

2013 EMSEV Annual Report

1. INTRODUCTION

Since its foundation by IUGG in 2001, EMSEV Inter-Association on 'Electromagnetic Studies of Earthquakes and Volcanoes' (<http://www.emsev-iugg.org/emsev/>) continuously develops new research and findings relating electromagnetic (EM) and other geophysical observations to the physics of the Earth, and volcanic and eruptive processes. By integrating electromagnetic methods with other geophysical techniques, EMSEV broadens the study of dynamical processes leading to fault rupture and volcanic eruptions.

EMSEV's objectives remain (1) the evaluation and the promotion of advanced studies in the electromagnetic field through international cooperation, conferences and regional workshops, as well as high levels international publications, (2) the application of electromagnetic with other geophysical methods to the study of earthquakes and volcanic eruptions in developing or interested countries, (3) the organization of international and regional workshops and the sponsorship of sessions at international meetings, and (4) the participation to local educational programs.

2. ADMINISTRATION

EMSEV is composed of a 4-years elected executive bureau, a nominated assembly of members and collaborators, EMSEV collaborators who are scientists contributing to EMSEV activities and working in Natural Hazards in any related field of research, and the community interested in electromagnetic phenomena, called corresponding members.

The new EMSEV collaborators body is very significant for the analysis of observations and understanding of physical processes from their respective analyzes.

Till IUGG-2015, the bureau is composed as follows. The Chairperson is J. Zlotnicki, the Vice-Chairperson is M.J.S. Johnston, and the Secretary is T. Nagao. IAGA, IAVCEI and IASPEI liaison members are J. Y. Liu, Y. Sasai, and M.J.S. Johnston, respectively, while IAGA WG1-2 corresponding liaison member is T. Harinarayana. Q. Huang (China), V. Lapenna (Italy), A. Meloni (Italy), V. Korepanov (Ukraine), and R. Singh (India-USA) are also bureau members. S. Uyeda is Past-Chairperson.

They are 32 working group members representing 16 different countries (China, France, Greece, India, Indonesia, Italy, Japan, Kyrgyzstan, Philippines, Poland, Romania, Russia, Taiwan, Turkey, Ukraine, and USA). All of them have great expertise in Natural Hazards and they exert a strong scientific activity in the EM field or in connected research fields.

EMSEV is now composed of more than 300 scientists who belong to IAGA, IAVCEI and IASPEI Associations. EMSEV is now attracting researchers of other disciplines of research for analyzing more accurately our new results.

During each biennial International EMSEV meeting, a large business meeting is held. Management of research, cooperation, activities, and new findings are widely discussed. This discussion gives rise to a rich list of new research prospects. Such last business meeting was held in 2012 during October EMSEV-2012 meeting at Gotemba in Japan (<http://www.emsev-iugg.org/2012program/index.html>). Similar business meeting will be held during the next EMSEV meeting in Warsaw (Poland, <http://emsev2014.cbk.waw.pl/>) in September 2014. Other business meetings are organized during General Assemblies (i.e. during 2013-IAVCEI General Assembly at Kagoshima (Japan,

http://www.iavcei2013.com/related_meetings/related_meetings.html).

Annual reports, minutes of the business meetings and activities on EMSEV Inter-Association can be found on EMSEV web site (<http://www.emsev-iugg.org/emsev/>).

3. ACTIVITIES

In 2013, EMSEV was very active in: (1) a number important international meetings, and (2) in promoting and implementing high level contributions to international cooperative studies.

- Meetings

A large number of sessions in international conferences were sponsored and organized by EMSEV members:

EGU, April 7-12, 2013 (3 sessions), Vienna (Austria)

IAVCEI General Assembly, July 20-24, 2013, Kagoshima (Japan)

AOGS, June 24-28, 2013, Brisbane (Australia)

AGU, December 9-13, 2013, San Francisco, USA

- EMSEV activity on volcanoes

Since 2004, EMSEV and the Philippines Institute of Volcanology and Seismology (PHIVOLCS, <http://www.phivolcs.dost.gov.ph/>) tightly work together on the understanding of Taal volcano dynamism and on the monitoring of the activity by the means of electromagnetic and other geophysical methods. This is of critical importance since about 650,000 inhabitants are living in a radius of 20 km from the volcano summit.

At present, the cooperation involves a large international consortium with teams from Japan, France, USA, Greece, Italy, and Belgium. As far as possible, EMSEV and PHIVOLCS lead two field campaigns per year. The volcanic structure is now better known thanks to magnetic, self-potential, ground temperatures profiling, resistivity and magnetotelluric soundings, degassing mapping from the land and the Crater Lake. In addition, EMSEV has made a huge effort in installing real-time multi-parameters stations on the volcano. Four stations are now in operation recording electric and magnetic fields, tilt, seismic information and ground temperatures. The local observatory maintains the data acquisition system and takes care of daily data transfers to PHIVOLCS-headquarter and VEML servers (<http://www.phivolcs.dost.gov.ph/>, <http://virtual-electromagnetic-laboratory.com/etaal.html>). A JICA program has also supported the installation of 3 magnetic and electric stations. These data are recovered by satellite transmission (<http://vanpc02.iord.u-tokai.ac.jp/taalplot/>).

During the last three years, the Japanese team educated a Filipinos young scientist in magnetotelluric methods. This latter, P.A. Alanis, is to obtain his Phd degree in March 2014.

- EMSEV activity related to Earthquake Processes

Kyrgyzstan International Geophysical Centre (IGRC), located at Bishkek Research station and the Academy of Sciences (RAS) of Moscow are conducting active monitoring of underground electrical conductivity along the Kyrgyzstan range (42-43°N, 72-76°E) for more than thirty years. In particular, about 6 times a day, 600 A electric current is injected into the ground through a 4 km long electrical dipole. Residual electric signal can be received up to 70 km away. Observations show that (1) resistivity changes of a few per cent may be observed before EQs of magnitude above 4, (2) a reduction in overall seismicity appears to result when increased small magnitude EQs were induced by the current system, and (3) large injected currents generate an increase of low magnitude EQs during the days following injection.

In 2011, EMSEV and Bishkek Research station decided to focus more deeply on this experiment and on the natural and induced electromagnetic signals which may appear along the ridge.

During the Kick-off meeting held at the station on October 8 to 12, 2011, EMSEV and IGRC decided to (http://www.gdirc.ru/en/index.php?option=com_content&view=article&id=16:-emsev-&catid=1:latest-news&Itemid=50) focus research on several important topics: (1) detection of signals possibly related to tectonic activity, (2) independent evaluation of Seimo-Electric signals and comparison with results obtained in Greece, (3) triggering effects of electric current injection and magnetic storms, and (4) anisotropy of propagation of the electric signals through the faults system.

A 4-year agreement of cooperation between IGRC and EMSEV was signed in October 2011. Japanese and French passive EM stations (sampled at 100 Hz and 40 Hz, respectively) were installed at new field sites, 40 and 30 km away from the current system used by Kyrgyz colleagues. Since then, joint data processing systems are implemented.

The first data issued from the collaboration were shown at the 2012 EMSEV meeting. Huge amount of data are recorded, and, most importantly, signal to noise is good. Data are now being processed.

In March 2014, a workshop in Toulouse (France) will gather teams involved in the cooperation, and detail analysis will be performed. In June 2014, Japanese and French team will benefit from the international symposium on " PROBLEMS OF GEODYNAMICS AND GEOECOLOGY OF INTRACONTINENTAL OROGENS" at Bishkek Research station for upgrading the stations, and implementing new experiments. Results will be presented at the 2014-EMSEV international meeting.

4. PLANNED FUTURE ACTIVITIES

In 2014, in addition to the management of sessions at imperative international meetings, as EGU, AOGS, and AGU, EMSEV will mainly organize a workshop on ' Fundamental problems on the earthquake generation processes and the way to monitor them for hazard mitigation' at Toulouse in France (March 25-29, <http://www.emsev-iugg.org/emsev/page027.html>), and The 2014 international EMSEV meeting at Warsaw in Poland (Sept. 22-26, <http://emsev2014.cbk.waw.pl/>). In 2014, EMSEV will continue to maintain a high level of collaboration in the Philippines on Taal volcano, and also will emphasize the cooperation on the relationships between earthquakes and EM signals with the Bishkek Research station in Kyrgyzstan.