NEWSLETTER N. 2

March 21, 2011

(MItigate and Assess risk from Volcanic Impact on Terrain and human Activities)

The MIAVITA project is financed by the European Commission under the 7th Framework Programme for Research and Technological Development, Area "Environment", Activity 6.1 "Climate Change, Pollution and Risks"- Starting date: October 1st, 2008 - Duration: 4 years

This second newsletter includes results of 2009-2010 MIA VITA activities and the acquired improvements due to extraordinary activities for Merapi eruption.

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CVGHM (Indonesia).
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1 - SUMMARY OF PROJECT AND OBJECTIVES

MIA-VITA is working in close cooperation with local stakeholders and will develop useful products not only for the participating ICPCs but also for other countries with similar risks.

The project **MIA-VITA,** which in Italian means "my life", is a 48-month project that has been designed to address multidisciplinary aspects of volcanic threat, assessment and management in the International Cooperation Partner Country (ICPC) and European volcanoes, from prevention to crisis management and recovery.

Following UN International Strategy for Disaster Reduction recommendations, and starting from shared existing knowledge and practices, the **MIA-VITA** project aims at supporting some of the ICPCs, the most exposed to volcanic threat, through **developing tools and integrated cost effective methodologies to mitigate risks from various hazards on active volcanoes (prevention, crisis management and recovery)**. Therefore, to fulfil the European Commission requirements, **MIA-VITA** includes civil defence agencies, national geological and volcanological surveys, scientific teams (earth sciences, social sciences, building, soil, agriculture, information technologies (IT) and telecommunications) and an IT private company.

TARGET SITES

- **Mount Cameroon (Cameroon)**
- **Fogo (Cape Verde)**
- **Merapi (Indonesia)**
- **Kanlaon (Philippines)**

In order to get the project results usable for a wide range of ICPC countries, four volcanoes have been chosen. They are sited in various geodynamical contexts (sub-duction zones and intraplate volcanoes) and exhibit all dangerous volcanic phenomena. Such variety of phenomena and geodynamic contexts will allow us to find common features and highlight differences that will enrich the knowledge database and improve specific monitoring requirements and alert level set-up.

EXPECTED RESULTS

- **Original methodology and guidelines for multi-hazard and risk mapping on active volcanoes, based on research on the MIA-VITA's target volcanoes, validated by local authorities. This methodology will integrate a template for risk management WebGIS, and it could be used in other countries threatened by active volcanoes.**
- **Demonstration and validation of new methods to monitor volcanoes, integrating remote sensing techniques and geophysics (gas, seismicity and ground deformation).**
- **Repository of fragility curves for volcanic hazards, more specifically regarding buildings, soils and agriculture. A simulation of different eruption scenarios and the impact on ecological vulnerability would be achived.**
- **Guidelines for integration of socio-economic aspects in risk mitigation: proposals and examples for mitigation strategies to build community resilience to volcanic hazards, community-based disaster risk management plans and recommendations on how to integrate bottom-up and top-down risk mitigation measures.**
- **Guidelines and robust in situ tools for communications during crisis in isolated places. More particularly, the demonstration of possibility of using GEONETCast's services in natural disaster management may prove to be a highly innovative progress in this crucial domain.**

2 - SPECIAL SECTION ON MERAPI ERUPTION (OCTOBER/NOVEMBRE 2010)

With 300 deaths, more than 380,000 refugees, and about 1 million people evacuated or moved away, this eruption is the one involved the largest number of internally displaced persons for this kind of event. The 2010 eruption at Merapi volcano could have killed many more people; the eruption in 1931 killed 1300 people, despite having the expelled magma being much less than during the 2010 eruption, and the density of population being much higher nowadays. This improvement in capability to protect people from such phenomena, is due to the great experience of the Centre for Volcanology and Geological Hazard Mitigation (CVGHM - Indonesia) to deal with volcanic eruptions, to the activities of local Civil protection systems, and to the scientific observations gathered from modern techniques, included in MIA-VITA European project and USGS/VDAP (Volcano Disaster Assistance Program).

Photo by Bob Thompson

Brief history of a foreseen volcanic eruption from MIA VITA point of view

Starting from the beginning of 2009, first signs of reactivation of Merapi volcano (increased number of earthquakes and slight inflation of the volcano) were detected. Dr. Pak Surono (Director of the CVGHM) proposed at the MIA-VITA kick-off a meeting held in Yogyakarta from July 1st to the 4th 2009, to change the Indonesian target volcano from Kelut volcano (which did not show any sign of further activity after the 2007 eruption) to Merapi volcano; the MIAVITA consortium agreed. Later signs of reactivation became gradually more evident; CVGHM expressed concern about Merapi volcano activity at the mid-term meeting of MIA-VITA on 16-17 September 2010 in Rome. It was believed that Mount Merapi could start a new eruption within the next 3 months.

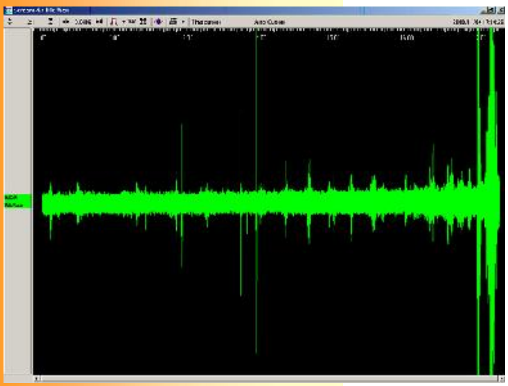
On 20th of September, the alert level was raised from “Aktif Normal” (= normal activity) to “Waspada” (= be alert), on the basis on increased number of volcanic earthquakes and deformation of the top of the volcano. Being aware that the volcano was reactivating, MIAVITA’s monitoring team accelerated the preparation of equipment in Indonesia and in Europe. On 21st October, because the seismic activity still increased and because the summit deformation rate dramatically increased (more than 20-30 cm/day) as observed by Electronic Distance Measurement (EDM), the status was raised to the 3rd alert level “Siaga” (= be prepared). During the following 4 days, the number of volcanic earthquakes increased again to more than 250 earthquake/day and deformation rates at the summit exceeded 50 cm/day. On 25th October 2010 at 06:00 local time, the status was raised to the 4th level “Awas” (= danger), 35 hours before the first eruption: people living within a 10 km zone were told to evacuate, affecting at least 19,000 people. More than 800 volcanic earthquakes were recorded by the permanent network and the MIA-VITA broadband seismological network.

Contribution of MIAVITA to MERAPI crisis management

- Participation to scientific and strategic discussion concerning the volcano behaviour;
- MIAVITA team gathered information from partners implied in WP3;
- Organisation of following missions for MIAVITA members.

The first eruption occurred on 26th October at 5:02 p.m. The seismic energy for this period is equivalent to the accumulated energy of the 1994, 1997, 2001, 2006 eruptions combined. The eruption on the 26th October destroyed the former domes and the pyroclastic flow reached about 6 to 7 km to the South. More than 30 lives were claimed in Kinaredjo village, including Mbah Marijan, the gardian of the keys to the volcano. All victims did not want to follow authority recommendations; many people thought the eruption was finished.

The second phase started after a short time of relative calm, when fresh magma appeared at the new crater - as a new lava dome with a quite strong emission rate. For about 2 days, the eruption produced an 8 km height column, probably corresponding to the evaporation of water of the hydrothermal system at the summit.



Eruption of the 4th November: series of explosions at Merapi volcano recorded at the MIA-VITA Imogiri seismic station (50 km south of Merapi).

During the third phase, a series of magmatic explosions with increasing frequency and intensity occurred, some of them heard at more than 30 km from the summit, for about 3 days. On the 3rd of November, following strong eruptive activity, the evacuated area was increased to 15km and a number of shelters were moved from 10km to 15km. The activity intensity peak was on 5th November 2010 at 00:05 (local time), (4th of November at 5 p.m. GMT time), when a powerful explosion (VEI~4) occurred and the evacuation zone was extended to its maximum of 20km with more than 1 million people displaced. The plume rose to more than 15 km in height. Heavy ash fall occurred in the WSW and WNW, with schools reported closed up to 120km west of Merapi. Pyroclastic flows and surges affected areas to the west and south, with flows in the Gendol river reaching more than 15 km to the south.

This explosion expelled a large quantity of SO2 and ash, which disturbed air traffic for several days up to Jakarta. A lot of scientific equipment (including MIAVITA BB seismometers) was destroyed at the summit and on the flank of the volcano up to 4 km distance. At the paroxysm, only the MIA-VITA station set-up at 50 km south of the volcano was able to follow the timing of the explosions.

During Merapi eruption, MIA-VITA team on-site sent daily reports to MIA-VITA participants, containing scientific and civil protection main topics.

The fourth phase was intense degassing and continuous eruption of pyroclastic flows, and it was characterised by strong tremors (saturation of the station at 6 km distance). The intensity of the tremors decreased slowly with time and was disrupted sometimes by strong explosions, heard up to Yogyakarta, up to November 15th. When the activity lowered, the exclusion zone was reduced from 15 to 5 km (depending on flank) on November 19th and the alert level was decreased on December 3rd from "Awas" to "Siaga".

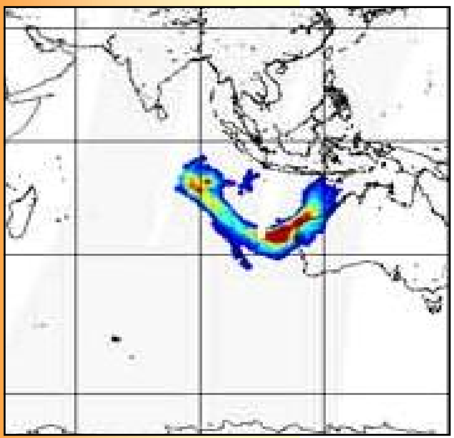
These phases have been described and analysed in great detail in real time, thanks to the large number of modern techniques deployed for this event, even within the European project MIA-VITA: broadband seismology (BRGM), deformation from satellite InSAR (INGV), gas composition analysis by DOAS (Cambridge University), SO_2 satellite images (NILU). Those observations were processed as quickly as possible and sent to Dr. Jousset and Dr. Boichu, in Yogyakarta. Integrated into other information coming from USGS and terrain observations by CVGHM and taking advantage of the great experience of Indonesian volcanic management, Dr. Surono and the local team evaluated eruption status and issued efficient and timely recommendations to the local authorities to manage evacuations.

Discussion and scientific work open to journalists for interview of Dr. Surono (9 November 2010).

MIA VITA project activities during MERAPI eruption.

Due to the exceptional situation at Merapi, the President of the Republic of Indonesia, Bapak Susilo Bambang Yudoyono, requested to Dr. Surono to enlarge collaboration. An American team from USGS arrived to set-up a seismic network for monitoring lahars; a Japanese team from the Disaster Prevention Research Institute set-up infrasonic equipments to track explosions; and French team from the Institut de la Recherche and Development set-up one additional broadband seismometer. At the request of the Director of the CVGHM, within the framework of MIAVITA European project, Philippe Jousset (BRGM) took part to the monitoring of Merapi volcano, together with the University of Cambridge, from November 2nd to 25th. Prof. Franck Lavigne (CNRS) also joined the team in charge of lahar evaluation, together with Adrien Picquout.

All the information makes for very valuable scientific data-sets never attained up until now and will contribute greatly to the understanding of this eruption.



IASI images of the eruption at Merapi volcano (SO_2 flux)

The activities carried out from MIA-VITA teams on site had been the following:

a) Gather and disseminate information coming from all partners; ground and satellite monitoring techniques (Broadband seismology, gas, InSAR, OMI, etc.) defined in MIAVITA project were gathered at Yogyakarta and transmitted as soon as delivered to CVGHM to help to assess and mitigate the volcanic activity. Together with the efforts from USGS/VDAP, these were used to define the status of activity of the volcano. It is the first time that such a large international community gathered efforts together for a volcanic eruption.

b) Setting up new equipment (Broadband seismological station and digital tiltmeter, with telemetry) to help CVGHM/BPPTK to rebuild a broadband seismological monitoring network of high standard.

c) Investigation of physical, agricultural and health impacts of the current eruptive activity, by a MIA-VITA team which included non MIA-VITA scientists joining the mission with their own funding. This team arrived in Jogjakarta at the end of November.

d) Participation to scientific and strategic discussion concerning volcano behaviour.

e) Organisation of following missions for MIAVITA members.

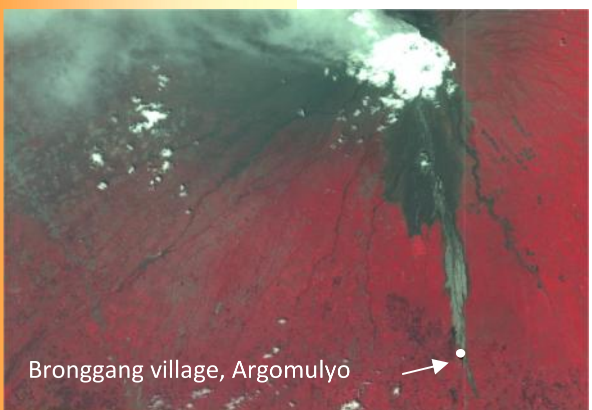
A MIA-VITA team arrived in Jogjakarta at the invitation of CVGHM to investigate the physical, agricultural and health impacts of the eruptive activity. The team includes non MIA-VITA scientists who have agreed to join the mission.

Major Findings

The Merapi eruption provides a unique opportunity to study the impacts of an explosive eruption inside populated areas.

Characteristic of eruptive deposits:

In the area of Bronggang village, where a 6m high wall as lahar mitigation structure on the Gendol river was built, the main pyroclastic flow and its mass load was strongly channelized and the pyroclastic flow deposit was at least 2-3 m thick on the edge of the flow, and was variably inflated by about 0.8 to 2.5 m. It contained mostly angular to sub-angular fragments of dome rock with, so far, little to no vesicular material identified. Temperatures 0.63 cm from the surface reached to least 197° C; this was the longest pyroclastic flow of the eruption with a maximum run-out of about 17 km, stopping approximately 15.5 km from the vent.



SPOT image of the affected area to the south of Merapi on the 11th November 2010. The village of Bronggang is shown. Image by IPGP.

Building and infrastructure damage

A detailed field survey of villages that suffered damage and casualties from pyroclastic flows and surges in the Gendol river on the 4th and 5th November, showed that much of the structural damage to buildings was the result of fires caused by the hot surge deposits, rather than the dynamic pressure indicating that the surge was not very turbulent.

The damage boundary for building and vegetation damage and occurrence of casualties was very sharp and in the order of a few metres. Preliminary inspection of the direct impact of the surge on structures and people indicates that the temperature of the pyroclastic surge was in the range of 200° to 250°C.

Agricultural damage:

The heavy rains have washed away most of the ash in accessible areas, especially on the agricultural crops themselves and mobilisation has removed the original layering on agricultural fields. Observed damage included full removal of leaves, breakage of branches and full burial of some crops.

Structural damage to buildings in Bronggang village, Argomulyo. Two timber frame buildings have suffered fires and collapses. The intact nature of tiles on the roofs, along with other evidences, suggests that this surge was associated with relatively low dynamic pressures.

Health and community:

As rains are daily in this location, there is currently very little exposure for people to re-suspended ash, in contrast to two weeks after the Nov 5th eruption where there was very little rain, and considerable re-suspension and associated anxiety about the health impacts of the ash.

In Bronggang village, there was a 95% mortality rate following the surge impact, with approximately 70% dying on site and 25% dying at the hospital.

In the EUROPEAN GEOSCIENCES UNION General Assembly 2011 (Vienna 03-08 April 2011) a special session will be dedicated to 2010 Merapi eruption: *"Merapi volcano Central Java, Indonesia: dome collapses and centennial 2010 eruption"*

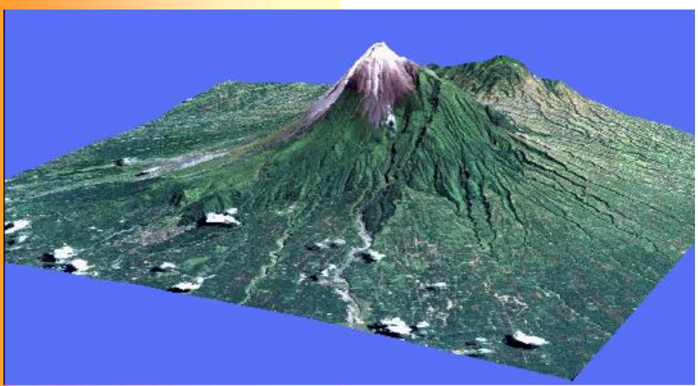
Lessons learnt

- Remote sensing observations allowed following closely the evolution of the volcano's morphology, before and during the eruption, the evolution of ash and gas in the atmosphere, the quantification of the SO2 expelled, allowing the quantification of the magma volume intruded and establishing constraints on ash models;

- Regarding monitoring, the existence of a seismic station far away from the volcano allowed to record the signal of the eruption, that would have been not possible using stations close to the summit. Moreover, it is important to improve the deformation network by setting up tiltmeters at different distances form the volcano and not only at the summit area;

- Sharing data and information among scientist and decision makers by participation of scientists to discussion concerning the volcano behaviour was very useful.

3 – GENERAL RESULTS ACHIEVED DURING 2009-2010



3D representation of Merapi volcano: QuickBird Very High Resolution optical image superimposed on the DEM obtained from ALOS data.

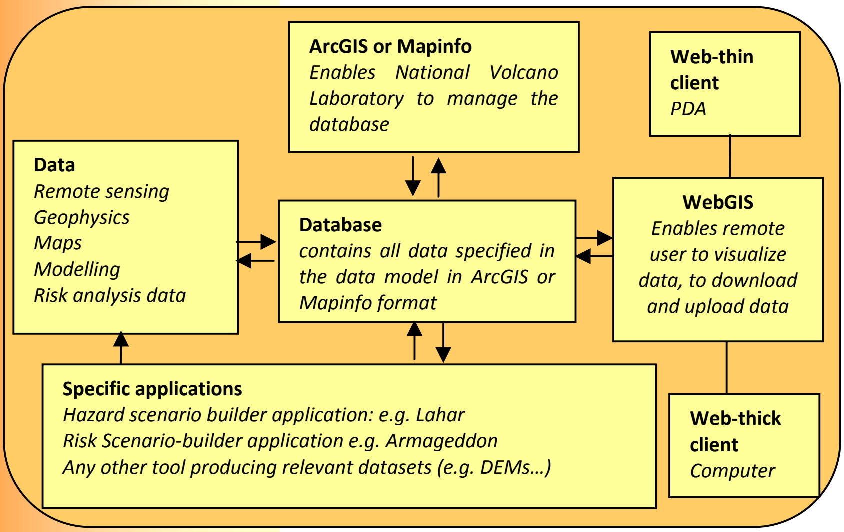
GENERAL RESULTS

Results which have a general value for the project are synthesized below:

WP2 – Knowledge database and web-GIS design. In 2010, this work package has been dominated by WebGIS database architecture definition.

The main objective of the WebGIS is to **enable displaying a very complex database**, which should be managed using ArcGIS or Mapinfo as well as used for scenario building using a specific scenario software.

After this definition phase, KELL is currently undertaking the development of a pilot application, applied to data of Mount Cameroun. Setting up and applying homogeneous hazards and risk mapping methodologies is a second major aspect of WP2. A document presenting the generic methodologies proposed within the project has been issued. The proposed hazard mapping methodology merges two hazard mapping approaches (results of FP6 project EXPLORIS as well as previous work undertaken at Mount Cameroon by BRGM/ MINIMIDT). In addition, a risk mapping methodology based on a work previously undertaken on the Merapi by CVGHM/BPPTK and staff has been proposed a generic approach for risk mapping in MIAVITA.



WP3 – Cost effective tools for integrated monitoring. New Digital Elevation Models (DEM) for Kanlaon and Merapi volcanoes have been extracted from Synthetic Aperture Radar (SAR), exploiting the space sensor on board of ALOS (Advanced Land Observing Satellite) Japanese satellite. As far as SAR data analysis concerns, the first prototype of Corner Reflector has now been completed and will be tested at INGV; two or three corner reflectors will be installed initially on Fogo volcano.

The first prototype of Corner Reflector

WP4 – Fragility curves and ecological vulnerability assessment. In the second year of the MIAVITA project, Cambridge Architecture Research collaborated with Instituto Superior Técnico. Cape Verde Metereological and Goephysical Institute and PHIVOLCS to undertake a vulnerability study of buildings on Fogo Island (Cape Verde) and on Kanlaon (Philippine).

In addition, major agricultural activities and characteristics of the supporting infrastructure were identified and their vulnerability to volcanic hazards discussed qualitatively.

WP5 – Socio-economical vulnerability and resilience. Around Fogo, Cameroon and Kanlaon volcanoes, activities conducted during the past twelve months aimed at collecting background data, selecting sites for subsequent research and disaster risk reduction activities, identifying partner stakeholders. Around the Merapi volcano, preliminary research activities intended to gather systematic socio-economic, geo-referenced data which would eventually be integrated into the MIA VITA GIS platform and which would help in drawing the profile of target communities.

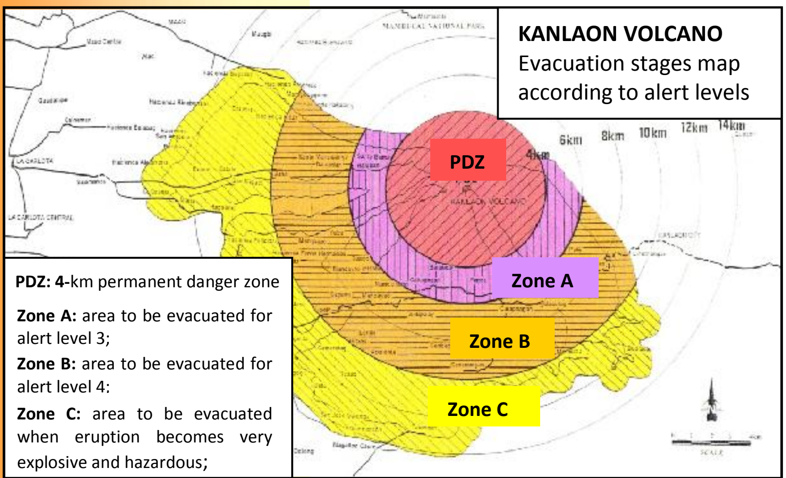
A single short and straightforward document combining both research outputs and policy recommendations turns out to be more practical and useful for end users as it enables them to fully appraise the scientific basis for particular actions.

Five policy briefs covering each of the following communities was prepared: Yubo in Negros Occidental and Masulog in Negros Oriental, threatened by hazard associated with Kanlaon volcano (Philippines); Turgo in Central Java (Indonesia), which faces the threat from the Merapi volcano; Cha das Caldeiras and Figueira Pavao in Fogo (Cape Verde), which faces hazards from Fogo volcano.

WP6 – Communication strategy for crisis management. Regarding the V-SAT communication, a Ku-band service provided by Skylogic (Eutelsat subsidiary) was tested in the Moroccan Sahara, with very positive results about the power of the signal (comparable to the strength in Europe) and the rates (cost/min). The same test was negative when the apparatus tested in Fogo: the link to the satellite could not be established. After consultation with the Cape Verde Atmospheric Observatory, run by a German-British-Capeverdian consortium and one of the rare VSAT users in Cape Verde, WP6 considered to switch to C-band to avoid the effect of atmospheric dust, which a possible cause of the difficulties. However, the costs of C-band VSAT services offered proved unsustainable. More recently, WP6 chose to exploit the Inmarsat BGAN satellite service as a backup for the mixed radio/cable connection under implementation. Procurement of the equipment and service are underway. Concerning Geonetcast, a contract between Eumetsat and IST was signed and the procurement of equipment is underway. This purchase was delayed because it was being negotiated together with the C-band VSAT hardware, which was by then abandoned.

V-sat antenna set in Fogo.

WP7 – User's needs and volcanic threat management. A specific mission was organized by WP7 at Kanlaon to meet all stakeholders involved in volcanic crisis management. Due to the frequency of natural disasters (e.g. earthquake, volcano, tsunami, typhoon, flood) the Philippines developed a system especially effective for crisis management; general information about the organization of civil defence has been collected. An example of an "evacuation stages map" is shown.



For the emergency plan of Kanlaon volcano a detailed analysis of issues has been done based on varying scenarios upper bounds. Human impacts (evacuation), agriculture or infrastructure has been very well quantified. Beyond the impacts, financial and material needs are also finely defined.

WP8 – Validation and dissemination of results and User's training.
A first newsletter with the objectives and results of the first year of the project was issued (March, 31th 2010) on the MIA-VITA website (http://miavita.brgm.fr). As dissemination strategy the first newsletter was sent by email (as a pdf file attached) to a broad-spectrum mailing list , which included international organizations, scientific communities and local stakeholders, as civil protection authorities and government from ICPCs and EU countries.

- Interviews and questionnaires were disseminated among the population from the targeted villages of Fogo, Kanlaon, Merapi and Mount Cameroon volcanoes by WP5 participants.
- Results of the project were presented in seminars, conferences and on different reviews. A special section on Merapi eruption will be held in the EUROPEAN GEOSCIENCES UNION General Assembly 2011 (Vienna 03-08 April 2011).
- A first index of contents has been drawn for the final handbook, and a meeting will be held in Paris on March 2011.
- Validation criteria report has been prepared for the majority of deliverables.

4 - RESULTS GATHERED FOR EACH TARGET VOLCANO

Mt. Cameroon (Cameroon)

Vulnerability/Social communication: to investigate the socio-economic vulnerability, capabilities to face volcanic crises and resilience in risk zones, a profile of communities living in volcanic hazard-prone areas has been drawn by means of field data collection carried out in Fako Division, West and South West Region, from 4 November 2009 to 15 March 2010. Two sets of questionnaires with local (pidgin) and English languages for common people and administrators, respectively, were used (108 interviews). Pidgin language was mostly used in conducting out the interviews because it is a language most spoken and understood in the region and people were more comfortable with it. From gathered experience, in fact, because local (language and related culture are strongly rooted, has been strategic to approach people following their traditions and cultural points of view, to make all information (as hazard knowledge, how to cope with natural risks, etc.) really available and intelligible. English Language was used in interviewing those who preferred it, for instance officials such as the Divisional Officers, Mayor of Buea, and the Principal of Government High School Idenau preferred this language. Transcribed translations were made.

Sample of houses built on landslide body and information risk billboard on landslide risk ((Flemish Interuniversity Council in Belgium (Vlaamse Interuniversitaire Raad/VLIR))

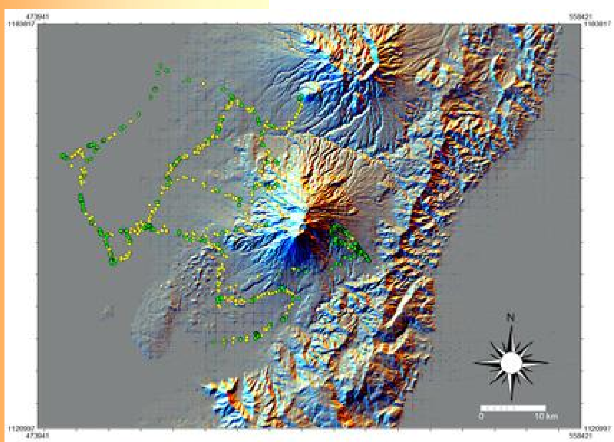
Interactive tool based on GIS environment has been produced by MINIMIDT to locate and store the interviews (oral and written) made up along this first anthropological fieldwork survey.

Results:

Infrastructures: Houses are built mainly on wood and concrete blocks. In some cases villages are built on old landslides, where tree plantain cultivations were restored after disasters, despite government warnings against the danger of landslides.

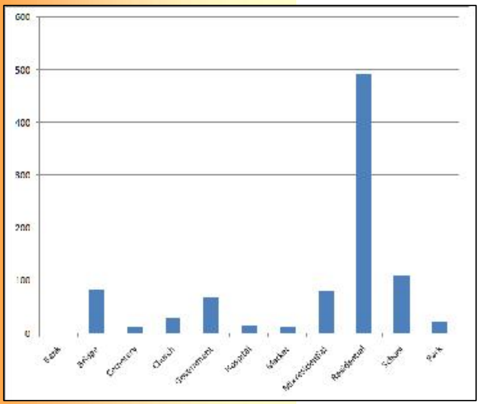
Kanlaon (Philippine)

- Field survey to review existing geologic and hazard maps was conducted during the second year of the MIA-VITA project by WP2 partners (Phivolcs, INGV). The mission provided a better comprehension of the volcano-tectonic evolution of Mt. Kanlaon and allows an improvement of the existent hazard map by redefining the general temporal succession of its volcanic units. Preliminary results will be utilized in assessing future volcanic hazard re-evaluation (WP2).
- Field observations together with remote sensing data and pre-existent geologic data were then evaluated in the GIS platform. A Digital Elevation Model (DEM) for LAHARZ modelling using SRTM 90m x 90m resolution and ASTER DEM 30m x 30m resolution and simulation of lahars using LAHARZ has been obtained. Then, an assessment of



Data points risk elements distributions. Yellow dots are related to agriculture and green dots related to infrastructure (Kanlaon) possible erodible material volume and rainfall quantity that could trigger lahars in the vicinity of Kanlaon Volcano, and acquisition of better DEM, is needed to come up with a revised lahar hazard map for Kanlaon Volcano.

- Inventory of risk elements that includes infrastructures (buildings and facilities) and agricultural produce was conducted using Google Earth. These available remote satellite images were used to produce land cover or land classification map for field-based data gathering and validation. Image processing was also conducted using available ASTER images provided by USGS (WP2). In March 2010, the preliminary field data gathering and validation was conducted using real-time Google Earth Navigation. Around 25% of the area has been collected in the field and also coordinated with various municipal assessors' office in order to come-up with locally based assessment values to be used for land valuation analysis (WP2).



Bank	2
Bridge	83
Cemetery	13
Church	31
Government	70
Hospital	16
Market	14
Mix residential	81
Residential	493
School	110
Park	21
TOTAL	934

Distribution of green dots (previous figure) in infrastructure and buildings typology

- During two fieldtrips to Negros Island the University of Hohenheim collected soil and rock samples for establishing a soil chronosequence on the flanks of Mt. Kanlaon. Chemical and physical analyses are in progress and first results are expected by early 2011. The results will lead to conclusions on mid- and long-term soil development after eruptive events under tropical climate conditions. Here, a special emphasis lies on recovery duration estimations and post-eruptive land use recommendations WP4).

- Three additional seismic stations were constructed and installed with broadband seismometers at a) Tuburan, Mambucal Murcia, b) Upper Pantao, Canlaon City, and c) Mansalanao, La Castellana. A repeater site was also located at Kanlandog, Murcia (WP3).

- Fourteen GPS campaign sites were selected for ground deformation measurements. Aside from the geometric distribution of the sites around the volcano, accessibility and power availability at the prospective sites were the main factors considered. In October 2009, the Araal precise levelling line (Carlota city) was improved as more benchmarks were constructed and then surveyed. The Pula precise levelling line in Kanlaon City was started to be enhanced in October 2009 by constructing 2 benchmarks and was finished by adding 12 more benchmarks at April 2010 (WP3).

Fogo (Cape Verde)

A vulnerability study of buildings on Fogo Island has been undertaken, using data sourced from detailed surveys in different communities on Fogo. Building typology classes and appropriate vulnerability functions were defined for each area and for each of the potential volcanic hazards. In addition, major agricultural activities and characteristics of the supporting infrastructure were identified and their vulnerability to volcanic hazards discussed qualitatively (WP4).

Setup of radio links between the new seismographic stations and the telecommunications hub in Cha das Caldeiras. An Hybrid system was designed and the transceivers and antennas to setup this network were purchased and shipped to Cape Verde; installation is scheduled for the next weeks (WP6).

Newsletter n.2

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