



Volcanic Unrest in Europe and Latin America: phenomenology, eruption precursors, hazard forecast, and risk mitigation

WP 9: Decision-making and unrest management

Task 9.6: Simulation of unrest and decision making

DOMINICA EXERCISE

“DEBRIEFING REPORT”

14th – 15th
May 2015



In the days 14th and 15th May 2015, the fourth and last VUELCO simulation exercise took place in Dominica, according to the project’s “Description of Work”, within the framework of Work Package 9, Task 9.6.

Exercise’s organization, rules, goals, phases, agenda, as well as the list of the several participating institutions (both Dominican, Caribbean and international), were synthesized in the “Dominica Exercise Plan” developed together by The UWI Seismic Research Centre (UWI-SRC), the Office of Disaster Management (ODM) and the Italian Department of Civil Protection (DPC) and released prior to the exercise.

The following flow-chart (fig. 1) represents the working scheme of the exercise, in which a group of experts, called “volcano team”, periodically released simulated monitoring signals to the Scientific Advisory Committee (SAC), composed of scientists belonging to UWI-SRC and VUELCO partners.

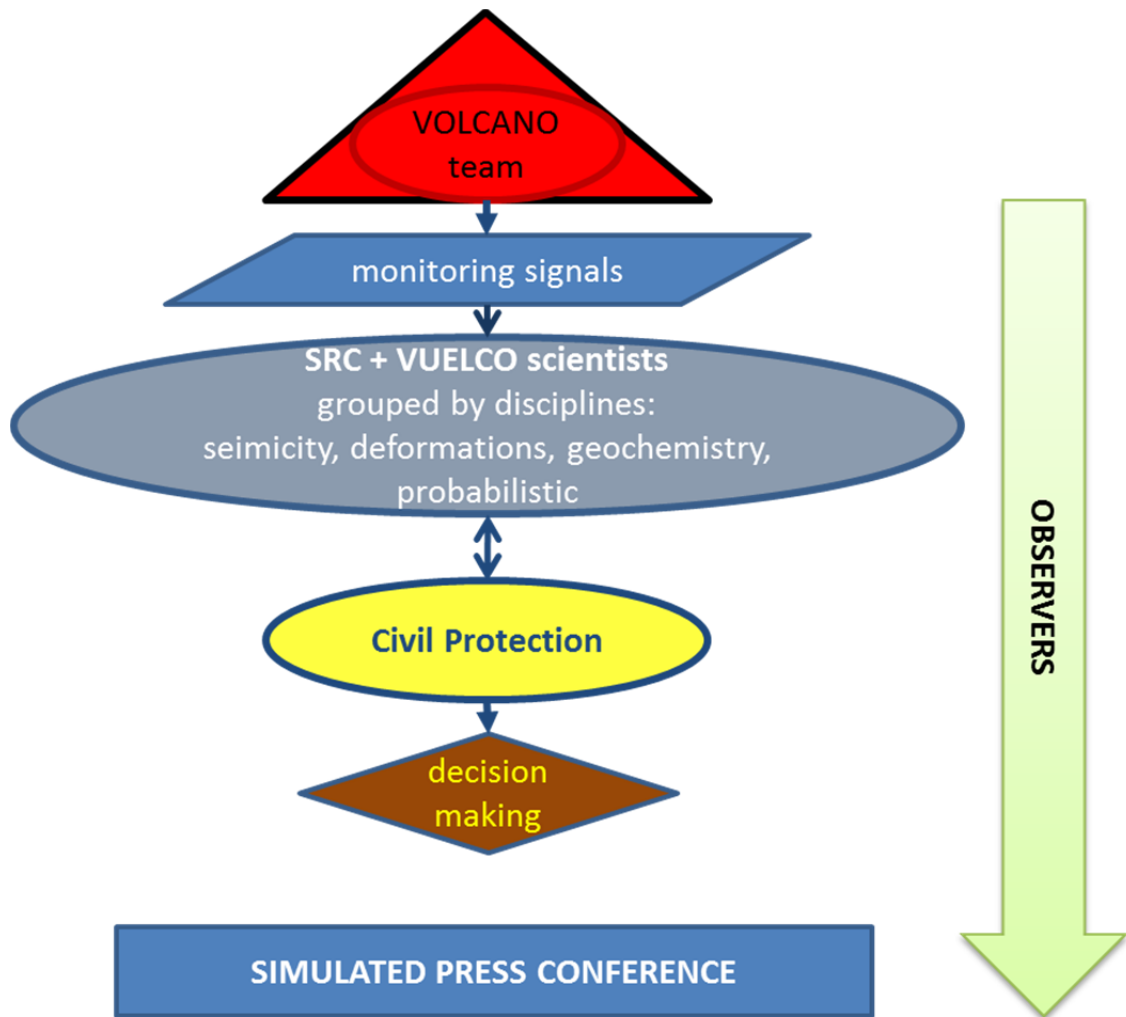


Fig. 1: Exercise working scheme.

Scientists within the SAC, organized themselves into sub- groups according to their expertise. Five thematic sub-groups were formed: seismology, ground deformation, geochemistry, visual observation and probabilistic models (this last group was constantly in contact via video-conference with colleagues in Italy) . After internal discussion each sub-group reported to the SAC and a wider discussion occurred. In the end the lead scientist, belonging to UWI-SRC, summarized the outcomes and evaluations and reported the advice to Civil Protection and decision-makers authorities who comprised the National Emergency Planning Organization (NEPO).

An interaction phase followed, during which members of NEPO were able to ask scientists for more details on their report. NEPO then met amongst itself to decide on the mitigation measures to put in place.

In the end, the results of scientific evaluation and mitigation measures adopted were communicated to the communities by civil protection authorities, assisted by the lead scientist, during a simulated a press conference.

All the above mentioned process was repeated across three phases, simulating different possible stages of a crisis evolution.

A debriefing phase was then held after the end of the simulation exercise. Participants were divided into the following groups: scientists, probabilistic models developer, civil protection officer, observers. Each group was asked to provide feedbacks, highlighting strong and weak points under the four following themes:

GENERAL ORGANIZATION

SCIENTIFIC PROCESS

INTERACTION SCIENTISTS-DECISION MAKERS

CIVIL PROTECTION ASPECTS AND MEDIA/PEOPLE COMMUNICATION

The results of the debriefing have been organized and are presented in this report.

It is important to understand that the comments provided should not be interpreted as a criticism of any individual or organisation. Comments should be taken as a way to highlight and understand possible issues that are critical, in order to improve the process for any future exercises organized by the Dominican authorities and to enhance the response of the local system to possible volcanic crises.

GENERAL ORGANIZATION

STRENGTHS

- Exercise planners were able to take advantage from the previous VUELCO exercise, avoiding some troubles and organizing a very fruitful simulation.
- The planning of the exercise was very well organised.
- Well organized flow of information.
- Excellent engagement with civil protection officer (ODM).
- Detailed and well synthetized information provided in advance on the eruptive history, the volcanoes' behavior, the geology, the monitoring networks, the alert levels etc. without too long reports or wide bibliography to read.
- Exercise was effectively prepared, timely and efficient (the duration of each phase and of the period between them was appropriate).
- Designation and roles in the simulation were clear and helpful from the beginning.
- Focus was not to discuss the data, but to test the communication and response.
- Good idea to release password protected documents (clear start and clear finish).
- Good opportunity to test a scenario with apparently decreasing hazard.
- General infrastructure were very good.

WEAKNESSES

- Information were provided close to the start of the simulation.
- Introductions should have been done at the beginning of the exercise to ensure that everyone knew each individual and their designated role. It was challenging for members of NEPO to accept information from persons whom they did not know or have any clue as to their background or capabilities. Also the scientists must be aware of who they are working with in order to frame their advice appropriately.
- Participation from high level officials from local authorities would have been important.

- The long time period covered in each phase made it difficult to run models.
- More details on specific roles / legal responsibilities of different groups should have been given.
- It would have helped for scientists to have heard the discussion among civil protection officers.

SCIENTIFIC PROCESS

STRENGTHS

- Quality of data was excellent (coherent, appropriate detail and scope).
- Good SAC internal organization (effective division of experts into groups since the beginning).
- Excellent integration of external scientists (VUELCO) in SRC group.
- The simulation was very well prepared, very thought-through and very realistic (monitoring signals coherent and consistent, scenario and crisis evolution, unsure signals and non linearity, phreatic eruption was no precursor of a magmatic eruption, complexity of available and missing data, keeping unrest alive over 3 phases).
- Good chairing of the SAC.
- First time that probabilistic tools have been really considered during an exercise.
- For the first time BET_UR (developed completely within VUELCO) was tested in a hydrothermal-dominated system, showing that the model is able to provide probability also for non-magmatic events (e.g., hydrothermal unrest or eruptions).
- Running BET_UR remotely (from Italy) has worked fine. This simulation shows that it may be a feasible strategy, and it also highlighted a few advantages (i.e., being away from frenetic rush); this was possible thanks to the availability of SRC (well before the simulation) in setting of some of the BET_UR parameters, allowing to better account for local experts' knowledge and adjust everything before the beginning of exercise.
- First test for HASSET short-term model (it shows the evolution of the probability estimates of an eruption based on different combinations of

unrest indicators -time variation). It supported the scientific group to have an overview of the entire process and detect changes in the activity. The result from the model was in agreement with the scientific group decision (to lower alert level).

WEAKNESSES

- Providing the SAC with a table showing usual chemical composition of fumaroles would have been useful.
- There is need of more integration of probabilistic models inside the SAC. The collaboration with experts is fundamental to input data in the model and to obtain good results. Having an expert from each discipline would have helped models' developer in recognizing or identifying anomalies with more confidence.
- It is important that experts know the models to understand how probabilities are produced and how they should be considered, otherwise they will never feel confident with models' outcomes. Although dedicated lectures before the exercise were given, many scientists seemed to be not aware of the exact working of the models. A more direct and clear link with the exercise could have been clearly stated, in order to solicit more attention and discussion.
- There is need of more standardization of the SAC meetings: secretary identification (different from chairman), data organization and presentation, discussion, interpretation, procedures followed for consensus achievement (i.e. unanimity, majority, elicitation), request of monitoring integrations or other action to be taken, prioritization of requests.

INTERACTION SCIENTISTS-DECISION MAKERS

STRENGTHS

- Interaction was very realistic.
- NEPO was very clear in its request for clarification to SAC.
- The quality of reports from the SAC improved during exercise.
- The exercise represented an excellent opportunity to let people know each other and to improve relationships (especially considering the difficulties in

building and keeping them alive due to the distance between Dominica and Trinidad where SRC is based).

WEAKNESSES

- Need to improve constant relationship and collaboration between SRC and Civil Protection in quiet time.
- Reports from SAC should: have a standardized format, contain information relevant to disaster managers (clearly highlighted), include time-frames, prioritize the requirements for additional support, contain less technical jargon.
- NEPO was informed about technical terms but more explications/translations would have been necessary.
- Although SAC reports included a lot of information, very few of them (often hidden) were useful to Civil Protection to make their decisions.
- A list of options/scenarios should have been presented to Civil Protection with probabilities of events happening in different time-frames, so that more informed decisions could have been made.
- There is need for more conversation about what type of information is needed by civil protection.
- Scientists shouldn't limit themselves to ask civil protection officer what do they want, but should try to be more helpful, giving indication on the possible implications of different evaluations and proposing different analysis on different time-frames, etc. Civil Protection is not everywhere used to deal with this kind of situations and may need to be supported.
- Civil Protection could take advantage of the creation of an internal technical-scientific team (with proper personnel) that could easier relate to scientists.
- Scientists were so concerned about giving any indication of risk, they neglected to give essential evaluations on hazard (although requested, no indications were given to update the existing hazard maps; scientists told NEPO to refer to the general hazard map for Dominica that is based on long term analysis and includes 9 volcanoes);
- No scenario was provided although crucial for planning.

- Scientists decided not to take into account the results of probabilistic models in their advice, but no explanation was given for this decision, neither was NEPO even informed of the availability of probabilistic models.
- Scientists must avoid claims that non-scientists do not understand probabilities or “science”; probabilities should be possibly compared to familiar events and science should be explained in easy terms.
- Behaviour of scientists at times created a sense of “us” and “them”, while it is crucial that everyone feels that they are part of the same team (especially during an emergency).
- When alert levels table include public policy requirements (as was the case), scientist need to indicate that the advice is based STRICTLY on the volcanic activity description, not on the linked policy requirements. There is always a danger with inflexibility between hazards / alert levels / and policies).

CIVIL PROTECTION ASPECTS AND MEDIA/PEOPLE COMMUNICATION

STRENGTHS

- There is a list of considerations, resulting from the debriefing held among the NEPO and the Civil Protection officer, that is attached to this report and constitutes a very important part of the process, to be considered for the improvement of the local response system.
- Good organization of press conference; being civil protection and scientists together, gives to people and media an immediate perception of agreement between institutions and help in building trust; it’s also good that scientists talk about science and hazard, while civil protection representatives talk about mitigation measures and rescue operations.

WEAKNESSES

- It is imperative that hazard maps be made available in GIS format as well as any other relevant information (population distribution, road networks,

location of shelters, food stores, location of hospital and other key services etc.) for facilitating decision making.

- During press conferences it is essential always to avoid sarcasm or any behaviour that can be perceived as hostile, even when provoked by uncomfortable questions.
- Press training is essential for anyone in front of media (avoid sarcasm, no need to answer every question, feel free to pass questions to experts, NEVER accuse the press of faulty reporting).
- Civil Protection and SRC should consider employing a Press Officer.

List of materials collected and documents produced for the Dominica exercise:

- Dominica exercise plan.
- Bibliography on Dominica volcanic hazard.
- For each scientific committee simulation meeting:
 - ✓ Monitoring data (seismic, geochemical, geodesy, observation);
 - ✓ Report on probabilistic models evaluation;
 - ✓ Report from the Scientific Advisory Committee to decision makers.
- Photographs collection.
- Debriefing report from ODM-NEPO group (see annex).
- Debriefing report.

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AFTER ACTION REVIEW
Simulation Exercise (VUELCO)
Commonwealth of Dominica
May 10th - 15th 2015

INTRODUCTION:

The VUELCO Project for Dominica was undertaken as part of the European project ‘VUELCO – Volcanic Unrest in Europe and Latin America and the Caribbean: and involved the overall objective of understanding the Phenomenology, Eruption Precursors, Hazard Forecast and Risk Mitigation – associated with the volcanic risk. Dominica was selected due to the high concentration of volcanic centres on island and its unique geology.

The project is funded through the EU 7th Framework Program.

The period May 11th to 15th consisted of field trips, summer school lectures and a table top simulation exercise.

On Monday 11th and Tuesday 12th there were field trips to various locations in Dominica to familiarize members of the scientific team with the specific nature of the geology of the island in preparation for the simulation. On the afternoon of Tuesday 12th to Wednesday 13th a number of lectures were held at the Fort Young Hotel around the general theme of ‘unrest’ as part of the VUELCO summer school and presented relevant results of research undertaken as part of the project.

The simulation ran from Thursday 14th May to Friday 15th 2015. The actual simulation took place in three sessions and was preceded by a series of lectures as part of the VUELCO summer school. The participants involved in the simulation were divided into three groups representing, respectively, monitoring scientists, local civil authorities and regional disaster management officials. In addition there were a number of evaluators.

General Organisation

Activities	Outcomes	Recommendations
Pre-planning <ul style="list-style-type: none"> - Collaboration with SRC - Meetings with stakeholders - Hospitality services 	<ul style="list-style-type: none"> - Regular meetings held via conference calls. - Productive meetings. - No complaints received. 	<ul style="list-style-type: none"> - SRC Representative should have been on the ground earlier. - Increased participation from high level officials. - Earlier confirmations needed.
Field Trips	<ul style="list-style-type: none"> - Objectives achieved. 	<ul style="list-style-type: none"> - Itinerary should be less intense.
Lectures	<ul style="list-style-type: none"> - Objectives achieved, educational. 	<ul style="list-style-type: none"> - A wider cross section of local participation including tertiary institutions.
Reception/cocktail	<ul style="list-style-type: none"> - Objectives achieved. 	<ul style="list-style-type: none"> - Confirmation of event to be done earlier. - A level of socialization was achieved. Cultural exchanges established.

Simulation

Activity	Outcome	Recommendations
Science Component	<ul style="list-style-type: none"> - Although the group (NEPO) was presented with a lot of information – There was uncertainty as to what questions should be asked to clarify information received. - A list of options/ scenarios should have been presented to the NEPO with probabilities of events happening so that more informed decisions could have been made. - Insufficient interaction between scientists and NEPO/ODM during quiet time. - Science made it clear that decision making is that of the local authority, they only provide the data/information. - Lack of a volcanic observatory on island. 	<ol style="list-style-type: none"> 1. A list of questions which need to be asked should be prepared in collaboration with appropriate scientist and form part of our emergency plan. 2. Information presented needs to have less acronyms/ jargon / technical terms and be presented in a manner which is easy to understand. 3. A list of options/ scenarios should have been presented to the NEPO with probabilities of events happening so that more informed decisions could have been made. 4. Seek collaboration with the consortium to establish an observatory for Dominica given the high concentration of volcanic centres on island.
NEPO Component	<ul style="list-style-type: none"> - Operational space too cramped to allow for proper management including chronicling of events (normally bigger conference room would be used where better access is available). - Decisions took too long to make. One reason being senior persons from the varying departments sent their representatives who were not necessarily authorized to make decisions on behalf of management. A second reason being that even though department plans exist, the information contained within was not known and so persons were unclear as to the roles of their various departments 	<ol style="list-style-type: none"> 1. NEPO needs to review and test current emergency plans in each sector/department/ community with a view to improving the overall coordination and identifying gaps including specific institutions . 2. Pre-written Press release statements should form part of the emergency pack. 3. NEPO needs to consider within its plans varying needs of a short term vs long term event. And the effect this will have on available resources, morale of the moral, shelters (type, quality and quantity), gender needs etc. 4. Senior officials MUST attend NEPO exercises. 5. Department plans must be

	<p>and themselves in an emergency situation.</p> <ul style="list-style-type: none"> - There was a lack of commitment of heads of departments to the simulation as not one Permanent Secretary was present. - There is an inability to get data on population/ and population distribution etc. This needs to be rectified. - There is a need for private companies as well as government institutions to have continuity plans for after disasters where they are forced to relocate. - A prepared set of plans should be made for the design and set up of tent cities in various locations so that in case of emergency the plans need only be submitted to donor agencies. - Lack of contingency plan for missing 4 areas. 	<p>reviewed and practised annually.</p> <ol style="list-style-type: none"> 6. ODM needs to provide training courses to heads of departments as to how to prepare emergency plans. 7. A focal point person is needed in each organization who can be the main contact person with chain of command clear in case this person is unavailable. 8. It is imperative that Hazard maps be made available in GIS format as well as any other relevant information such as population distribution, road networks, location of shelters, food stores, location of hospital and other key services etc. for facilitating decision making. 9. NEPO to consider the setting up of a Geo-hazard Task Force / subcommittee 10. A secondary EOC to be considered for operations should Jimmit be compromised.
CDEMA Component	<ul style="list-style-type: none"> - Communication established. - Situation reports submitted in a timely manner. 	<ul style="list-style-type: none"> - Want a CDEMA representative for future exercises. - NEPO should advise CDEMA as to the close of the exercise.
Debriefing Component	<ul style="list-style-type: none"> - Had open and frank discussions. - Knowledge and skills transferred. 	

CONCLUSION

Exercises such as this highlight the need to have regular and diverse manoeuvres. These events allow critical networking and build synergies among civil protection agencies and scientists in understanding volcanic unrests characteristics. We encourage continued collaboration between SRC, ODM and VUELCO.