# IAVCEI

## COMMISSION/WORKING GROUP REPORT
### FOR THE LAST FOUR YEARS

Commission leader(s) information:


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| Starting Date: | August 2008 |

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Brief (half page max) description of main objectives:

**Commission of statistics in volcanology (COSIV)**

A key aim of volcanology is the accurate, quantitative forecasting of volcanic hazards. To this end, volcanic processes have long been subject to intense scrutiny, both in the field and the laboratory. The result is a wealth of data, not all of which is well-constrained or complete, and a wide range of sophisticated numerical models that can successfully replicate the primary features of many volcanic flows. Thus, we can legitimately claim that physical volcanologists today have achieved an understanding and quantitative description of the principal, underlying mechanisms that drive volcanic eruptions. This provides a strong foundation, but is not in itself sufficient for accurate forecasting. The focus of this past modelling has been almost exclusively process-oriented and deterministic. The stochastic nature of much volcanological data has rarely been exploited and the models do not generally produce the type of probabilistic outputs needed for forecasting. This is now changing. In the last decade or so, researchers have begun to exploit a wide range of analytical and statistical methods for dealing with stochastic and distributed datasets. This represents a major step forward within physical volcanological modelling as we move to a new generation of probabilistic or statistical models. The primary aim of all this new activity is to develop rigorous methods for quantifying the likelihood of

outcomes given the set of current and past observations.

Main goals:
1) To organise and coordinate workshops and publications.
2) To facilitate communication – provide a platform for the dissemination of statistical knowledge amongst academics and between researchers and civil defense authorities to improve analysis and research of volcanic data and hence ultimately lead to the development of better forecasting methods for volcanic hazards
3) To enable interaction with statisticians in other areas in Earth Science and Mathematics – volcanological statisticians stand to gain much by exploiting the advances made by statisticians with interests directed at other Earth Science hazard scenarios and vice versa
4) To encourage access and exchange of datasets – we will set up a website for researchers where published datasets could be lodged to facilitate general access and to foster discussion
5) Determine/set standards – longer term it is expected that the activities of COSIV would enable IAVCEI to provide guidelines and protocols regarding appropriate analysis of stochastic data in a wide range of settings but particularly to quantify volcanic hazard and reduce volcanic risk.

The main goal of the last four years has been to work for a capacity building. As a matter of fact, when COSIV started its activity scientists who applied statistics to volcanoes were rare and mostly independent one from each other. A capacity building has been pursued through informal dedicated meetings among researchers sharing the same interest in statistics, and the preparation/participation of two important American (Vhub funded by NSF) and European (VUELCO funded by EU) projects. The present (Warner Marzocchi), past (Chuck Connor), and many of the COSIV's affiliates are now working together for these projects.
The ever-growing scientific and practical interest for statistics and probability is testified by the increasing number of probabilistic tools to manage long- and short-term volcanic hazards. Next September, there will be a workshop in Erice (Sicily, Italy) dedicated to define the "best practice" for eruption forecasting. COSIV is, among many others, a co-sponsor of the meeting and its leader (Warner Mazocchi) and affiliates will participate to the preparation of a final document on the best practice for eruption forecasting to be distributed through WOVO (World Organisation of Volcano Observatories) and UNESCO.

COSIV has also distributed Newsletters and maintained a webpage that presently is not accessible due to a change of the server. It will be online as soon as possible.

List of Commission members:

The commission has one leader (Warner Marzocchi), and one past leader

(Chuck Connor) that is still managing the COSIV webpage.

Recent workshops and meetings
(for the last four years, indicating name, place, dates, aim, number of participants)

1. COSIV meeting during the IAVCEI meeting, Reykjavik, 2008 (conveners: Chuck Connor, Department of Geology, University of South Florida, USA, Heidy Mader, Department of Earth Sciences, University of Bristol, UK. Title of the session: "*Data processing, statistics and pattern recognition in Volcanology*". In the last decade or so, researchers have exploited a wide range of analytical and statistical methods for dealing with stochastic and distributed datasets. This represents a major step forward within physical volcanological modelling as we move to a new generation of probabilistic or statistical models. The primary aim of this new activity is to develop and promote rigorous methods for quantifying the likelihood of outcomes given the set of current and past observations. The IAVCEI Commission on Statistics in Volcanology (COSIV) was established in 2007 to foster statistical analysis of volcanological data. This session is the inaugural meeting for COSIV. We invite papers on all aspects of the application of statistical methods to volcanic data in areas such as description and analysis of field data, time series and forecasting, and model validation.
2.

Future workshops and meetings
(for the next two years, indicating name place, dates, aim, expected number of participants)

1. VOLCANO OBSERVATORY BEST PRACTICES WORKSHOP: ERUPTION FORECASTING 11-15 September 2011, Erice, Italy. This meeting is under the auspices of many organizations. The leader of COSIV (Warner Marzocchi) is actively involved in the organization program and in the preparation of a final report, being the probabilistic eruption forecast one of the main target of the final document. Several COSIV's affiliates will attend this meeting. Scope of the meeting: Risks posed by volcanic eruptions continue to grow as populations near active volcanoes and air traffic over them continue to increase. Meanwhile, there is increasing technical capability of volcano observatories and associated scientists to detect and analyze unrest well in advance of eruption, providing great promise and sometimes the reality that forecasting eruptions can minimize loss of life and property. This capability carries with it the responsibility to construct the best possible procedures to support necessary governmental actions such as evacuating populations and/or restricting travel and commerce. Although scientific understanding of volcanic processes is advancing, the basis for interpretation of monitoring data with respect to near-term hazards remains

largely empirical. Critical experience may come first-hand only a few times during the career of an individual observatory-based scientist, but much of the advance in short-term eruption forecasting depends upon relating monitoring observations to volcanic outcomes. It is therefore important that lessons learned be shared internationally, so that a consensus on, and useful guide for, volcano observatory best practices can be developed. Under the aegis of IAVCEI and WOVO, the INGV and USGS are convening the first of what may become a series of volcano observatory best practices (VOBP) workshops. This meeting will focus on the critical theme of forecasting the occurrence of eruptions and their probable impact in the near term, when quick action may be needed. The emphasis will be on presentation and discussion of experiences in forecasting eruptions, both successful and unsuccessful, while leaving extensive discussion of the important underlying science to meetings such as IAVCEI, AGU, and EGU. The objective is to develop synergy among volcano hazards programs and their observatories internationally, so as to more rapidly and broadly advance the field.

2.

Other activities:

Observations:

This application form should be submitted electronically by e-mail to the Secretary General Prof. Joan Martí (joan.marti@ija.csic.es)