano on the island of Java. The volcano, located in a very remote location, has been in a continuously active state for the past few decades. The primary expression of that activity has been small steam and ash explosions lasting 10-30 seconds. The group at the summit was there for a post-IAVCEI meeting trip to observe that activity. After several "typical eruptions" a larger event occurred at 6:31 am local time July 27. The eruption began in the same way and then expanded to a different point in the vent, ejecting juvenile rock and ash.

Caught in the fallout were myself, Amit Mushkin (Israeli student), Paul Kimberly and Lee Siebert (both at the Smithsonian Institution) and 3 scientists from the VSI (Volcanological Survey of Indonesia). The eruption lasted for less than a minute, but unfortunately took the lives of two of the Indonesian scientists, Asep Wildan and Miktu due to massive head injuries. Their bodies were later recovered from the summit.

Asep Wildan had worked at VSI since 1993, most recently as a geophysicist in VSI's Eastern Java section. He is survived by his wife and young daughter. Mukti served with VSI since 1990 as a volcano observer and was posted at Semeru. He is survived by his mother. Both Wildan and Mukti made many contributions to VSI's volcano research and monitoring programs.

Of the survivors, Kimberly had a penetrating wound to the upper shoulder which required field sutures. In addition to that, he had a dislocated and broken arm and hand along with 3rd degree burns on the legs. Both Mushkin and Siebert had several large wounds and minor burns. I fared the best of the group with only major bruises, minor cuts, burns and a slight concussion.

It took over 30 hours to get us off the mountain due to the remoteness of the location and the inability to secure a helicopter. That was a very tense and trying time, but we managed to get through it all. We express thanks to all the local folks in the villages who responded, and our deep sympathy to the folks at the VSI and the families of the victims.

**Michael Ramsey,**  
Assistant Professor  
Department of Geology & Planetary Science,  
University of Pittsburgh

*[note: IAVCEI is making a contribution to VSI to help provide economic assistance to the families of Wildan and Mukti - ed.]*

## Volcanologist Diego Viracuchka Killed at Guagua Pichincha

Guagua Pichincha has been producing fewer seismic events with the Continuing growth of dome #9, about 100 events/day. Still, in the week of 7-13 Jan. the LP events produced by the volcano were of greater magnitude and depth in that they registered significantly in stations located 10 out from the crater.

### *The Accident*

Surface manifestations in the crater area were reported by Diego Viracucha of the Instituto Geofisico via radio on the morning of 14 Jan. Diego reported that in dome 9 a new crater appeared to be forming, but there were actually few other surface manifestations that showed superficial response to the new variety of LP's.

Diego informed his two assistants that he was going to quickly move ahead several hundred meters west of the seismic station "Pino" where he was to take photos—and would return in 20 minutes and keep contact via the radio.

Attempts to communicate with him on the radio were furtive. Apparently he slipped and fell over a cliff of about 200 meters into the caldera of Guagua Pichincha. Since he was by himself during this moment, we will never know the exact cause of the fall. His body was found hours later bruised and broken and without life. Given the length of the fall and the impact, he probably died immediately from head wounds and internal injuries.

The body's recovery occurred with the intervention of 6 volcanologists from the IG, the Civil Defense, the Guards of the Refuge, the Red Cross, The elite group of the police, various mountaineering groups, and family members. The site of the accident was 2.5 hours from GGP Refuge and it took all day to recover the body. Use of helicopter was out of the question because of the climatic conditions.

Diego Viracucha (age 37) was a dedicated volcano seismologist who had worked in the Instituto Geofisico for 9 years. He was given to the study of seismic patterns of Cotopaxi, Guagua Pichincha, Cayambe and Tungurahua. He had campaigned the installation of a seismic instrument on the summit of 5900 m high Cotopaxi. He was an accomplished mountaineer and had scaled almost all of the important peaks of Ecuador's volcanoes. One of his greatest passions since Sept., 1999 was keeping a close visual-photographic record of the changes in the domes of Guagua Pichincha. His excellent companionship, his unflagging enthusiasm, his well-stilled knowledge of the seismicity of the active volcanoes leaves a tremendous void in the Instituto's monitoring efforts.

**Patricia Mothes**  
Instituto Geofisico,  
Escuela Politecnica  
Nacional, Quito Ecuador

*THIS ISSUE WAS EDITED BY STEVE McNUTT: SECRETARY-GENERAL, IAVCEI*

*LAYOUT AND DESIGN BY JEAN CHIU, ADMINISTRATIVE SECRETARY*