COTOPAXI VOLCANO EXERCISE 13th NOVEMBER 2014

DEBRIEFING REPORT

WP 9: Decision-making and unrest management

Task 9.6: Simulation of unrest and decision making

INTRODUCTION

The third VUELCO exercise took place on November 13th 2014 in Quito (Ecuador) at the National Crisis Situation Room (ECU911 Ecuadorian System for Emergency Response national headquarters), where real national-scale emergencies are usually managed.

For this exercise, an unrest scenario for Cotopaxi volcano, including time-line and monitoring data, was created under the responsibility of the *Instituto Geofísico – Escuela Politécnica Nacional* (IGEPN).

The main purpose of the simulation was to test the usability in a real crisis of some tools developed within the VUELCO project, in order to facilitate the probabilistic analysis of data during volcanic unrest crises

Additional aims consisted in testing the level of communication and discussion among scientists as well as between scientists and decision-makers.

ORGANIZATIONS INVOLVED

The exercise involved approximately 50 experts (scientists and civil protection officer) coming from 13 different Countries worldwide (see table).

It also involved a selected audience from Ecuador, belonging to the National Risk Management Department, the Civil Aviation Department, the Municipalities of Quito and Latacunga, the Metropolitan Company for Water Supply of Quito.

Delegates	Institution	Country
1	Universidad Nacional de La Plata	Argentina
1	Universidad Nacional de Salta – INENCO – CONICET	Argentina
1	University of British Columbia	Canada
1	Servicio Nacional de Geología y Minería	Chile
3	Servicio Geológico Colombiano	Colombia
1	University of Costa Rica	Costa Rica
13	Instituto Geofísico – Escuela Politécnica Nacional	Ecuador
5	Institut de Sciences de la Terre d'Orleans - CNRS	France
2	Dipartimento della Protezione Civile	Italy
1	Istituto Nazionale di Geofisica e Vulcanologia	Italy
1	Instituto Geológico Minero y Metalúrgico	Peru
1	Instituto Geofisico del Perú	Peru
1	Philippine Institute of Volcanology and Seismology	Philippines
2	Institute of Earth Sciences Jaume Almera, CSIC, Barcelona	Spain
1	National Geographical Institute	Spain

3	University of the West Indies, Seismic Research Centre	Trinidad and Tobago
3	University of Leeds	United Kingdom
7	University of Bristol	United Kingdom

DEVELOPMENT

The exercise lasted one full day and developed through thirteen simulated subsequent phases, showing an increase in monitoring parameters. At the beginning of each phase the "volcano group" (previously constituted) released a report containing details about the monitoring signals.

These reports were analyzed together by foreign and Ecuadorian scientists, who, after discussion, released an assessment to the IGEPN.

Then the IGEPN informed the national authority, who informed about the decisions taken and the actions to put in place.

All the materials produced before and during the simulation are available upon request.

DEBRIEFING RESULTS

A debriefing session took place the day after the exercise. It involved all the participants (except Ecuadorian authorities) divided into the following working groups:

Group number	Institutions
1	Instituto Geofísico Escuela Politécnica Nacional (Ecuador)
2	University of Bristol (UK) University of Leeds (UK) University of British Columbia (Canada)
3	Institut de Sciences de la Terre d'Orleans (France) University of the West Indies, Seismic Research Centre (Trinidad and Tobago) Philippines Institut of Volcanology and Seismology (Philippines)
4	Universidad Nacional de La Plata (Argentina) Universidad Nacional de Salta – INENCO – CONICET (Argentina) Servicio Nacional de Geología y Minería (Chile) Servicio Geológico Colombiano (Colombia) University of Costa Rica (Costa Rica) Instituto Geológico Minero y Metalúrgico (Peru) Instituto Geofísico del Perú (Peru) Instituto Geográfico Nacional (Spain)
5	Dipartimento della Protezione Civile (Italy) University of Bristol – Social scientists (UK)
6	Istituto Nazionale di Geofisica e Vulcanologia (Italy) Institute of Earth Sciences Jaume Almera (Spain)

After brainstorming each working group was invited to report to the assembly its observations, providing strong and weak points grouped under the following themes:

GENERAL ASPECTS

SCIENTIFIC PROCESS

COMMUNICATION AND INTERACTION BETWEEN SCIENTISTS AND CIVIL PROTECTION

It is important to take into account that the comments provided are not to be interpreted as a criticism, but as a way to point out and to understand possible troubles, in order to improve the process over the next exercises that Ecuadorian authorities should organize in the future.

GENERAL ASPECTS

STRENGHTS

- A clear awareness message about the potential hazards of Cotopaxi has been transmitted to decision-makers at different level in Ecuador.
- The involvement of civil protection authorities at many different levels was really important.
- The involvement of representatives from public service agencies (aviation, water and energy supply,…) was a very good result, although they should have not been involved since the beginning, but only in an advanced phase of the simulation.
- Impressive location and infrastructure: using the National Situation Room for the exercise was good and realistic.
- The logistics (transport, food, etc.) were well organized.
- The exercise was a very important training for everybody involved.

WEAKNESSES

- Purposes and goals of the entire exercise were unclear.
- An exercise work-plan was not prepared, as a consequence the following aspects were not clearly defined in advance: 1) objective (what was going to be tested?); 2) organizational structure and communications chains (what was the role of each participant? how were they expected to work?).
- No communication flow (neither templates) between scientists and decision-makers was defined.
- External scientists did not receive any summary reports or information about eruptive history of Cotopaxi volcano prior to the exercise.
- The scientific committee should have been provided with operational instruments, like maps, DEM, etc. or, better, there should have been a technical team supporting scientists.
- The environment of the exercise was confusing: participants did not know about their own roles or the roles of many people present.
- The time-span covered by the unrest scenario was too long. This resulted in too long monitoring reports and in difficulties in applying probability models (time scale problem and not representative data).
- The volcano monitoring reports were often already interpreted, while raw data were missing.
- The language (Spanish, English) sometimes represented a barrier for

better development of the exercise.

- Some unexpected problems arose when many people tried to connect simultaneously to the WiFi network in the National Situation Room, highlighting an important problem to be solved in view of possible real emergencies.

SCIENTIFIC PROCESS

STRENGHTS

- Very big work done by the team of the IGEPN prior to the exercise, in preparing the volcano monitoring reports for 13 subsequent phases (although some inconsistencies in the data were recognized).
- Basing the exercise on real data was an added value.
- The external advisors were fully integrated in the scientific committee.
- IGEPN was open to interpretations from external scientists and helpful in explaining their own point of view.
- Very high level of scientific discussions developed at the moment of data analysis.
- Very useful scientific exchange.

WEAKNESSES

- The organizational and operative plan was briefly communicated only at the beginning of the exercise and soon fell apart due to the lack of coordination.
- Lack of application of methodology. The initial idea of working groups was broken down soon by personal attitudes which gave place to one large break-out group. This favored the emergence of individual personalities.
- It was unclear if there was a separation between IGEPN and external experts.
- Too much attention devoted to seismic data respect to other parameters (e.g. geochemical).
- IGEPN should improve gas data acquisition and integrate petrological knowledge in the interpretation of volcanic precursors.
- It was not evident if the results from the probabilistic tool (BET) were taken into account during scientific evaluation and advice. Input from BET would have been welcome at each step.
- There was no written record on how the scientific committee arrived to conclusions and recommendations (how the local knowledge was

integrated with the external expert's advice?). At least a minute of meeting should have been done.

- No map indicating the position of different monitoring stations was available.
- The historical background was poorly considered in the discussion.
- Scientists recommended the deployment of additional monitoring instruments only at the end of the 3rd phase.

COMMUNICATION AND INTERACTION BETWEEN SCIENTISTS AND CIVIL PROTECTION

STRENGHTS

- Great trust that Civil protection authorities put in IGEPN scientists.

WEAKNESSES

- Civil Protection was not informed of the presence of BET and the possibility to use it as a support in decision-making.
- Scientific advice did not provide indications of the geographic zones that could be affected by potential events. No maps or potential scenarios were presented. It was assumed that the existing hazards map was sufficient and it was not shown until the end of the 3rd phase of the exercise.
- Written communication from scientists was improvised, poor and characterized by academic discussion. No template existed prior to the exercise and the resulting texts lacked crucial details.
- The communication was nearly uni-directional. There was almost no request for clarification of scenarios from civil protection. Basic questions like "when", "where" or "how" were never asked by the decision-makers.
- Despite the huge presence of civil protection authorities at different level and of representative of public service agencies, actually the decisions were taken instantly, with very little or no reflection, in a systematic pre-defined fashion and by only one person without any interaction with others.
- An evacuation decision was taken at the end of the 3rd phase of the exercise, however, the issue of providing information to the population was not considered until the end of the 4th phase, and the eruption occurred in the 5th phase (two years after the evacuation decision).

- A translation of the decision taken would have allowed a better comprehension from no Spanish speaking people and a feedback to external experts.

List of materials collected and documents produced for the Cotopaxi volcano exercise:

- For each phase of the simulation:
  - ✓ Monitoring parameters report from volcano group;
  - ✓ Advice from IGEPN after discussion with external experts;
- Photographs collection.
- Debriefing report.

For further details please contact:

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