

1st Meeting of IASPEI/IAGA/IAVCEI Inter-Association Working Group on Electromagnetic Studies of Earthquakes and Volcanoes (EMSEV) August 23, 2001, Hanoi, Vietnam

Summary

1. Date & Time August 23 (Thu) 18h00m - 19h30m
2. Place: at LOC room in ICC for IAGA and IASPEI 2001, Hanoi.
3. Presiding: Seiya Uyeda (RIKEN, Japan)
4. Summary of discussions

The purpose of the meeting was to have initial discussions on how to form and run the new WG . Considering the fact that the meeting participants were relatively few and not uniform in discipline and geography, the meeting was started with the understanding that no formal decisions were to be made.

1. Report by S. Uyeda

The proposal to form an Inter-Association (IAGA/IASPEI/IAVCEI) Working Group on Electromagnetic Studies of Earthquakes and Volcanoes made at the Birmingham IUGG General Assembly 1999 by Uyeda, Johnston, Zlotnicki, Sasai, Gokhberg and Spichak was approved by the July 2001 IUGG Executive Committee held at Sapporo.

The Terms of Reference set by the IUGG Executive Committee is as follows:

1. Purpose of the Working Group
 - a. To promote co-operation and collaboration between individuals and research groups, internationally, on observations and research into electric and magnetic effects associated with earthquakes and volcanoes.
 - b. To promote the dissemination and discussion of relevant data and research results.

2. Scientific Objectives

- a. To critically assess data providing evidence for electrical and magnetic effects associated with earthquake and volcanic activity.
- b. To investigate the physical mechanisms responsible for substantiated electrical and magnetic effects associated with earthquake and volcanic activity.
- c. To provide interpretations of the observed effects to advance understanding of earthquake and volcanic processes.
- d. To design experiments to optimise the collection of data critical to the understanding of mechanisms and processes.

3. Relationship of the Working Group to the Associations

- a. The Executive Committees of the sponsoring Associations shall each appoint one member to the Working Group who will be responsible for liaison with the relevant Association.*
- b. Annually, in December, the Working Group shall submit a report on its activities and achievements to the Secretary-General of each of the sponsoring Associations.
- c. The status of the Working Group shall be reviewed by the sponsoring Associations every two years.

*IAGA in Hanoi nominated Zlotnicki as IAGA representative to the WG, and Zlotnicki accepted.

4. Discussions

(a) WG I-2: Electromagnetic Induction and Electrical conductivity of IAGA Division I, which runs the Induction Workshops is a well-organized expert body. Why don't we join WG I-2 rather than forming another WG?

<-> WG I-2 is mainly concerned with resistivity structure (and its time variation). Resistivity is one of the items in our EM study of earthquakes and volcanoes.

<->Our WG is an Inter-Association one, while WG I-2 is within IAGA.

<-> However, it is very important for the new WG to cooperate with WG I-2.

(All agreed.)

(b) The word EM included in the group name is misleading.

<-> EM may be read Electric and Magnetic or Electric, Magnetic and Electro-magnetic.

(c) Our main fields of study should include earthquakes, volcanos and geothermal fields.

(d) Uyeda summarized some items to consider for the well balanced memberships of the WG, of which main objective is to promote "cross- communication" among different disciplines and geography. Namely, the balance between:

--> Theory (EM, solid state physics, statistics) and Experimental (field, lab.)

--> Solid Earth and Ionosphere (EM waves, satellite)

-->Time Change (tectonic and volcanic activity, co-earthquake and co-eruption changes) and and Structure

--> EM and non- EM studies (seismology, geodesy, geochemistry, fluids)

Projects to be encouraged are:

--> Assistance to developing countries

--> Developing International Interdisciplinary Projects.

5. Mailing list

We will first set up a mailing list of the WG, to which any interested scientist can join.

For this purpose, recipients of this e-mail are solicited to advise, via available mailing lists (e.g. mtnet), as many as possible scientists to indicate their intention to join the WG mailing list to Professor T. Nagao <nagao@scc.u-tokai.ac.jp> . Your prompt action is urgently requested.

6. Important workshops in 2002

Induction Workshop: Santa-Fe, USA, August, 2002.

The 3rd International Workshop on Magnetic, Electric and Electromagnetic Methods in Seismology and Volcanology: Moskow, Russia, September, 2002.

(The 4th Workshop will be held in France in 2004 (after J. Zlotnicki).)

7. Session in IUGG_2003 in Sapporo

Following the successful session on EM studies on earthquakes and volcanoes in Birmingham, the same joint-IAGA-IASPEI-IAVCEI session was proposed by M. J. S. Johnston (USA), Y. SASAI (Japan) and J. Zlotnicki (France). However, the initial proposal was strictly limited to the ground-based observations. In order not to exclude the participation of those who are working in the ionospheric and/or satellite studies, suggestion was made to modify the proposal. The two of the convenors, Zlotnicki and Sasai, who were at the discussion meeting, agreed with it*. The acceptance of this Inter-Association session will be decided around December this year by the IUGG Science Program Committee.

(* Also, Johnston agreed with the modified proposal.)

8. List of participants in this meeting:

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9. Materials or your information

(1) The proposal made at IUGG 1999 in Birmingham (EMSEV).

Joint IASPEI/IAGA/IAVCEI Inter-Association Commission on
Electromagnetic Studies of Earthquakes and Volcanoes
Background

Investigations of electromagnetic (EM) effects of earthquakes and volcanoes are currently being carried out by many diverse groups in many different countries within various sub-disciplines of geophysics (seismology, space physics, ionospheric physics, magnetotelluric monitoring, geodesy, geomagnetic observatories, etc). These groups are scattered, isolated and, in many cases, are unaware of data, theoretical constraints, observational constraints, experimental techniques and general information that may be obvious to others. What can appear to be an insurmountable problem in one group can be a solved problem to another? There is an urgent need to provide an internationally-based forum to reduce these problems and improve communication between these various groups. In particular, this commission would focus on:

- * Provision of cross-disciplinary communication, interaction and knowledge
- * identification of the critical problems facing the various sub-fields of these diverse groups, provision of available solutions and suggestions for solving these problems
- * integration of ideas and knowledge from the various disciplines (such as successfully attempted in IUGG inter-association symposiums during the past 12 years.)

We propose the formation of a joint Inter-Association (IAGA, IASPEI, and IAVCEI) commission or working group as the most obvious way to provide this forum. These associations provide the international organizational framework within which this effort can be made. The primary leadership would be S. Uyeda (IASPEI), M. Johnston (IAVCEI) and J. Zlotnicki (IAGA). Other participants would be Y. Sasai, M. Gokhberg, V. Spichak and others interested in solving these problems.

Aims

Our goal would be to understand the fundamental problems of EM phenomena related to earthquakes and volcanic processes.

In particular, we would wish to:

- * To provide a means of cross-disciplinary interaction, probably in the form of a WWW discussion group, to identify all the interested people and groups and allow discussion and integration of various ideas as viewed from the different areas of geophysics.
- * To provide cross-disciplinary feedback to the various groups on experimental techniques, theoretical ideas, current available processing, software, etc.
- * To provide a forum for exchange of ideas, suggestions for promising avenues of research and exchange of data.
- * To identify the critical problems currently facing this field and to provide ways in which suggestions for their solution can be proposed.
- * Formation of groups to focus on particular unsolved problems, such as 3-D electrical conductivity structure of volcanoes and active faults, rigorous statistical testing of proposed relations between satellite EM data, earthquakes and volcanoes, identification of the primary physical processes involved in these processes, etc. These groups would come together in specialist meetings, notably at the IUGG, IASPEI, IAGA and IAVCEI meetings.

Urgent Scientific Problems Needing Cross-disciplinary Input

- * Clear definition (amplitude, form, background physics, etc) of anomalies supposedly related to earthquakes and volcanic activity.
- * Quantification of background noise in satellite and ground-based EM measurements particularly before anomalies suggested to be related to earthquakes and volcanoes
- * Rigorous statistical analysis of the significance of possible relations between earthquake and volcanic behaviour and suggested anomalies.
- * Determination of methods for 3-D imaging and monitoring structure beneath volcanoes and active faults and determination of 3-D electrical conductivity structure on active faults and beneath volcanoes.
- * Determination of ways to express seismic parameters (energy, size, static and dynamic displacement amplitudes, etc) that allow realistic testing against observational parameters.

Products.

The expected products would be a data base of observational data related to this problem and special issues (publications in peer reviewed literature)

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(2) The modified proposal for the joint session at IUGG2003 in Sapporo:
<Seismo-, Volcano- and Tectono-Electromagnetic Effects.>

The realization that electromagnetic phenomena are generated by earthquakes, volcanic eruptions, other volcano processes, and aseismic fault failure has been the subject of intense interest during the past few years. These phenomena may arise directly and/or indirectly from source processes driving these tectonic events and may reflect the roles of fluids in active faulting and volcanism. Unfortunately, not all aspects of these measurements, or theories proposed to explain them, are well understood. This symposium will focus on four main areas of investigation:

1) Measurements of electromagnetic fields on active faults and volcanoes, remote sensing and ground based measurements related to tectonic processes,

(*originally: Measurements of electric and magnetic fields near active faults and on volcanoes,)

2) Controlled laboratory observations and observations from natural laboratories such as vents, dam loading/filling, and geothermal fields,

3) Theoretical considerations regarding source generation mechanisms.

4) Measurement resolution, data quality, identification separation and removal of spurious signal sources.

Each of these areas provide insight into, and quantification of, electromagnetic fields generated by earthquakes and volcanic eruptions.

Lead Convenor: Malcolm Johnston, Yoichi SASAI, Jacques Zlotnicki