

# **2010 EMSEV Annual Report**

## **1. INTRODUCTION**

The Inter-Association Working Group of Electromagnetic Studies on Earthquakes and Volcanoes (EMSEV) is supported by IAGA, IAVCEI and IASPEI Associations under IUGG. EMSEV focuses on the physics, monitoring and interpretation of electromagnetic (EM) phenomena of earthquakes and volcanic eruptions (<http://www.emsev-iugg.org/emsev/>).

The main objectives of EMSEV are (i) to promote international co-operation and develop collaboration between individuals and research groups focused on observations and research into electric and magnetic effects associated with earthquakes and volcanoes, (ii) to develop EM methods in developing countries based on joint field campaigns, workshops and educational plans and (iii) to support the dissemination and discussion of relevant data and research results.

EMSEV is very active in the organization of international and regional meetings, specialized sessions workshops and assemblies as well. During these conferences and the business meetings, EMSEV promote new directions of research and encourage international projects with developing countries.

## **2. ADMINISTRATION**

EMSEV is composed of an elected executive bureau, a nominated assembly of members, and the community interested in electromagnetic phenomena, called corresponding members.

The bureau consists of a Chairperson (J. Zlotnicki), a Vice-Chairperson (M.J.S. Johnston), the past Chairperson (S. Uyeda), a Secretary (T. Nagao), liaison members from IAGA (T. Liu), IAVCEI (Y. Sasai) and IASEPI (M.J.S. Johnston), and a corresponding liaison member from IAGA WG1-2 (T. Harinarayana).

The WG members are nominated for their expertise in the EM field, and their scientific activity. They are nominated during EMSEV business meetings. Now, they are 44 working group members from 16 countries (China, France, Greece, India, Indonesia, Italy, Japan, Kyrgyz, Philippines, Poland, Romania, Russia, Taiwan, Turkey, Ukraine, and USA).

The number of corresponding members has crossed 264.

In 2010, EMSEV hold the XIII<sup>th</sup> business meeting during EMSEV International workshop at Santa-Ana, USA during Oct. 3-6. In this meeting, new directions of research in EM field were discussed. There was discussion on initiation of new projects. It is proposed and accepted to start a new project by EMSEV on the physics of EM signals generated by large earthquakes. Annual reports, minutes of the business meetings and activities on the Working Group can be found on EMSEV web site (<http://www.emsev-iugg.org/emsev/>).

## **3. ACTIVITIES**

EMSEV is very productive during the year 2010. For example,

- EMSEV and the Philippines Institute of Volcanology and Seismology (PHIVOLCS, <http://www.phivolcs.dost.gov.ph>) hold an International Workshop entitled 'Monitoring active volcanoes by electromagnetic and other geophysical methods – Application to Asian volcanoes' in Quezon City (Feb. 24-27, Quezon City). About 60 participants were present. The workshop was followed by 2 weeks of joint field work on Taal volcano.

- 2008 EMSEV workshop and meeting held at Sinaia (Romania). The 2010 International EMSEV workshop was organized at Chapman University (USA, October 3-6; <http://sites.google.com/site/emsev2010/>) by Professor R.P. Singh. About 55 participants from 12 countries (Japan, France, Italy, Romania, Poland, India, Russia, Ukraine, New Zealand, China, Mexico and US) have participated in the meeting. A total of 67 abstracts were presented in oral or poster sessions, devoted to the following six sessions: 'Seismicity, Geophysical and Seismo-electromagnetic studies', '2009 L'Aquila Earthquake and San-Andreas Fault', 'Electric, magnetic, and electromagnetic methods related to earthquakes, tsunamis, volcanic, landslides and geothermal activities', 'Techniques for Correction of EM data and Identification of EM Signals Associated with Earthquakes and Volcanoes', 'Generation and Propagation Mechanisms of EM signals and Laboratory Studies', and 'Ionospheric and GPS studies associated with Seismo-electromagnetic Processes'.

- EMSEV is also active in organizing specific sessions in international meetings like:

*EGU, Vienna, May 2-7, 2010*

*COV6 (Cities on Volcanoes 6), Tenerife Island, Spain, May 31-June 4, 2010*

*AOGS, Hyderabad, India, 5-9 July 2010*

*AP-RASC (Asia-Pacific Radio Science Conf.), Toyama, Japan September 22-24, 2010*

*AGU, San Francisco, USA, December 13-17, 2010*

EMSEV sincerely makes efforts for promotion of scientific projects at international scale with well-recognized Institutes in developing countries. One such project was initiated in 2004 on Taal volcano in the Philippines with PHIVOLCS, and one is now on the way to be launched with Bishkek Institute in Kyrgistan.

- In Volcanology sector, EMSEV has started a cooperation with PHIVOLCS (<http://www.phivolcs.dost.gov.ph/>) on Taal volcano in November 2004. The objectives are a) to get a better knowledge of the volcano structure and tectonic setting, b) to develop a strong EM community in the Philippines, and c) to monitor the activity of the volcano. About twice a year, joint EMSEV-PHIVOLCS field works are organized. IUGG has granted EMSEV in 2008 for a two years project. During these two years, bathymetry, magnetic, electric, resistivity, and temperatures mappings of the Crater Lake and also on land are achieved. Considerable effort was made for developing a multi-parametric real time monitoring network including electric, magnetic, ground temperature and gradient, seismic noise, deformation and Rn emission. As of now, the international cooperation involves scientific teams from Japan, France, USA, Greece, Italy, and Belgium. A new Memorandum of Agreement was signed for the next 5-years between PHIVOLCS and EMSEV. It is a standing example of long term and successful cooperation.

In the study of active faulting, we plan for better understanding of the interrelation between the changes in the electrical conductivity structure associated with seismic activity with the Bishkek experimental high power current ejection system.

The following target experiments are discussed:

- 3D modeling of the source region(s) where electrical conductivity changes are occurring,
- Detailed investigation of correlation between electrical conductivity changes and seismicity,
- Electromagnetic triggering processes and their implications,
- Distortion of electrical signals by regional tectonics and faults systems,
- Independent checking of VAN'S SES observations outside Greece,
- Physical mechanisms of EM signals generated by the MHD-generator.

Realizing the importance of the experiment, we propose to organize an international cooperation agreement between the Bishkek Institute and the EMSEV working group. Within the framework of this agreement, EMSEV members will visit and conduct joint experiments with the Bishkek Institute.

#### **4. PLANNED FUTURE ACTIVITIES/ ANNOUNCEMENTS**

In 2011, EMSEV will be involved in all important international meetings. For example in:

- EGU meeting, Vienna, Austria, 3-8 April 2011
- IUGG GA, 27 June – 8 July 2011, Melbourne, Australia

Four sessions are being organized under EMSEV responsibility in association with other organizations and one session by one EMSEV member. Following are the details:

J-S09: Electromagnetic Studies of Earthquakes, Active Faulting and Tsunamis [Convenors: M. Johnston, T. Harinarayana]; J-S10: Electromagnetic studies of active processes using space technology [Convenors: M. Parrot, Y. Hobara]; J-S11: Imaging and monitoring active volcanoes and geothermal fields by ElectroMagnetic (EM) and other geophysical techniques [Convenors: J. Zlotnicki, Y. Sasai, V. Spichak]; J-S12 : Towards short-term earthquake prediction - Electromagnetic and other possible precursors and their generation mechanisms [Convenors: T. Nagao, K. Eftaxia, F. Freund]; J-A04 : Electromagnetic oscillations from space to Earth: Celebrating 150 years and recent developments in ultra-low frequency wave research [Convenors: B.J. Fraser, M.J.S. Johnston].

EMSEV is also planning to organize sessions in:

- AOGS, 8 - 12 August 2011, Taipei, Taiwan
- URSI GA, 13-20 August 2011, Istanbul
- DEMETER meeting (October, CNES-Paris, France)
- AGU Fall Meeting, San Francisco, December 2010