

12th Business Meeting of IASPEI/IAGA/IAVCEI Inter-Association Working Group on Electromagnetic Studies of Earthquakes and Volcanoes (EMSEV)

August 28, 2009, Sopron, IAGA meeting, Hungary

1. Opening Remarks

Objectives

Activities

2. EMSEV structure

Membership and rules

For general information the EMSEV WG is composed of three bodies:

- The **Bureau** (Chairman: Jacques Zlotnicki, Vice-Chair: M. Johnston, Past Chair: S. Uyeda, Secretary: T. Nagao, IASPEI liaison: M. Johnston, IAVCEI liaison: Y. Sasai, IAGA liaison: J-L Liu, IAG WG1.2 representative: T. Harinarayana)
- The **EMSEV members**. There are 38 members (14 countries) with generally not more than five per country to ensure international and interdisciplinary balance.
- The **EMSEV corresponding members**, about 230 in number, include all (i.e., any number per country) who are interested in EM aspects of earthquakes and volcanoes and have joined the EMSEV mailing list.

Web Site

EMSEV organises the following site : <http://www.emsev-iugg.org/emsev/>

The site has 40GB capacity, if the corresponding members have any comments, please contact to the secretary.

3. Reports from liaison officers:

IASPEI - Malcolm Johnston (IASPEI liaison)

IAVCEI – Yoichi Sasai (IAVCEI liaison)

IAGA – Tiger Liu (IAGA Liaison)

WG I-2 (Electromagnetic Induction and Electrical Conductivity) – T. Harinarayana

I) 19th International workshop on ‘Electromagnetic induction in the earth

The main event of the 19th International workshop on ‘Electromagnetic induction in the earth’ during Oct. 23-29, 2008 was held at Beijing, China. There is an increase use of EM studies on both land as well as in marine environment, especially on Controlled Source ElectroMagnetics (CSEM). CSEM is coming in a big way by the commercial companies for oil exploration. The above workshop was inaugurated in Beijing on 24th Oct. 2008 at Jiuhua Resorts and Convention centre with 500 personnel participated which include, the participants, organizers and media. This workshop has deliberated for t 6 days on various aspects on the application for geothermal

resources, earthquake studies, mineral exploration, global models, laboratory studies, modeling studies etc.,.

The main event is preceeded by a data interpretation/training for 2 days mainly for the youngsters and followed by post-workshop at Chengdu institute of technology, Chengdu with a major focus on the tectonics of Tibet and Himalayan Orogeny. This post-workshop is followed by a field visit to the 8.3 Wenchuan earthquake area, south China. It is amazing to see the damage caused by this earthquake. The roads have been severely damaged and torn apart by about 2 -5 meters. At one place, two school buildings standing opposite to each other which were equal in size but due to the earthquake one of the building is uplifted by about 1.5 meters without falling!!! It is still standing like a monument.

II) The following 4 sessions are proposed to IUGG by the WG I-2 on Electromagnetic Induction in the Earth.

- (1) "Recent Advances in Electromagnetic Induction: near-surface environmental applications" by Gad El-Qady, Claudia M. Sainato, EL-Said Ragab
 - (2) "Recent Advances in Electromagnetic Induction: modeling and inversion " Gary Egbert, Ian Ferguson, Graham Hill, Malcolm Ingham
 - (3) "Recent Advances in Electromagnetic Induction: lithosphere and asthenosphere structures" Alan Jones, Kate Selway, K. Veeraswamy, Elena Sokolova
- Union session:
- (4) "Fluids in the deep crust to mantle: geodynamic consequences, geophysical constraints" Yasuo Ogawa

III) The next EMI workshop will be held near Cairo, Egypt during September, 2010.

4. EMSEV activities 2008 - 2009

4.1 2008 meetings

4.1.1 IWSEO2008 International Workshop on Seismo-Electromagnetic Observation Satellite, JAPAN, Feb. 29-March 1, 2008

(Secretary: Tetsuya Kodama, Chair and Co-chair: Kiyohumi Yumoto and Katsumi Hattori).

Cosponsored by EMSEV/IUGG an International Workshop on Seismo-Electromagnetic Observation Satellite, Japan on March 1, 2008 (Chair and Co-chair: Kiyohumi Yumoto and Katsumi Hattori)

At this session there were 5-6 speakers

4.1.2 EGU, Vienna, Austria, 13-18 April, 2008

Session NH5.1

Seismic hazard evaluation, precursory phenomena and reliability of prediction (Co-listed in SM & TS); Convener: Contadakis, M. Co-Convener: Biagi, P.; Zschau, J.

Session NH5.2

Electric, magnetic and electromagnetic phenomena related to earthquakes
Convener: Biagi, P., Co-Convener: Hayakawa, M.; Molchanov, O.; Vallianatos, F.

4.1.3 AOGS 2008 Meeting, Busan, Korea, July 16-20, 2008

Session ST-13

ST19 Mid- and Low-Latitude Ionosphere During Quiet and Disturbed Times

Convener: Liu, J. Y. Tiger, Co-Convener: Lin, C. H. Charles

Tiger presents: Ionospheric Earthquake Precursors of GPS TEC Observed in Taiwan during 2001-2007.

4.1.4 URSI GA 2008 Chicago, USA, 9-16 August 2008

Seismo-electromagnetics, Conveners: M. Parrot, S. Pulnits, O. Molchanov

4.1.5 IAVCEI 2008 Reykjavik, Iceland

Session: New insights from Electromagnetic (EM) Investigations of Active Volcanoes and Hydrothermal/Geothermal Fields. Conveners: J. Zlotnicki, M. Johnston and R. Karlsdottir.

Talks and posters were presented in three different sessions:

2-f: Advances in electromagnetic investigations of active volcanoes and hydrothermal fields

2-b: Integrated monitoring and modelling of volcanic activity

3-e: Volcanic and geothermal systems at the Earth's surface: From fumaroles and mudpools to volcanic lakes.

J. Zlotnicki and M Johnston attended a meeting with the IAVCEI executive committee headed by Joan Marti who expressed support for our efforts, particularly in under developed countries.

4.1.6 EMSEV-DEMETER 2008 Sinaia, Romania; September 7-12, 2008

LOC-chair: Dimitru Stanica

The Workshop was organized in six sessions:

1. Seismicity and seismotectonics of Vrancea zone. Inter-correlation with other seismogenic zones
 2. Electric, magnetic, and electromagnetic methods related to earthquakes, tsunamis, volcanic eruptions, landslides and geothermal activities
 3. Integration of multi-technique monitoring. Cross-correlation between ground and satellite observations
 4. Generation and propagation mechanism of EM signals, and related laboratory experiments
 5. Study of ionospheric perturbations, GPS based measurements
 6. Imaging active faults, volcanoes, landslides and geothermal fields by EM methods.
- Integration of other methods: geophysical, geochemical, geological, etc.

The Workshop sessions included 48-scientific presentations and stimulating discussion.

The papers were presented by scientists from 13 countries – China, Czech Republic, France, Greece, India, Iran, Italy, Japan, Poland, Romania, Russia, USA and Taiwan.

4.1.7 AGU Fall meeting, USA, Dec. 2008

The session of interest was “Search for Large Earthquake Precursors from Space and Ground Observations”, convened by: Dimitar Ouzounov, Patrick Taylor, Sergey Pulnits, J.Y. Liu, Katsumi Hattori, and Michel Parrot. In order to provide wider exposure, a number of invited papers were planned.

4.2 2009 meetings

4.2.1 IASPEI General Assembly, Capetown, South Africa, 10-16 January, 2009

Malcolm Johnston represented EMSEV. Sessions of interest to EMSEV were:

1. *Earthquake source and prediction*

Symposium on Earthquake sources: Modeling and Monitoring for Prediction

Geophysical anomalies and Earthquake prediction

Prospective Testing of Earthquake and Faulting Probability Models

2. *Hazard and risk*

Earthquake Hazard

Earthquake Risk

Workshop "Effects of Surface Geology"

Seismic Source Modeling and Ground Motion Prediction

Earthquake Risk Reduction and Preparedness: Socio-economic aspects, particularly in developing countries

3. *Applied geophysics*

Electromagnetic prospecting and crustal structures

4.2.2 EGU, Vienna, Austria, 19-24 April, 2009

EMSEV members were active in the organization of three sessions:

NH5.2/SM4.6

Seismic hazard evaluation, precursory phenomena and reliability of prediction

Convener: M. E. Contadakis, Co-Conveners: P.F. Biagi, J. Zschau

NH5.3/SM6.3

Electric, magnetic and electro-magnetic phenomena related to earthquakes

Convener: P.F. Biagi, Co-Conveners: M. Hayakawa, O. Molchanov

NH5.4/SM6.5

Deformation processes and accompanying mechanical and electromagnetic phenomena, for rocks and other materials, from the laboratory to the geophysical scale

Convener: K. Eftaxias, Co-Conveners: T.L. Chelidze, Dr. Nomicos

4.2.3 2009 International Workshop on Validation of Earthquake Precursors by Satellite, Terrestrial and other Observations (VESTO). Case studies of the recent Asian events, Chiba University, and Japan March 26-28, 2009

This workshop was organized in the frame of EMSEV activities.

Organization: Dimitar Ouzounov, Katsumi Hattori and Tiger Liu

The aim of this workshop was to provide a forum for discussion and exchange of different experience in the science and cross validation of earthquake related signals. The main goal of this meeting was to cross-examine the results of precursory detection for several major earthquakes by applying different methodologies for analysis of ground-based and satellite data for the four major most recent earthquakes in Asia. VESTO LOC has proposed four major earthquakes for common validation: (1) Sumatra (Indonesia) 2004.12.26 M9.2; (2) Ping Tong (Taiwan) 2006.12.26 M7.0×2; (3) Chuetsu Oki (Japan) 2007.7.16 M6.8 and (4) Wenchuan (China) 2008.5.12 M7.9.

4.2.4 Second International Seminar on Prediction of Earthquakes, Lisbon, Portugal, 29-30 April, 2009

Jacques Zlotnicki represented EMSEV.

In the frame of the Year of the Planet Earth, a second International Seminar on Prediction of Earthquakes was held in Lisbon on April 29-30, 2009. It was held during the 100th anniversary of the Benavente 1909 earthquake ('1909 Lisbon Earthquake'). The objectives were to (i) provide the largest platform for discussing observations made along active faults, (ii) to state the level of knowledge in the prediction of earthquakes, and (iii) to promote international cooperation in the field of earthquakes prediction. Plenary sessions were devoted to advanced research:

- In seismology (Giuliano Panza), from statistic evaluations of impending earthquakes based on different word-scale software to the evaluation of the predictability of earthquakes,
- In electromagnetism (Jacques Zlotnicki) where recent progresses in the analysis of observations have been highlighted,
- In multi-parametric observations (Max Wyss, Heiko Woith) in which cross-correlation of data allows determine the sensitivity of methods applied to Earthquake monitoring (gas, fluid, geodesy, seismicity ...),
- In paleoseismology (Tom Rockwell) which has shown the applications in the long term forecasts of large earthquakes.

The conclusions and recommendations of the meeting were that earthquake prediction research has made progress in the last decades, but earthquake prediction remains an unsolved domain. The earthquake prediction requires an international coordinate strategy in which multi-disciplinary co-operation should be promoted.

4.2.5 International Conference “Electronic Geophysical Year: State of the Art and Results”, Pereslavl-Zalessky, Russia, 3-6 June 2009

<http://elpub.wdcb.ru/ebooks/absegy.pdf>

Jacques Zlotnicki represented EMSEV.

Among the topics reported during the conference, several of them were in the scope of EMSEV activities: GIS and artificial intelligence methods in geoscience; problems of geoinformatics in seismology, data processing and signal recognition, and geoecology, transition of World Data Centers into the World Data System as well as geomagnetic observations, and virtual observatories. About 150 attendees from Russia, Austria, Germany, USA, Iran, Slovakia, Ukraine and France held over 120 presentations at six scientific sessions.

4.2.6 AOGS 2009 meeting, Singapore, 11-15 August, 2009

The Philippines Institute of Volcanology and Seismology presented one talk on PHIVOLCS-EMSEV observations on Taal volcano.

Session: IWG07 (Propose specifically representing EMSEV)

Seismo Electromagnetics: Lithosphere-Atmosphere-Ionosphere Coupling

Convener: Katsumi Hattori, Co-Convener: Liu, Jann-Yenq (Tiger), Huang, Qinghua

Session description: There have been accumulated a lot of convincing results on electromagnetic effects associated with earthquakes, and these electromagnetic phenomena are considered as useful for short-term earthquake prediction. The aim of this session is to have a forum to highlight the electromagnetic phenomena associated with crustal activity taking place in the lithosphere, atmosphere and ionosphere/magnetosphere and their related phenomena. The session is planned to evaluate and discuss the state of

the art and the recent progress in Seismo-Electromagnetics research. The scope of this session is in the following;

- Ground-based earthquake-related electromagnetic phenomena
- Ground-based volcano-related electromagnetic phenomena
- Satellite based earthquake/volcano-related phenomena
- Signal Processing
- Observation / Instrumentation / Data integration
- Physical mechanism / Theory
- Lithosphere-Atmosphere-Ionosphere Coupling
- Space weather and Lithosphere weather
- others

13 oral and 4 poster papers were accepted and presented.

4.2.7 XIth IAGA 2009 meeting, Sopron, Hungary, 23-30 August, 2009

Session I06 is organized by T. Harinarayana and Y. Ogawa.

Crustal tectonic processes constrained by electromagnetic observations

Topic: Study of the crustal processes helps to delineate the natural resources, seismically active zones, geothermal regions etc. The session is devoted to research contribution of electromagnetic studies in resolving structural features of crust ranging from Archean to Recent in age. Recent review paper on EM investigations of the lithosphere in Europe provided an overview of the large-scale EM surveys on a regional scale. We particularly invite such large scale studies. The session also addressed the role of EM in monitoring crustal processes. EM monitoring of seismic and volcanic processes have examined correlation of electrical resistivity models with crustal melting, seismicity, and fault zones.

XIIth EMSEV business meeting will be held on Friday Aug. 28.

4.2.8 AGU 2008 Fall meeting, San Fransisco, 14-18 December 2009

Two sessions will held in the EM field.

NH11: Terrestrial and Satellite Observation Related to Abruzzo M6.3 Earthquake of April 6, 2009

http://www.agu.org/meetings/fm09/program/scientific_session_search.php?show=detail&sessid=402

Description: The 2009 L'Aquila earthquake was an earthquake of magnitude 6.3 that occurred in the central Italian region of Abruzzo on 6 April 2009, following a series of hundred minor aftershocks. The majority of the damage occurred in the medieval city of L'Aquila (capital city of the Abruzzo region) and the surrounding villages. About 300 people are known to have died, making this the deadliest earthquake to hit Italy since the 1980 Irpinia earthquake. The cost to human life of such events is another indication to the science community that development of an earthquake risk management scheme requires diverse interdisciplinary efforts. Main scope of the proposed session is to introduce interdisciplinary approach of studying M6.3 Abruzzo event from multiple satellite and terrestrial observations. The science community and the operational agencies are struggling with how to provide early detection of such catastrophic events and reduce the loss to humans and property. The recent advances in solid earth sciences and remote sensing capabilities make the multidisciplinary approach possible and could provide additional information to the other methods of monitoring and early detection of earth movement, such as GPS and InSAR. Topics of this session are extending the discussion

about M6.3 Abruzzo earthquake proposed by the Union session "An Earthquake in an Ancient City: the April 2009 L'Aquila (Central Italy) Seismic Sequence" and include geophysical imaging of active faults, satellite thermal imaging, electromagnetic, geochemical and gas observation, atmospheric, ionospheric and GPS/TEC observations. The papers are invited from international community composed of scientists, decision-makers, first responders, and operations experts who are involved in new space- and ground-based observation related to disaster risk management. Conveners: Pier Francesco Biagi, Vincenzo Lapenna, Dimitar Ouzounov, Valerio Tramutoli

NH12: *Multidisciplinary Approach for Earthquake Precursors Validation*

http://www.agu.org/meetings/fm09/program/scientific_session_search.php?show=detail&sessid=403

Description: Within the last several years there have been major earthquakes that caused great devastation and significant loss of life. We propose this session to validate the results of precursory detection for major earthquakes by using different methodologies with the hope that development of such a multidisciplinary approach could provide significant early warnings for such catastrophic events such as the recent M7.8 earthquake in Sichuan, China and M6.3 earthquake in Abruzzo Region, Italy. The observational evidence from the last twenty years suggests the existence of geochemical, atmospheric, ionospheric and electromagnetic phenomena accompanying or preceding some earthquakes. Recent studies, presented at the 2009 International Workshop on Earthquake precursor Validation (VESTO) in Japan, provided new evidence for a distinct coupling between the atmospheric boundary layer and the ionosphere, which are strongly related to an enhanced tectonic activity. Still, more validation work in this area is needed to address the concerns of some in the science community that is whether such signals actually precede and were related with these earthquakes. Topics include case studies related to investigating large earthquakes, statistical theory of precursor validation, reanalysis and new observations and a theory relating tectonic stress changes to electrical, electrochemical and thermodynamic processes. Contributions are also solicited on all possible new space- and ground-based methodologies of studying earthquake related phenomena. Conveners: Dimitar Ouzounov, Sergey Pulinet, Michel Parrot, J Y Liu, Katsumi Hattori

4.3 2009 EMSEV activity on Taal volcano (Philippines)

4.3.1 Frame of the cooperation

The Philippines is a highly populated developing country that faces serious Natural Hazards from Volcanic Eruptions and Earthquakes. Risk assessment is a key issue for Civil Authorities and Official Institutions (such as the Philippines Institute of Volcanology and Seismology - PHILVOCS) responsible for delivering reliable information on volcanic unrest and potential earthquakes. In 2004, a PHIVOLCS-EMSEV agreement was signed. The common objective of PHIVOLCS and EMSEV is to develop a new scientific community of both young and experienced Philippine scientists who are skilled in EM methods for the study of volcanoes and earthquakes. The rational way to achieve this objective is to combine EM methods with other geophysical methods to study known geophysical hazards. Priority was given to Taal volcano which has exhibited signs of unrest since 1992. The surrounding population exceeds several hundreds of thousands of local inhabitants.

Since 2005, an international Japan-French EMSEV team has visited Taal about twice a year with a PHIVOLCS EM team with the objectives to understand the structure, the dynamism and the heat and fluid transfers, as well as to monitor the volcano activity.

4.4 IUGG two years grant (Sept. 2008 – Aug. 2010)

EMSEV submitted one proposal to IUGG based on the on-going cooperation with PHIVOLCS, which is “Monitoring Taal volcano unrest in Philippines based on a joint Electromagnetic and multi-disciplinary educational EMSEV-PHIVOLCS program”. The IAGA and IAVCEI Associations supported the project. IUGG Executive Committee, at its meeting in Karlsruhe in August 2008, reviewed the recommendation of the IUGG Bureau regarding the project and decided to award the project. The amount of the IUGG grant is US\$9,300 for the 2 years project. In addition to the research and training program, EMSEV will organize a workshop focused on training young scientists in Asian countries.

4.4.1 2008-2009 activity

EMSEV-PHIVOLCS have focused their studies on:

- Large scale self-potential, magnetic, electric resistivity surveys for mapping the upper part of the hydrothermal system, the fissures from which magmatic/hydrothermal gases escape, and the hydrothermally altered areas which can collapse into the crater owing to mechanical instability.
- Large scale temperature and degassing surveys on the ground and in the Crater Lake. Results will provide information on the thermal state of the volcano and on its changes with time.
- The bathymetry and the surface temperature of the Main Crater Lake.

In addition, an EM network based on multi-parametric stations is continuously upgraded:

- Two continuous stations located inside and outside the crater records the electric and magnetic fields, the ground temperature and the gradients, the seismic noise (RMS). The data of these stations are telemetered in real time at the local observatory where a first level analysis is done, before an internet transfer to PHIVOLCS headquarter and France.
- Two proton precession magnetometers are continuously recording the total magnetic field inside and outside the crater.
- One continuous station is recording the temperature and the water level of the Main Crater Lake.

4.4.2 2010 activity

Field work and volcano monitoring

In the frame of IUGG grant, EMSEV will extend the EM surveys on the volcano and will provide further equipments for monitoring Taal volcano, as a three component borehole seismometer granted by USGS (Malcolm Johnston).

Real time data collection, processing and analyzing will be further developed and a common GIS will be installed.

In addition, the Japanese team (T. Nagao) has obtained a 5 years support from JICA to install new total and three components magnetometers.

2010 EMSEV-PHIVOLCS Workshop

A second International workshop is scheduled to be organized in Manila in January-February 2010. This will be followed by field excursions and campaigns.

Asian researchers will be invited to this workshop as well as several experienced foreign researchers who will provide lectures and teaching.

About 10 to 20 foreign researchers could attend the meeting, while 20 to 40 participants from Philippines could benefit from the workshop content.

5. Plans for 2010 meetings

5.1 PHILVOLCS-EMSEV meeting 2010:

In the frame of “Monitoring Taal volcano unrest in Philippines based on a joint Electromagnetic and multi-disciplinary educational EMSEV-PHIVOLCS program”, a specific workshop will be held at the beginning of 2010 (January-February) at PHIVOLCS headquarter, Manila.

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5.2 EGU meeting, Vienna, Austria, 2-5, May, 2010

One session is already scheduled by EMSEV:

Applications of integrated electromagnetic and other geophysical methods on active volcanoes

The aim of the session is the application of multi-methodological geophysical methods based on electromagnetic (EM) and other geophysical methods to volcanic unrests and related natural hazards. Combined methods are the most efficient approach for understanding the physical structure and the dynamics of active volcanoes, reducing interpretative ambiguities. In order to highlight the state of art in these domains, the session will focus on:

- Tomography of active volcanoes and geothermal fields by multi-parametric methods,
- EM observations along with other geophysical methods,
- Advanced electromagnetic and potential field methods in integrated time series inversion,
- Advanced technologies for processing time series of EM and potential fields,
- Development of automatic data processing; adaptation of monitoring systems and analyses in real time,
- Modelling volcanic unrests and predictability

Convenors: J. Zlotnicki and Ciro Del Negro

5.3 Cities on Volcanoes, COV6-Tenerife 2010, Tenerife, Canary Islands, Spain, May 31 – June 4, 2010

CoV6-Tenerife 2010 is planned as an international forum on volcanic risk management. Scientific and technical sessions are planned to bring together geoscientists working on active volcanoes, authorities, civil protection specialists, city planners, social scientists, economists, psychologists, educators, health specialists, engineers, mass media and general members of communities living in active volcanoes to exchange and understand their experiences and knowledge in order to evaluate and improve prevention/mitigation actions, land-use planning, emergency management, and all required measurements to improve volcanic risk management in densely populated volcanic regions.

COV6 organizing committee accepted a session led by EMSEV.

Electromagnetic and other geophysical methods for monitoring and predicting volcanic eruptions.

ElectroMagnetic (EM) fields are particularly sensitive to rather shallower parts of a volcano because of their penetration depth. They often manifest anomalous changes simultaneously with geochemistry, temperature and potential field signals. EM observations are mainly based on the detection of signals in (1) the geomagnetic field, (2) the electrical resistivity, (3) the self electric potential (SP) and (4) the EM emissions. Volcanic eruptions generate various kinds of EM signals, from the ground to the ionosphere, which can also be detected by satellites as GPS-TEC or DEMETER observations. Combined EM methods turn into a very powerful tool for volcano monitoring when other geochemical and geophysical observations are associated. Also, EM methods can be effective for monitoring phreatic explosions, which sometimes show no mechanical forerunners.

This session will focus on:

- Volcano structure as revealed by combined EM and other geophysical methods.
- Geochemistry and thermal budget of sources for volcano-EM signals.
- Joint EM, geochemical and geophysical observations.
- Joint modelling of EM and other geophysical data.
- Advanced technologies for time series analyses of EM signals.
- EM and other signals related to phreatic and phreato-magmatic explosions.
- Satellite and other remote sensing of EM signals related to volcanic activities.
- EM emissions related to volcanic eruptions and pyroclastic flows.
- Mapping volcanic hazards by EM, geochemical and geophysical methods.

Convenors: Yoichi Sasai, Jacques Zlotnicki

5.4 20th electromagnetic induction workshop, Egypt, 15-28 September, 2010

The workshop is organized by the National Research Institute of Astronomy and Geophysics NRIAG, India and by Prof T. Harinarayana (thari54@yahoo.com).

5.5 EMSEV 2010 meeting, Chapman University, Santa Ana, USA, August/October 2010

Prof. R.P Singh is in charge to organize the next EMSEV meeting which will be held in South California. **This international EMSEV will be held between October 3 and 6, 2010.**

The content and the scientific program are in process and will be available soon on the Web. Information will be provided by through EMSEV Web site as soon as possible.

5.6 DEMETER meeting

At present, CNES is scheduled to end the Demeter mission after July 2010. An international meeting similar to the one in Toulouse in 2006 is planned by CNES and the main proponents of the project.

Contact: M. Parrot (mparrot@cnrs-orleans.fr).

5.7 AGU Fall Meeting, San Francisco, December 2010

6. Plans for 2011

EMSEV is solidly focused on the IUGG General Assembly in Melbourne, Australia (27 June – 8 July, 2011)

Four sessions have been proposed. They will be submitted to IUGG during IAGA 2009 meeting.

EMSEV session1; EM, Active tectonic and surface processes

Title: Electromagnetic Studies of Earthquakes, Active Faulting and Tsunamis

The realization that earthquakes, aseismic fault failure and tsunamis generate electromagnetic phenomena has been the subject of intense interest during the past few years. Crustal phenomena may arise directly and/or indirectly from source processes driving these tectonic events and may reflect the roles of fluids in active faulting. Unfortunately, not all aspects of these measurements, or theories proposed to explain them, are well understood. Tsunami effects arise from the movement of conducting seawater in the Earth's magnetic field.

This symposium will focus on the following four main areas of investigation:

- Measurements of electric and magnetic fields near active faults and with tsunamis
- Controlled laboratory observations and observations from natural laboratories such as locked faults, slipping faults and stress from dam loading/filling,
- Theoretical considerations regarding source generation mechanisms.
- Measurement resolution, data quality, identification separation and removal of spurious signal sources.

Each of these areas provides insight into, and quantification of, electromagnetic fields generated by earthquakes and tsunamis.

Conveners:

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EMSEV session2; EM, remote sensing of active processes

Title: Electromagnetic studies of active processes using space technology

Observations of electromagnetic phenomena associated with seismic and volcanic activities have been reported for many years. Perturbations occur not only in the lithosphere but also in the atmosphere and ionosphere, leading to the generation of a new science field, lithosphere-atmosphere-ionosphere coupling. This session will accept papers dealing with new observational findings on the seismic effects with satellites. Contributions along the following lines are also encouraged:

- The TEC variation provided by GPS satellites,
- Coordinated satellite and ground-based EM experiments.

Conveners:

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EMSEV session3; EM, Imaging and monitoring volcanic activity

Title: Imaging and monitoring active volcanoes and geothermal fields by ElectroMagnetic (EM) and other geophysical techniques

Electromagnetic methods have been intensively applied to volcanic systems, hydrothermal and geothermal fields for understanding the structure and tectonic setting, and for monitoring

the activity. Analyses of long time series undoubtedly show that magnetic and electric effects can precede volcanic eruptions, and geothermal activities. The development of new technologies and methodologies allows us to clarify the relationships among magmatic, hydrothermal, environmental and mechanical processes. Combination of land and satellite EM studies with other geophysical observations could also drastically improve the description and understanding of on-going processes.

The session will focus on the following lines:

- EM tomography and modelling of volcanic/geothermal environments,
- Integrated EM monitoring such as self-potential, magnetic, electric, magnetotelluric, combined with satellite observations,
- Joint EM, geochemical, thermal, ground deformation and seismic observations,
- Laboratory experiments and physical mechanisms of EM generation processes,
- Modelling of volcanic activity,

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EMSEV session4; EM and other possible precursors to Earthquakes: mechanisms and modelling

Title: Towards short-term earthquake prediction - Electromagnetic and other possible precursors and their generation mechanisms

It is generally believed that the achievement of the short-term earthquake prediction is very difficult. However, this topic is one of the ultimate goals of the solid earth sciences. Furthermore, to achieve short-term prediction, the unambiguous identification of precursory phenomena is essential.

During the past few decades, there have been strong arguments about the reality of the existence of “reliable” precursory phenomena. In this session, we would like to focus not only on electromagnetic “precursors” but all suggestions of “reliable” earthquake precursors.

Most important will be evidence showing clear uniqueness of these signals in the long-term record, relation to other independent geophysical data and their generation mechanisms. Thus, we would like to discuss the following topics from a critical points of view.

- 1) All kinds of evidences of precursory phenomena, involving seismic, geodetic, geochemical, hydrological, in addition to electromagnetic anomalies, and their inter-relationships.
- 2) Theoretical models and lab experiments to explain the physical mechanisms behind precursory phenomena.
- 3) Study of various data bases with new procedures (e.g. critical approach).

Convenor:

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7. IUGG Grants Program 2008-2011

7-a EMSEV submitted one proposal to IUGG based on the on-going cooperation with PHIVOLCS on volcanoes “Monitoring Taal volcano unrest in Philippines based on a joint Electromagnetic and multi-disciplinary educational EMSEV-PHIVOLCS program”

The IAGA and IAVCEI Associations supported the project.

IUGG Executive Committee, at its meeting in Karlsruhe in August 2008, reviewed the recommendation of the IUGG Bureau regarding the project and decided to award the project. The amount of the IUGG grant is US\$9,300 for the 2 years project. In addition to the research and training program, EMSEV will organise a small workshop.

7-b In July, EMSEV and PHIVOLCS signed a memorandum Memorandum of Agreement on the Use of Geomagnetic Data from Muntinlupa Magnetic Observatory (Philippines) National Mapping and Resource Information Authority (NAMRIA), The Ocean Hemisphere Research Center, Earthquake Research Institute (OHRC-ERI), the Philippine Institute of Volcanology and Seismology (PHIVOLCS), the IUGG Inter-Associations Working Group on Electro-magnetic Study of Earthquakes and Volcanoes (IUGG-EMSEV).

8. EMSEV Budget

8.1 EMSEV general activities

8.1.1 2008 Support

- IUGG, EMSEV general activity: received 1380 Euros (\$2000)
- IAGA, International cooperation: received 710 Euros (\$1,000)
- IASPEI, Developing countries: received \$1,000

8.1.2 EMSEV 2008 Balance

Outgoing

- Support to PHIVOLCS (2007: rubber boat): 795 Euros
- EMSEV 2008: IUGG support to participants: 320 Euros
- IASPEI support to developing countries: \$1000 (borehole seismometer)

Remaining budget on December, 2008 for EMSEV general activities:

- \$2,300
- 975 Euros

8.1.3 2009 Support

- IUGG, EMSEV general activity: received 1424 Euros (\$2000)
- IAGA, International cooperation: received 755 Euros (\$1,000)

8.1.4 EMSEV 2009 Balance

Outgoing

- Support to VESTO: 950 Euros

Remaining budget on August, 2009 for EMSEV general activities:

- \$1,000
- 3236 Euros (\$1,300 transferred in Euros: 1032 Euros)

8.1.5 Proposed expenditures at EMSEV meeting (Sept.10)

General activities and researches

EMSEV 2010

Cities on Volcanoes (EMSEV session)

DEMETER

EMSEV-PHIVOLCS Workshop

8.2 IUGG grant for Taal

8.1.1 First year support

September 2008: \$5,000 (3890 Euros)

8.1.2 First year balance

Outgoing

- February 2009 field experiment in Philippines: 725.43 Euros

Remaining budget on August, 2009: 3164.57 Euros

8.1.3 Next expenditures

- October 2009 field experiment in Philippines: 1200 Euros

[Local expenditures, infrastructures, batteries, renting boats, horses, man power, borehole tiltmeter, etc]

- October 2009; preparation to EMSEV-PHIVOLCS 2010 meeting Philippines: 1500 Euros

9. New memberships

During last EMSEV business meeting held at Sinaia, Romania, it was decided to strong and active, Seiya Uyeda suggested we continue to update our EMSEV members list with active researchers in the EM fields, taking into account some balance between representative between different countries. The following were nominated as new members:

Dr. Renato Solidum, Jr. (PHILVOCS, Phillipines) as national representative of Phillipines EM survey.

Prof. Zhao, Guoze (China Earthquakes Networks Center, CEA). Chairman of geoelectric committee, Chinese Geophysical Society.

Prof. Lu, Jun (China Earthquakes Networks Center, CEA). Leader of earthquake prediction efforts using geoelectric methods at CEA.

Prof. Du Xuebin (China Earthquake Administration – Lanzhou). Leader of geoelectric data and processing.

It was also decided that the following would be rotated off the membership list:

Zeng, Xiaoping, China Seismological Bureau, China

Zhan, Zhijia, China Seismological Bureau, China

Shapiro, Vsevolod, Inst. of Geophysics, Urals Dept. of RAS, Russia

There was some discussion about the nomination concerning the nomination of a new Italian representative. It was suggested that the Italian delegation should decide who could be the most appropriate representative in the frame of the balance between disciplines in the actual EMSEV structure. J. Zlotnicki received a proposal from Director of INGV-Roma:

“In case you need to elect new active EMSEV members and/or rotate off some national representatives, in order to keeping a strong and powerful organization, I have a suggestion to nominate a new member that could also act as a representative for Italy.

I point to your attention the possibility of taking advantage of the great experience in the field of EMSEV of Ciro Del Negro at INGV, Sezione di Catania, Italy. Ciro is a widely well known expert in the studies of volcanoes from the integrated EM monitoring systems and data analyses to the knowledge of the physical mechanisms that bring to research results.”

Therefore, a vote should be suitable to accept Ciro Del Negro as new EMSEV member.

Last year, T. Nagao and S. Uyeda visited Bishkek laboratory (Kyrgyz) and the test site on which a large-scale active EM monitoring is operating.

Both T. Nagao and S. Uyeda would like to propose adding one WG-member from Kyrgyz: Dr. Anatoly Rybin, the director of Research Station RAS in Bishkek. He is also in charge of the EM survey. Dr. Rybin will attend the IAGA GA, and the business meeting where he can give us a short summary of his activities.

10. New EMSEV activities

11. Free Discussion