WOVOdat: the World Organization of Volcano Observatories Database of Volcanic Unrest

F. M. Schwandner (1), C. G. Newhall (2)

(1) Dept. of Geological Sciences, Arizona State University, Tempe AZ 85287-1404, United States (fschwandner@asu.edu), (2) U.S. Geological Survey, University of Washington, Department of Earth and Space Sciences, Box 351310, Seattle, WA 98195, United States (cnewhall@ess.washington.edu)

The *World Organization of Volcano Observatories* (WOVO) is currently building a *Database of Volcanic Unrest* (WOVOdat). WOVOdat will be a user-friendly Internet-based georelational global database with query and analysis tools, based on multidisciplinary and multi-format data of volcanic unrest.

WOVOdat is intended to aid observatories, academic researchers, political decision-makers and the public in their understanding of the complex suite of phenomena that accompany imminent unrest of active volcanoes. It enables the visualization of data of different formats, dimensions, frequencies and origins in a common query and analysis environment, using open source software with superimposed custom programmed scripts (e.g., for translation of data formats for import/export, simple data analysis functions) and non-commercial visualization tools. Prior problems and delays in forecasting volcanic eruptions can be eased if contemporary symptoms of unrest can be inspected and correlated together on the same screen, and compared to historic data of the same or similar sites, despite different data types, formats and frequencies of the data sources. This approach is comparable with the use of epidemiological databases of the medical community, in which researchers and practitioners can quickly find the incidence and associations of any particular set of symptoms or disease.

We are currently at the state of having built the database structure, designed and tested simple query scenarios, and are in negotiations of defining a pilot site and –dataset. Discussions are under way with several potential partners, to incorporate or adapt existing application software solutions for the visualization and management of time

series data (MULTIMO, IRIS, INGV, USGS, and others), for geospatial data visualization (GEOWARN, Geosemantica), and for data analysis tools (MULTIMO, IRIS, GEOWARN, INGV, and others). A central WOVOdat data and application server will be at the heart of a distributed server system serving the volcanological community: the central WOVOdat server (and its mirrors/nodes) will hold a basic set of processed data while accessing certain large specialized data sets on demand from partner data warehouses. The relational WOVOdat database for the basic dataset is based on a list of parameters and a scheme developed over the past years with contributions of many of the member observatories, agencies, and individual researchers. The queried data will derive from WOVO member observatories, the Smithsonian Institution's Global Volcanism Program (GVP) database, as well as independent organizations holding specialized data repositories (e.g., UNAVCO, IRIS, etc.). These partners contribute their historical and recent (though not real time) multidisciplinary and multi-format data to this new "volcano epidemiological" database, WOVOdat.

To put WOVOdat to use, query capabilities will include data from seismicity, ground deformation, gas emission, thermal, hydrologic, potential fields, and other changes, as well as some basic contextual background data (topography, geology, slope stability, photographs, historical notes,... where available). Because of this multitude of multidisciplinary data, and the complexity of volcanic systems, realistic eruption forecasts are necessarily probabilistic. The wealth of empirical data from volcano observatories around the world and its potential use for estimating probabilities 1-4 of the generic event tree of Newhall and Hoblitt (2002), together with advanced pattern recognition algorithms, will in the near future allow for a better assessment and forecast of patterns and symptoms of unrest in times of a volcanic crisis. We welcome and appreciate any comments, suggestions, and participation in all aspects of the WOVOdat project.

URL: http://www.wovo.org/wovodat.htm

References and partner web sites;
Newhall C.G., Hoblitt R.P. (2002) Constructing event trees during volcanic crises. Bull. Volcanol. 64:1, 3-20.

INGV / OVNI: http://www.ov.ingv.it
IRIS / UW: http://www.iris.edu and http://www.ess.washington.edu
GEOWARN: http://www.geowarn.org and http://www.hazneth.ethz.ch
Geosemantica: http://hub.geosemantica.net
MULTIMO: http://earth.leeds.ac.uk/Multimo and http://www.dgt.uniud.it
Smithsonian Institution: http://www.volcano.si.edu
UNAVCO: http://www.unavco.org
USGS / AVO: www.avo.alaska.edu and http://volcanoes.usgs.gov