

# July 2009 Report of the Internal Committee for Scientific Evaluation and Strategic Control

The Committee met in Rome on July 6-8, 2009 in the main building of the National Institute of Geophysics and Volcanology (INGV). Present were: Prof. Franco Barberi, Ing. Mauro Massulli and Prof. Adam Dziewonski, the chair the Committee. Prof. Stephen Sparks could not attend.

At the beginning of the meeting, Dr. Gianluca Valensise gave an overview of the developments during the thirteen months since the last Committee meeting. Dr. Valensise also presented the Committee with a series of tables summarizing some aspects of the Institute activities. Power point presentation of Dr. Valensise's is included as Appendix A. In particular, Dr. Valensise drew attention to new features in the report for the year 2008:

- A reader's guide & a list of the main institutional events
- INGV structures (e.g. TTCs) with details on composition
- A list of cooperative project and of funding bodies, agencies
- A list of projects that were active during 2008
- A summary of relations with national & int'l institutions
- A section on "*Institutional and scientific excellence*"

Clearly, the most important event of the last 13 months was the l'Aquila earthquake sequence. In addition to the obvious importance of the events themselves, the Committee thought this sequence can serve as a test of the preparedness of the Institute to respond to a catastrophic event. At the request of the Committee, Dr. Valensise organized a mini-symposium on the activities of INGV related to the l'Aquila earthquake sequence of 2009. Following brief introductory remarks by Dr. Selvaggi, the Director of the National Earthquake Center, there were 12 presentations:

1. Seismological data - Chiaraluce (CNT)
2. Surface geological effects - Pantosti (RM1)
3. Geodetic data and crustal deformation - Selvaggi (CNT)
4. SAR interferometry data and source modeling - Salvi (CNT)
5. Strong motion and shakemaps - Faenza (CNT)
6. Earthquake prediction and forecasting - Marzocchi (RM1)
7. Seismic hazard and building code in the light of the L'Aquila earthquake shaking - Meletti (MI-PV)
8. Emergency assessment of possible site effects in the view of the reconstruction - Luzi (MI-PV)
9. Damage surveys - Tertulliani (RM1)
10. "Did you feel the earthquake?": web based macroseismic survey results - De Rubeis (RM1)
11. Post-earthquake relief - Nostro (CNT)
12. Calculation of seismic moment tensors - Pondrelli (BO)

The Power point files of all the presentations are included as Appendix B.

In order to familiarize the members with the current activities of INGV, the Committee invited the directors of all the Sections of the Institute to submit a one page long review summarizing the activities of their Section, major accomplishments and areas of difficulties. In addition, the Directors were asked to give very brief (ca. 10 minutes) oral presentations. Four Directors were present at the meeting (CNT, Roma1, Roma2 and Pisa), and four presentations were given using teleconference facilities (Bologna, Catania, Naples and Palermo); the Section of Milano-Pavia did not give an oral presentation. In the following, we summarize, in alphabetical order of the Sections, the essential points made in each written and oral presentations.

## **Bologna**

### *Personnel*

The staff includes 55 people, plus a custodian, and 5 post-docs (*'assegnisti di ricerca'*). This makes 61 employees. Of these, 29 have a permanent position, and 32 no not. To this number, one should add 5 PhD students, and 2 INGV employees formally belonging to CNT and Central Administration, bringing the (effective) total to 68. During the calendar year 2008 there have been a few changes. A scientist has been transferred from CNT to Bologna. Two scientists with temporary contracts have left. Two scientists with permanent positions have moved to Rome (RM1). Two administrative staff and a scientist have turned from temporary to permanent positions.

### *Budget*

An estimate of the yearly budget, using INGV *internal sources* (*'fondi ordinari'*), can be made considering the total amount spent during 2008 and grouping our cost categories as follows. The total figure is about **271,000€**, that can be split into different classes in the table below.

Travel (Italy & abroad), research-related services, meetings	<b>27,000</b>
Print costs, books, journals, outreach activities	<b>23,700</b>
Furniture, technical parts, building maintenance, computer hardware, software	<b>162,500</b>
Office consumables, maintenance contracts, post, staff training courses	<b>58,000</b>
<b>Grand total</b>	<b>271,200</b>

Note that only 2,600€ were spent to partially fund three individual participations to congresses abroad. Travel in Italy (17,000€) is largely related to institutional activities. So, internal sources do not support specific activities, but only provide for the maintenance and upgrade of the general infrastructure. The main expenditure is for computer hardware, but also for general building maintenance and improvement. During 2008 we faced some extra costs due to the addition of some more office space and a conference room.

*External* funding sources contributed by **573,000€** to specific research activities for 2008. This figure represents the money that was actually *spent* during calendar year 2008, on all type of expenses *other than salaries*: travel costs, consumables, computers, etc. To this number, one should add the *expenses for salaries* — managed by the central administration — to pay for the staff on temporary appointments, that are difficult to quantify at this stage (but very significant:

they pay for 30 assistants/post-docs/young scientists). I should emphasize that external funding by and large supports costs related to research activities.

#### *Principal research/monitoring objectives*

Our research is generally aimed at the multi-disciplinary study of dynamical processes in the Earth, at their hazard and impact on the environment, both natural and anthropogenic. Specifically, topics range from seismology, to geodynamics, volcanology, oceanography and climatology. We do theoretical simulations of processes, analysis and inversion of observational data, historical research on natural events, and we estimate hazard connected to earthquakes, volcanic eruptions, climatic and marine events. The tools we employ are numerical methods, inverse methods, statistics, historical research, construction and exploitation of data bases. Although our main interest is data modeling, we also contribute to data collection from the national seismic and geodetic networks, and in instrumental and macroseismic field campaigns. We keep a strong tie with the university in Bologna, teaching and tutoring students.

#### *Main accomplishments*

In the study of seismic sources we concentrated in evaluating the effects of fully dynamic supershear seismic ruptures on radiated energy, and on the study of instantaneous dynamic triggering in a 3D fault system. We continued the update of the Euro-Mediterranean seismic moment tensor catalogue, developing a new application that allows visualization on Google-Earth. Bologna participates in the European project NERIES by developing a seismological reference model for the deep structure of the European plate. In 2008 we saw important developments, with the creation of candidate models for crust and upper mantle, a wide comparative analysis of existing models, development of a tomographic exchange format, and of model visualization tools. In 2008 a well-structured research group, well known in the field of application of historical and archaeological research to the study of natural phenomena, became part of the section. These research activities have substantially increased. Several studies have been completed, a book dedicated to the hundredths anniversary of the Messina earthquake has been edited, as a methodological manual on historical research, to be published by Cambridge University Press. In the field of volcanology, we point out probabilistic studies and simulations on the dynamics of eruptive processes, applied to the definition of hazard and scenarios of Italian volcanoes as well as others, such as Cotopaxi, Ruaumoko, Kilauea, Las Canadas. The operational oceanography has developed new versions of the forecast systems for the Adriatic and the Mediterranean, planned to go into production in 2009, fixing and improving on a number of issues such as the parameterization of heat exchange, data assimilation, and tide components. Bologna gave a leading contribution to national activities in outreach. The follow-up to EDURISK, also coordinated by Bologna, has started, and in 2008 it expanded its range to ten Italian regions. The anniversary of the Messina earthquake was the occasion for a broad educational project in Calabria.

#### *Principal problems*

The low level of institutional funding does not permit to support research from an institutional point. As noted above, internal funding covers only expenses related to maintenance and upgrade of the infrastructure (building, computer center, library, printing costs, consumables, travel in Italy). Scientists continue to show good potential to obtain resources for externally-funded projects, but priorities for these are set by the specific funding organization. In perspective, it

appears that we will possibly have to face a decrease in funding devoted to solid-earth geophysics, so it will be important to increase our efforts to gather these resources. On the other hand, general reliance on external funding does not really allow the flexibility in orienting and directing the activities. It is therefore difficult to set plans for long term development. The lack of ability to hire on permanent appointments has several repercussions. Staff members who had been on temporary positions for too long, may not be highly motivated. Bologna relies on temporary staff for its core activities (administration, informatics) and this is a rather vulnerable position. Besides, the lack of possibility for career advancements is, again, not very motivating for the researchers, and it does not allow us to hire ‘fresh’ scientists from outside the institution that can bring innovation and reenergize the Section. The general administrative system of INGV is rather cumbersome and often redundant. The system rules are unnecessarily complicated. It needs to be trimmed down. So far, INGV appears quite unable to fully utilize current opportunities available through internet and office automation.

## Catania

The INGV Section of Catania is mainly involved in the seismic and geodetic monitoring of tectonic areas and active Sicilian volcanoes and in particular in the multi-disciplinary study of volcanic phenomenon. All of this, together with the numerous volcanic emergencies managed in the recent years, has created a strong link between the monitoring and the research activities.

### *Number of personnel and the change from 2007*

	Dir. di Ric.	I Ric. II Liv.	Ric. III Liv.	Ric. a contr.	I Tecn.	Tecn. III Liv.	Tecn. a contr.	CTER IV-VI	Amm. VII-IX	CTER IV-VI art. 23	Op.Tec. VI-VIII	Borse	Assegnisti
2007	4	10	10	19	1	6	9	18	5+2Art. 23	15	3+2 Art. 23	10	6
2008	5	10	10	15	2	5	9	19	6+1Art. 23	13	5	6	12
2008-2007	1	0	0	-4	1	-1	0	-1	0	-2	0	-4	6

### *Section budget*

Internal funds **1,081,050.00 €**

External funds **2,345,549.65 €**

### *Principal research/monitoring objectives*

Monitoring activities of both Eastern Sicilian tectonic areas and active and quiescent Sicilian volcanoes (Etna, Stromboli, Vulcano, Pantelleria) are shared between geophysical and volcanological units. In particular, the INGV-CT, leads the monitoring and study of volcanoes through multidisciplinary observing systems, consisting of seismic, geodetic, visual (cameras) and geophysical permanent and temporary networks. Today, in the eastern part of Sicily there are 230 stations; in particular the permanent network is represented by 96 seismic stations and 62 GPS ones. Etna volcano, with its multidisciplinary permanent network of 135 stations (seismic, GPS, gravimetric, accelerometric, geochemical and Infrared thermal cameras, etc..) is one of the most monitored volcano in the whole world. Since 2004, the seismic and GPS permanent networks have been enhanced and in the near future stations will be deployed in the whole Sicilian area, through the APQ Regione Sicilia Project. Moreover, the INGV-CT, together with the Dipartimento Nazionale di Protezione Civile (DPC), shares all the technical and scientific

aspects related to the seismic and volcanic risks, through studies and researches related to the surveillance and through the around the clock support of the Sala Operativa.

The several studies made so far, also collaborating with other INGV Sections and foreign institutions, have brought (notwithstanding the 2008 Etna emergency) also this year to considerable scientific results, as certified by the several publications in JCR journals. The basic and applied research activities during 2008 in seismological, ground deformation, gravimetric, magnetic and volcanological fields, has led to better understanding the dynamic of the volcanoes and of the tectonics areas monitored. One of the principal research objectives of the Section is the multidisciplinary approach to complex systems, not directly accessible, such as volcanoes, in order to understand the mechanisms of magma rise. We believe that this approach could be extended also to study of earthquake sources through the interaction among different physical, geological and mathematical sciences. Mathematic and statistical methods were recently developed and applied during 2008, in order to validate and to improve the knowledge obtained so far. Finally, both research and monitoring activities are included in several outreach programs, developed by the Section, aimed at institutions and society, in agreement with INGV proposal.

#### *Main accomplishments*

The main results in the seismological field, obtained in 2008, are: i) a better definition of the crustal structure of Etna and Stromboli volcanoes, through both passive and active tomographic approach; ii) the implementation at Mt. Etna of the location procedures in the nearly-real time for the seismo-volcanic events; iii) the modeling of synthetic seismograms for the long-period events in volcanic area; iv) the estimation of the ground-motion during the earthquakes; v) the study of the scaling laws of the seismic radiation and the computation of the attenuation mechanisms; vi) the quantification of the site effects. The 2008 version of Italian macroseismic database has been published for the 1900-2006 period. During the restructuring of the seismic data elaboration systems, a new location system (EarthWorm), a software for the control of signal quality and a multiparametric database were activated. During the Mt. Etna eruption that started on May 13, 2008, numerous researchers from INGV-CT, INGV-OV, INGV-PI, French and Dublin University carried out an experiment (European Project VOLUME) regarding the study of seismo-volcanic sources, with the installation of 30 broadband stations and 3 seismic antennas in order to integrate temporary with the permanent network stations. In 2008 the new geological map of Mount Etna was completed and geological, structural and macroseismic data were also compared; this map is now in press. Procedures for the analyses of volcanic risk, ash dispersion, pyroclastic flows, lava flows and dikes propagation have been implemented. Some investigation procedures, based on analyses system of satellite images, have also been performed. During the 2008 Mt. Etna eruption, the MAGFLOW Model was applied for the simulation of lava flows. The most precise results of the lava flow were obtained by integrating, into a model MAGFLOW, an algorithm that uses satellite images in the infrared to estimate the effusive rate. The volcanic ash dispersion, together with its fall, were simulated using numerical codes (VOL\_CALPUFF and FALL3D). At Mount Etna, the code VOL CALPUFF was used in order to extend the study to the analyses of the volcanic PM10 impact through high resolution meteorological data.

#### *Principal problems*

In the last years the INGV-CT managed numerous eruptive crises, achieving an equilibrium and efficiency in its performance. This equilibrium was achieved through balancing well the different activities of the Section (research, monitoring-surveillance and monitoring system development). Notwithstanding this, all activities in which the Section is involved and the development of instrumental networks, may be threatened in the near future. The main threat is the precariousness of the personnel of the Section. At present time, the percentage of personnel with temporary appointment, who work in several research and surveillance units, including management of the development of monitoring networks, is more than 40% of the total amount. During 2008 the almost total arrest of stabilization process that began in 2007, has made the situation worse, above all concerning the future of these workers. Another significant fraction of the personnel involved in this process who renewed their contract for 2008 and almost the 2009, will run into problems because of actual situation of INGV. This picture of unreliability is in contrast with well planned development and implementation of the observing system. Another problem, even if less critical, is the lack of the right space for activities in the building on Piazza Roma. We suggest that it could be quickly solved through a better utilization of the section buildings. A planned maintenance has been provided for some infrastructures, such as the CUAD in Catania, as well as the Nicolosi building, while both Osservatorio Pizzi Deneri and the Centro Divulgativo of Stromboli need a larger amount of investment, not feasible with the routine funding. Finally, considering the scientific results, it is hoped that there will be a permanent institutional appropriation of funds for research fellowship and PhD, in order to allow the young researchers to obtain appropriate training and experience in foreign institutions.

## **Centro Nazionale Terremoti**

*Number of personnel in 2008 and the change from (2007) -*

Permanent appointments 105 (104) ; temporary appointments 49 (53) ; Post docs (assegni di ricerca) 11; Grants 5; PhD students 2. Total number of personnel 172.

*Section's budget (internal and external sources, updated July 2009)*

Total internal budget                      €1.179.227,00 (1.171.647,00 in 2008)

Total external budget                      €1.795.317,34 (3.236.793,53 in 2008)

*Principal monitoring/research objectives*

CNT maintains three national networks (seismometric, strong motion and geodetic), the Mediterranean network and the around the clock monitoring room for the service for Civil Protection. CNT is also involved in the development of broad band OBS (7 at the moment) and includes the remote sensing group and the group dedicated to the scanning and archiving of historical seismograms. CNT has also the responsibility for the maintenance of the informatics network for the INGV-Roma departments. The research is mainly linked to the data produced by the networks, including accurate locations of Italian and Mediterranean seismicity, moment tensor, rapid determination of source parameters and earthquake effects (shake maps), tomography, geodetic solutions and velocity maps, as well as remote sensing research (SAR images and volcano activity).

Several field experiments got started in 2008 as for example the Messina 1908-2008 multidisciplinary project where we have carried out the installation of OBS, more than 30 temporary seismic stations (in collaboration with INGV-CT), GPS field campaign, SAR images and analyses. The project have also received an official award from a cultural society. Another important project (Airplane) is dedicated to the seismotectonic study of the Alto Tiberina fault. In the framework of this project we have substantially increased the monitoring system.

#### *Main accomplishments*

- All the relevant earthquakes that occurred during 2008 have been well located and our response to Civil Protection has always been rapid and within the formal agreement with DPC
- Seismic and CGPS data sharing with other institutions (universities, regional agencies etc) increased at low cost. The CNT monitoring system (actually more than 300 real-time seismic stations and more than 350 CGPS stations). The CNT monitoring system is the largest in Europe and of high quality.
- The research of CNT is now more linked to the data product by the networks than before, because we strongly simplify data mining and dissemination
- The OBS has come out from the development phase and we have now seven broad band OBS that have been used during the Messina 1908-2008 experiment
- SAR has reached a high level of research quality during 2008, thank to the increased number of researchers dedicated to remote sensing field and new important projects like Sigris in the framework of the relationship with the Italian Space Agency.
- The GPS network has now more than three years of continuous data production and the first papers that make use of them are coming out.

#### *Principal problems*

CNT is the largest department of INGV and with the largest responsibilities because of the seismic monitoring of the national territory. We have personnel in almost each department, and two important observatories, one in Sicily (Gibilmanna) and the other in Irpinia (Grottaminarda). In addition, CNT has also the remote sensing research unit and Sismos together with the responsibility for the informatics infrastructure for the INGV-Roma departments. All this makes CNT activities too broad, with too many responsibilities. As an example, due to the L'Aquila earthquake, I could not dedicate much time to anything not related to the emergency in the last three months. I will not report other problems because I think that this is the main one and other problems are derived from that.

## **Milano-Pavia**

#### *Number of personnel and the change from 2007*

Presently, 40 people are working within the MI-PV section. 23 people are researchers or "tecnologi". This number has not changed since 2007. MI-PV has 6 technicians. A technician with a non-permanent position was hired in 2008. Staff employed in the administration consists of 3 people (1 hired in 2009). In MI-PV, 5 "assegnisti" and 3 "borsisti" are also working.

#### *Principal research objectives*

The INGV MI-PV staff is entirely dedicated to the wide spectrum of researches concerning engineering seismology. The production of databases, hazard maps, shaking scenarios, maps of active faults, etc ... is the expression of the applied research MI-PV is performing. Within this light, *i*) the investigations in historical seismology are dedicated to the production of the widely used macroseismic databases and parametric catalogs available on internet; *ii*) earthquake geology and seismotectonics are aimed to draw maps of active faults and seismogenic sources; *iii*) the activities within the assessment of seismic hazard, deriving from information *i* and *ii*, are dedicated to the production of SHA maps and the maintenance of the official National Map of Seismic Hazard, available on internet; *iv*) the production of shaking scenarios occurs within the framework of projects dedicated to the prevention of the seismic effects; *v*) the monitoring activities made by the RAIS, Northern Italy Accelerometric Network, are entirely dedicated to record strong motion data; *vi*) the analysis of the data recorded by the network mentioned in *v* and of data recorded by other networks is related to the maintenance of ITACA, the strong motion database created and maintained by MI-PV.

#### *Main accomplishments*

Seismic and strong motion monitoring. The Accelerometric Network of Northern Italy that is run by the Section recorded 784 waveforms in 2008, relative to 30 local and regional events with magnitudes of 2.2 to 5.1. The emergency network intervened following the earthquake in Frignano on 23<sup>rd</sup> December (magnitude 5.1).

Seismological methods for seismic engineering. Amplification effects have been calculated for the Gubbio plain using the seismometric recordings of the array installed in the basin (in collaboration with GFZ-Potsdam and the University of Genova). The study of the directivity of the seismic radiation emitted by moderate earthquakes has revealed the key-role of these effects in the azimuthal variations of the movement. The simulation techniques used, which take account of the effects due to the proximity of the seismogenic source, have been tested so as to introduce the directivity also into the maps of the movement and the danger.

Databases and macroseismic methods. The 2008 version of the Italian Macroseismic Database has been published for the time window of 1900 to 2006 (DBMI08). It reports data of 557 earthquakes. Moreover, the 2008 version (of 1900 to 2006) of the Parametric Catalogue of Italian Earthquakes has been made available, which also contains records relating to foreshocks and aftershocks.

Instrumental seismology databases. The RAIS website <http://rais.mi.ingv.it> has been improved and updated. It reports the engineering parameters, such as the peak acceleration and velocity values, the spectra of the elastic responses under acceleration, and the duration parameters. With regards to ITACA, it has been released in the beta version after an improvement of the interrogation interface and the visualisation routines for the accelerometer traces. Likewise, the waveforms from after 2004 have been archived.

#### *Principal problems*

From 2007, the structure was renamed as the “Milano–Pavia Section: Engineering Seismology”. This change was designed to consolidate the collaboration with the Eucentre Foundation of Pavia, by virtue of the growing interest of the personnel for the development of research aimed at the evaluation of seismic risk components. In the Director’s Report on the activities in 2007, there was a mention of the need for an intervention on the part of the Institute in support of this change, particularly with reference to the attribution of personnel. The need was connected to the

acquisition of professionals who could provide the necessary connecting link in the Pavia Section between the Eucentre Foundation and INGV Milan. Moreover, the move by the Institute for the acquisition of new personnel was and would still be logical on the basis that the Milano–Pavia Section is the structure that has grown least in personnel terms after the founding of the INGV. For various reasons, the signals for this growth were missing also in 2008, and it appears therefore that for the moment the collaboration with Eucentre has lost its shine. In this not very encouraging scenario, there is also the suspicion that the activities carried out within OO.GG. 4 and 5, which are relevant to the applied character of the Section, are in reality considered to be less important within the INGV than basic and applied research activities carried out in other Sections. This is maybe the origin of the reduced calls for personnel over the course of the years – particularly for career advancement – and of the scarce financing for activities that should have an Institute character (e.g. the databanks). As for this latter point, the resorting to external sources appears to be less than opportune. The maintenance, updating and enriching of the already existing “containers”, such as the macroseismic databases and the accelerometric databank, should become activities directly linked to the priorities of the Institute or to *ad-hoc* conventions between the Institute and DPC, without the need for cumbersome application procedures for which the final outcome is the production of such working tools that are needed by the entire scientific community. Taking up this road would signify the definitive recognition of the “infrastructural” value of these products. Such a prospective would certainly constitute recognition from the side of the INGV of the importance of the activities carried out.

### **Ossevatorio Vesuviano – Naples**

#### *Number of personnel and the change from 2007*

- Permanent pos. 100 (104) - Temp. pos. 18 (23)
- Res. contracts 6 (10) - PhD Grants 2 (2)
- Associates from universities 6 (6)

Data updated to June 2009 (in brackets data are referred to May 2007)

#### *Section's budget (internal and external sources, updated july 2009)*

Total internal budget (all included ) €2.075.953,00

Total external budget €1.551.825,12

#### *Principal research/monitoring objectives*

Multi-parametric volcano monitoring (seismology, infrasonic, ground deformations, gravimetric, thermal, geochemical) of the Campania Region active volcanoes and seismological monitoring of the Stromboli volcano.

Principal research fields:

- Volcano and tectonic Seismology
- Geodesy
- Monitoring of the hydrothermal activity
- Numerical simulations
- Volcano dynamics
- Integration of volcanological, archaeological and rock-magnetic investigation

### *Main accomplishments*

- Very long period seismic signal analysis associated to Strombolian activity
- Seismic wave scattering and splitting in volcanic environment.
- Degassing processes and volcanic unrest investigations.
- Development of a seismic early warning system (Irpinia zone)
- Multidisciplinary marine monitoring system for the surveillance of volcanic area (Campi Flegrei)
- Array measurements and analysis of deep tremor signals (Cascadia subduction zone)
- Tephra fallout numerical simulations and hazard assessment (Campi Flegrei and Vesuvio)
- The magmatic system investigations (Campi Flegrei caldera).

### *Principal problems*

The Section of Naples “Osservatorio Vesuviano” is involved in the monitoring and research activities; this effort increased significantly during the recent years. At the same time, the number of personnel has gradually decreased, mostly because of transfer to other Sections and retirements, causing one of the principal problems for the Section.

In addition the Vesuvius Observatory is involved in teaching activities and science through a variety of projects with different types of schools. It is an important outreach opportunity for the INGV because of the educational activities through the Museum, located in its historical building where there is a permanent exhibition, with about 10,000 visitors per year. The historical building needs major repairs and an appropriate investment to ensure and improve these activities.

## **Palermo**

### *Number of personnel 2008 (2007 in parantheses)*

Permanent appointments 25 (20); temporary appointments 32 (37); other appointments 26 (32);

Total appointments 83 (89)

### *Section's budget*

Internal funds: ~600.000 Euros

External funds: ~1.445.000 Euros

### *Principal research/monitoring objectives*

The main subject of the INGV-PA is the application of geochemical methods to volcanic and seismic phenomena. Secondly, some studies focused on environment and climate. Concerning the volcanic surveillance, many efforts have been devoted during 2008 to the implementation of the monitoring networks installed on Mt. Etna, Stromboli and Vulcano Islands. About fifty monitoring stations (completely house-made in our laboratories) are installed on these volcanoes to measure the flux of CO<sub>2</sub> emitted from the soil, chemico-physical parameters in groundwater, temperature of fumaroles, temperature gradients in soil, acidic gas species in volcanic plumes. Recently, the automatic procedure for the re-processing, validation and visualization of collected data has been upgraded. Furthermore, periodic campaigns have been combined with the continuous monitoring, aimed to provide additional constraints about volcanic processes by

means of the measurement of specific parameters. Parallel to the volcano monitoring, the laboratory equipment and analytical procedures have been implemented, as described below:

- Nitrogen isotopes: a new method has been managed to measure nitrogen isotopes in gas samples to ascertain the eventual atmospheric contamination;
- ICP-MS and ICP-OES: New analytical procedures for the determination of trace elements in critical samples (high salinity or soda solutions);
- Laser ablation: this instrument allows the spot analysis of melt and fluid inclusions in rock samples; it is coupled to an ICP-MS for trace element analysis and also will be coupled to a mass spectrometer for isotope analyses.

Concerning tectonic areas, some investigations have been made on the characterization of fluid circulation in western Sicily, aimed to identify sites sensitive to seismic activity in Sicily. Furthermore, CO<sub>2</sub> degassing has been used to identify hidden active faults in the south-eastern sector of Mt. Etna in the frame of the INGV-DPC project FLANK. A branch of our department works on the modelling of magmatic processes and mechanisms of chemical and isotopic fractionation during magma ascent and differentiation. New experimental data have been acquired to constrain gas solubility in silicate melts, in cooperation with the laboratories of ISTO (Orléans). The experience acquired during the long-term observation of volcanic phenomena has allowed the development of scenarios of unrest in some volcanic areas. This has been made for Vulcano Island, in cooperation with INGV-CT, based on a series of expected variations in both geophysical and geochemical signals.

#### *Main accomplishments:*

- Analysis of the relationships between structural framework, volcanic activity and CO<sub>2</sub> degassing on Mt. Etna during 2005;
- Development of a model of fluid circulation in the summit hydrothermal system at Mt. Etna;
- Magmatic processes in Betic cordillera (Spain) by means of fluid inclusions and trace elements in xenoliths;
- Use of CO<sub>2</sub>/SO<sub>2</sub> ratios in volcanic plumes of Etna and Stromboli as indicator of volcanic activity; development of automatic stations installed on both Etna and Stromboli;
- Set-up of an automatic system for the measurement of geochemical parameters in submarine environment, installed offshore of Panarea;
- Modelling of kinetic effects of degassing in basic magmas
- Model of geodynamic development of Central Mediterranean.

#### *Principal problems*

The main problem resides in the large number of short-term employees (60% of workers), all involved in crucial activities in laboratories, volcanic surveillance and administration. Furthermore, at present, a logistical problem exists, but a new building will be adapted in the next few years for our needs.

## **Pisa**

#### *Number of personnel and the change from 2007*

In 2007, the number of researchers/technologists plus technical and administrative personnel was 20. In 2008, this number increased up to 25. Out of these, 9 have a temporary contract (about

35%). The increase was due to the transfer of a few researchers from other sections of the Institute. In addition the section has 8 research fellowships/post-docs and 7 research associates.

#### *Section's budget (internal and external sources)*

The internal ordinary budget is 202 k€ This amount is the same of the last 3 years. The budget coming from the external sources (e.g. MIUR, DPC, EU, Regional agencies, NSF, etc.) is about 584 k€(final balance 2008). The present total 2009 budget is 840 k€ It is worth to note that the amount of external sources is about three times the internal one.

#### *Principal research/monitoring objectives*

Most of the activities carried out in the Pisa section pertain to research, although some contributions are also provided to the volcano monitoring (essentially during emergencies and through the use of computer models). The main scientific goals are: 1) to quantify the dynamics of volcanic and geophysical processes through a multidisciplinary approach that integrates observational and experimental works with theoretical and numerical studies of the investigated processes and 2) to quantify the hazard and risk associated with these phenomena. Main activities pertain to the following TTC/OS (with reference to the Piano Triennale 2009-2011): 3.6 (Fisica del Vulcanismo), 4.3 (Scenari di pericolosità vulcanica), 5.4 (Sistema informativo territoriale), 2.3 (Laboratorio di fisica e chimica delle rocce), 3.5 (Geologia e storia dei sistemi vulcanici), and 2.1 (Laboratorio per le reti informatiche, GRID e calcolo avanzato). Researchers of the section serve also as coordinators of three TTC/OS.

#### *Main accomplishments*

It is difficult to select a single main achievement reached by the section during the last year. I would say that all three Unità Funzionali forming the section made substantial progress in terms of developing new experimental/observational techniques and numerical simulation codes as well as in their application to real systems. The scientific productivity, for the third year in a row, is satisfactory both quantitatively (34 JCR papers plus 12 non-JCR producing a number of JCR papers per researcher/technologists of about 1.9) and qualitatively (the average impact factor of the JCR papers is about 2.7). It is also worth mentioning that in 2008 the section further developed two infrastructures as the computing facilities (installing a second Linux cluster of about 100 CPUs) and the analytical/experimental laboratory (by starting the purchase of an electronic microscope).

#### *Principal problems*

The 2008 was the third year of activity of the Pisa section since its formation. All the technical and administrative offices have reached a regime in their functioning and a quite high quality of service. Similarly the research work was carried out effectively with a significant level of cooperation within the section and also with other colleagues of the institute. The main problem of the section remains the lack of permanent positions mostly for the level of researcher/technologist in the field of numerical modeling and for the technical and administrative services. I wish some action would be taken in the near future to fill these gaps. Another problem is represented by the lack of space in the present section building to allow the planned growth of the group. Nevertheless, some actions have been recently taken aimed to the purchase of a new larger building. Finally, a further difficulty in the management of the section

is represented by the quite heavy administrative and bureaucratic workload as well as by the sometimes difficult communication between the central services and the peripheral sections.

## **Roma 1**

### *Personnel*

In December 31 th 2008 RM1 had a staff of 140 units: 79 permanent positions, 41 fixed term contracts 12 postdocs, 8 PhD students and grants. Variations with respect to 2007 are +8 total units. In detail: +10 permanent positions (partly due to internal transfers), -2 fixed term, +6 postdocs, -6 phd students and grants.

### *Budget*

During 2008 the Seismology and Tectonophysics section has bound 936.655 euros coming from internal sources and 1.164.228 coming from external sources. The variations with respect to 2007 were +227.000 internal and -389.000 external. The internal variations are due entirely to investments in HPC and data storage that RM1, starting from 2008, implements for all the sections in Rome (the actual internal funding assigned to RM1 has been unchanged since 2005). The external variations are due basically to the great delays registered in the payment for the massive projects FIRB-FUMO and FIRB AIRPLANE (these payments are presently entirely suspended, which poses a big problem for RM1).

### *Main monitoring objectives*

- More than 30% of personnel involved in permanent seismic room service comes from RM1;
- At least 40% of the total INGV contribution to engineering seismology observing systems comes from RM1
- Arezzo seismic observatory contributes to seismic monitoring of Valtiberina, Mount Amiata and Appennino Tosco-emiliano;
- Massive contribution to seismic emergencies (at least 70 persons for more than 60 hours/week during seismic emergencies)
- Development of real time applications to retrieve seismic source parameters, simulate ground motion scenarios and forecast aftershocks occurrence;
- Geochemical monitoring of volcanic areas: Albani Hills carried out entirely by RM1, important contributions to Eolian volcanoes, Campi Flegrei and Etna;
- Important contribution to volcanic emergencies (mainly Stromboli).

### *Main research objectives*

- Development of innovative numerical approaches to model and invert geophysical data in order to achieve new results in the study of Earth internal structure and dynamics, seismic and tsunamis source mechanics, seismic effects (ground motion and macroseismic impact) and volcanic physics,
- Seismic and tsunamis hazard studies: paleo-seismology, attenuation studies, accelerometric datasets, soil classification;

- Complete the development of High Pressure High Temperature rock physics labs, boost the activities in geochemical lab and New Technologies lab;
- One of the peculiarities of RM1 is the coexistence of lab studies/infrastructures with theoretical/numerical approaches: we are trying to reach an higher level of interactions between these two “souls” also by “contaminating” researchers having a pure theoretical background with laboratory investigations;
- CO<sub>2</sub> capture and storage activities;

### *Main accomplishments*

The scientific production of RM1 is large and cannot be exhaustively summed up in few lines.

A few examples:

- The scientific production of the experimental labs that, though the infrastructures is not completed and the staff is not fully formed yet, is already of top level value (e.g. Benson, P., Vinciguerra, S., Meredith, P., Young, P., Laboratory Simulation of Volcano Seismicity, published in Science);
- The development of GEOcubit, a tool for the automatic and parallel generation of computational meshes representing geological features and properties with great detail. GEOcubit will probably become a standard widespread modeling tool;
- The USEMS project in 2008 reached is fully operative phase starting the construction of the world class high velocity high friction rotary apparatus (up to 50 MPa and 10 m/s);
- The conclusion of the pre-preparatory phase for the creation of a European “earthquakes-volcanoes” infrastructure (EPOS) led by INGV (investments involved are the order of 100 million euros);
- The first prospective, real-time earthquake forecast made during a seismic emergency: immediately following l’Aquila event, we began producing daily earthquake forecasts for the region, and we provided these forecasts to Civil Protection that used them in managing the emergency (actually, this is 2009).

### *Principal problems*

- The goal of maximizing scientific production is not considered as a real priority by all the researchers yet;
- The efforts needed to find external funding are becoming more and more time consuming and continuously increasing is the number of researchers, also young ones, who have to accomplish this task. We should find a balance in order to leave enough time to carry on real research tasks.
- The dynamics connected with the application of the “stabilization law” and the reserved competitions for senior researchers do not favor the establishment of merit;
- The ever increasing INGV complexity and dimension make necessary to introduce some intermediate structures (and decision making individuals) between Sections and President: with the present configuration we have problems both to do a sharp strategic programming and to carry on efficiently the routine management

## **Roma 2**

*Personnel*

See table at the end of this text

*Budget*

See table at the end of this text

*Principal objectives and accomplishments*

Section Roma 2, is the most heterogeneous Department of INGV covering a wide spectrum of geophysical sciences. The study of the space environment, solar terrestrial relations, crustal and deep Earth physics, some environmental problems, marine geophysics and ocean bottom observations, are an overall spectrum.

Almost all the Department subsections focus their activities on the data service and research; so, as usual, the Department activity and objectives range from data acquisition, validation and related services, also to the public, to purely scientific research.

In our scientific units several objectives were reached in 2008. Magnetic and ionospheric data were acquired from various installations in Italy and Antarctica and elsewhere. Data were analyzed for studies on secular variation and on external origin magnetic time variations. Antarctic data in particular, were used for the purpose of determining ionospheric and magnetospheric electrical current systems that flow above the Earth's poles. Data from our newly INGV ionosonde station, installed in Tucuman Argentina, were used to generate real time ionospheric electron density maps for the north western part of South America, practically so far devoid of stations.

Environmental magnetism is still a strongly used technique for the magnetic characterization of atmospheric particulate matter that, as found in our labs, is directly related to the anthropogenic environmental pollution. In our studies samples come from subway stations, central city roads etc while green park areas are used as a reference. Gas chemistry investigations revealed that methane propane and ethane natural emission from the Earth significantly contribute to a greenhouse effect.

Ocean floor multidisciplinary observatories were installed in Cadiz Gulf (Portugal), in the frame of EC Nearest project, for 1 full year, and in Weddell Sea (Antarctica) in the frame of PNRA-MABEL project. Initially planned for 1 year, this last experiment lasted 3 years for complications connected to the Observatory recovery by ship. Both activities furnished long data series for geophysics, oceanography and environmental matters. Investigations are in due course.

Quantitative numerical methods for interpreting potential field data, developing robust algorithms for the inversion, in particular of geomagnetic and gravimetric data, are other activities engaged in our Department. As a consequence, for example, crustal models were inferred for some Volcanic structure in the Tyrrhenian seafloor, as well as for some Eolian volcanic islands.

Numerous geophysical campaigns at sea were undertaken taking advantage of a strict cooperation with the Naval Hydrographical Institute (Italian Navy) and NURC (NATO Undersea Research Centre).

In general the scientific results obtained from several our activities were published in important international scientific journals (see table below).

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<i>year 2007</i>	<i>year 2008</i>
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<b>PERSONNEL</b>		
<i>Research units</i>	58	58
<i>Technical and admin. units</i>	21	23
<i>Other personnel</i>	8	8
<i>Doctorates, Fellows</i>	15	18
<i>External support</i>	8	7
<b>TOTAL</b>	<b>110</b>	<b>114</b>
<b>FUNDING</b>		
<i>From INGV (k€)</i>	603	649
<i>From external Projects (k€)</i>	2.110	1.509
<b>PUBLICATIONS</b>		
<i>JCR</i>	58	52
<i>Non JCR</i>	25	40

## Committee deliberations

On the second day of the meeting the Committee held a joint meeting with the members of the Scientific Advisory Committee (CCS). The notes from this discussion are attached as Appendix C. As in the joint meeting held in 2008, the discussion focused on four items, which appear to be the main problems for INGV: the relatively low scientific productivity, the low level of interaction among the Sections, the question of the temporary personnel and the cooperation with Universities. Much discussion centred on the financial issues; Table 1 is an overview of all the important financial aspects of the budget and its allocation to individual Sections.

ESERCIZIO FINANZIARIO 2008 ORDINARI	FONDI DATI DEFINITIVI		
<b>ENTRATE</b>			
MIUR	50.589		
PROCIV	15.000		
ALTRE	1.973		67.562
<b>USCITE</b>			
PERSONALE (1)	36.600		
ORGANI E DG	700		
FUNZIONAMENTO (2)	17.303		
ALTRE CORRENTI	300	54.903	
BENI DUREVOLI (3)	1.834		
MUTUO CT	600		
MUTUO RM	1.200		
ALTRE IN C/CAPITALE	2.006	5.640	60.543
AVANZO			7.019
ACCANTONAMENTI PER CCNL			4.600
AVANZO EFFETTIVO DA APPLICARE AL 2009			2.419
<b>PERSONALE (1)</b>			
AC	72	4.163	
NA - OV	104	6.013	
MI	22	1.272	
PA	33	1.908	
CT	81	4.683	
RM1	92	5.319	
RM2	59	3.411	
CNT	123	7.112	
BO	31	1.792	
PI	16	925	
	633	36.600	
<b>FUNZIONAMENTO (2)</b>			
AC		13.590	
NA - OV		811	
MI		137	
PA		376	
CT		672	
RM1		500	
RM2		355	
CNT		669	
BO		94	
PI		99	
		17.303	
<b>BENI DUREVOLI (3)</b>			
AC		285	
NA - OV		164	
MI		57	
PA		111	
CT		232	
RM1		329	
RM2		186	
CNT		276	
BO		147	
PI		47	
		1.834	
<b>TOTALE SEZIONI (1 + 2 + 3)</b>			

NA - OV	6.988
MI	1.466
PA	2.395
CT	5.587
RM1	6.148
RM2	3.952
CNT	8.057
BO	2.033
PI	1.071

### *Scientific productivity*

In its last 2008 report, the Committee noted with pleasure that INGV has been selected as a “Rising Star” in the field of Geosciences by Science Watch (July 2008 issue), as it had the highest percent increase in total citations from December 2007 to February 2008. This is a remarkable record indicating that the Institute has already achieved a high level of international scientific reputation. Nevertheless, the Committee thinks that scientific productivity could and should be improved. The JCR publications increased by 19% from 2007 (302) to 2008 (331) and also have increased the JCR publications resulting from cooperation among Sections (19 papers in 2007 and 66 in 2008).

Total JCR Publications	2007	2008
	302	<b>331</b>

JCR Publications per Section	2007	2008
BO	25	28
CT	44	52
CNT	35	36
MI	14	25
NA	43	53
PA	20	25
PI	25	35
RM1	60	91
RM2	55	52
	<b>321</b>	<b>397</b>

Table 2 shows that the ratio (R ) between JCR publications and the total number of scientific personnel (researchers and technologists, either permanent or temporary) is 0,88 (the true ratio is 0,73 as the real number of the publications is 331). This ratio exceeds 1 if only the 322 researchers are considered but this is not correct as the 139 technologists also contribute to scientific publications. As to the Sections productivity, neglecting CNT because of its relevant “service duties”, Pisa maintains the highest ranking (1,67) followed by Milan (1,09) and with the other Sections having R between 0,98 (RM1) and 0,89 (PA), with the exception of Bologna

which has the lowest ranking (0,67). Roma1 productivity increased remarkably in 2008 (91 JCR papers against 60 in 2007). As already stated in its June 2008 report, the Committee feels that the research output of some of the INGV Sections is still not satisfactory for an internationally prestigious institution. Scientific productivity should be regarded by all researchers as their main priority task and INGV should operate in this direction, for instance by adopting a convenient internal career promotion evaluation procedure. There are several other issues related to scientific productivity in addition to JCR publications. A detailed analysis was made by the Committee in its June 2008 report and those comments and suggestions are stressed again here. Among previous suggestions, we recall the opportunity of allocating special funds for young researchers to spend long study periods (> 6 months) in prestigious research Institutions outside Italy and to study the way of allocating a special prize (research funds) to the Sections with the best scientific productivity. Additional tables quantifying the productivity and the administrative vs. scientific effort, prepared by Dr. Massulli, are attached as Appendix D.

#### *Interaction among the Sections.*

The 2007-2008 increase of number of joint inter-sections JCR publications (from 19 to 66) indicates an improvement of the scientific interaction among the Sections. However, a greater effort remains to be made. The Committee suggests that INGV should critically review the number and tasks of TTCs. Some, as the ones attached to the OG1, appear too narrow and lack the interdisciplinary character needed to improve the scientific cooperation among sections. The Committee reiterates its previous suggestion to try to improve communication among the Sections by issuing a periodic internal newsletter containing information on exciting new findings, important published papers, new initiatives, new appointments, etc. Hopefully, Sections should compete in order to make their contribution more attractive and interesting and scientific cooperation and productivity might increase.

#### *The temporary personnel problem*

INGV has a high number of temporary personnel of 281, i.e. 33,7% of the total personnel (835); see Table D2 attached in Appendix D. The problem is particularly acute in Palermo where temporary personnel exceed permanent personnel. The present situation is rather confused, as one year ago it seemed that all this personnel should have been converted into permanent personnel according to a specific law, but this process is now interrupted and future perspectives are unclear, as INGV should be authorized by the law to increase the number of its total permanent personnel before being able to convert temporary positions into permanent ones. This situation is matter of concern for several reasons. First, the temporary personnel have been recruited apparently without a general strategic plan, but by rather following casual opportunities, such as availability of funds from specific projects. Consequently, also the conversion of such personnel into permanent positions not necessarily will contribute to a logical, harmonic well studied plan of personnel distribution among the priority tasks of INGV. Secondly such a process might compromise for many years the possibility for the Institute to recruit new young brilliant scientists. The Committee realizes that decisions in the matter are largely outside INGV competency, but it nevertheless recommends to explore any possibility of operating on a rational base, by designing the strategic priority objectives to be pursued in the future years and the related personnel needs and to cover any new permanent position possibly on the basis of wide competition open also to young researchers presently not included in the temporary INGV personnel. One issue that might help to better utilize and motivate the existing

personnel is “re-education”. Since some people have been hired to deal with specific projects, some of which have either ended or entered a new phase, it may be worthwhile to establish an Institute-wide system for retraining of personnel on different level. This could help with the redistribution of the personnel from tasks that have too many persons to those that have too few.

#### *Cooperation with Universities*

The need of improving scientific cooperation with Universities has been stressed in all previous reports of the present Committee and we again stress its importance here, expressing also some concern for the significant reduction of funds allocated to joint INGV – University research in the last triennial plan with Civil Protection Department. The Committee considers that the number of PhD students associated with the INGV sections is small compared to the Institute research potential and recommends that efforts should be made to increase this number significantly. In the present situation, with the freeze on new hiring, it could provide a very much needed influx of “new blood”.

The fact that scientific productivity is high in those sections having a high number of PhD students and young research fellows demonstrates the INGV interest in improving cooperation with Universities. The Committee also hopes that in the next triennial plan with the Civil Protection Department, the funds allocated to research could be appreciably increased.

#### *General comments*

A question was raised by one of the Section directors with regard to the peripheral Sections not being involved in new initiatives. We quote his statement:

*What sometimes I feel is a weakness in the general operation of INGV is perhaps an excess centralization of activities in the headquarters in Rome. This centralization, in turn, sometimes also reduces the flow of information to the different sections, for instance about latest events and ongoing activities, from the place where most of the action takes place. Maybe devolution of tasks and redistribution of national-level responsibilities could improve this situation, capitalizing on existing distributed resources, and forcing more interaction. I prefer not to make specific examples, but just mention that new facilities, such as laboratories and services -- e.g. when linked to IT aspects -- could effectively be hosted elsewhere and therefore also by 'smaller' sections, with the important side-effect of inducing a more proportionate growth of the various structures.*

Assuming that this statement represents a point of view that is not totally isolated, it might be worthwhile to give this idea a thought. In some cases it may actually lower the costs if, for example, the appropriate space is already available outside Rome, or the required expertise is available in one of the peripheral Sections.

Another issue that came up during the joint CIV/CCS meeting is the need for long term strategic planning. General Eisenhower (later President) once said “plans are useless but planning is essential”. The process of planning requires a joint assessment of the existing resources, additional resources needed and an agreement in what way to use them in the best way. In reality, many things may later be changed, and implementation may require modifications, but a plan represents a joint agreement on the strategic direction of the effort and, as such, is valuable. While triennial plans include an anticipation of the developments two years ahead, this is a very short time to consider major changes or needs for investment. When considering reorganization

of the Institute, it might be worthwhile to develop a vision of what the Institute might be like 10 years later and what would be necessary to achieve this goal.

Reorganization could also take place at the level of Functional Units. In the report on CNT, the Director pointed out that his Section is too large and diverse and he thinks that there are some tasks that could be moved to other Sections in order to streamline CNT's operational responsibilities. The Committee thinks that such a proposal should be given a thorough consideration and that similar action might be justified in case of other Sections and their Units.

*Next meeting of the Committee*

The Committee feels that it is important that it should be able to evaluate the next Piano Triennale (2010-2012). Having been informed that the document should be available at the end of January, we propose to meet during the first half of February 2010.

## Appendix C

### Notes from the joint CCS and CIV Committees on July 7, 2009

*(prepared by Antonella Cianchi and slightly edited by Adam Dziewonski)*

Dziewonski clarifies that the winter CIV meeting, which was to be focused on the Piano Triennale, was missed and today they are called to evaluate the Rapporto 2008.

Dziewonski reports yesterday meeting with the presentation about L'Aquila earthquake sequence and the videoconference with the Directors.

Civetta clarifies that CCS is called to evaluate scientific productivity. They are called to comment the publications results of 2008. She reminds that all years the number of pub is usually too low. CCS could give some impressions about scientific productivity.

Zollo reports that Rapporto 2008 is similar to the previous one. In the last year document INGV has a multi-parametric approach to earthquake, volcanoes and recently also atmosphere, oceans.

CCS highlights the many topics in which INGV is involved. Scientific activities and institutional act Scientific production: the numbers of publications are not so encouraging. It seems too low for a kind of Institute like INGV.

Suhadolc states that Rapporto 2008 seems very similar to that of 2007.

CCS suggests that their report be published in English. The international collaboration is huge but based on individual approach. INGV provides a lot of data, but not a focal point of European size; Italy should be the European natural laboratory for the "earthquake science"; situation is better in volcanology.

Stucchi said that the previous report and suggestions of CCS were only in part realized.

Stucchi explains the stand-by INGV situation.

Stucchi appreciates the effort of URSI in assembling the Rapporto 2008 but he thinks that it does not reflect the reality.

Stand-by means waiting for the new president, for modification of the structure, for the resolution of internal conflicts, for a new way of managing of an institution employing 1000 people, for a restructuring of the Sections, for a better support of Administrative and General Director.

CIV + CCS comments of last meeting: improvement of scientific productivity and dealing with cooperation among the sections. Something has been done. JCR publications if distributed among sections they discover that only 11 publications involve authors from different sections (*note: this number was revised the next day; in reality it is 66*) across different sections. Cooperation must be improved.

Sections cover different fields and it creates some problems to evaluate the publications.

Last year CIV was involved in discussing new organizational structure (Departments); the Section directors had different opinions: some agreed, some others not.

Today, after hearing yesterday director presentations, few of them mentioned their thoughts about the new organizational structure. CNT director was specific talking about the huge dimension of his Section and suggested that some projects be moved to other Sections: example, remote sensing tools... etc...

60 days after the reorganization, a new president will be announced. Any new organization must pay attention of the interaction among the sections.

The issue of temporary researchers was highlighted by the Directors. Competition that would lead to increasing motivation among the permanent researchers is also important.

CCS recommends that “merit” criteria instead of “anzianità” criteria be used when considering conversion of temporary to permanent positions. It is also necessary to allocate institutional funds for young researchers. Hiring for permanent position, for the stabilization process, should be open to the outside, not only for INGV people. Average age of researchers is pretty low and not many are retiring to allow for natural rejuvenation of the Institute.

An open discussion of the current INGV situation about the non permanent position is explained by Stucchi. He summarizes that the current attitude of the INGV researchers is not to go out to find funds, projects, to put themselves in competition in a European frame.

Suhaldolc, Zollo mention that the situation of temporary persons is similar also at the universities.

The question is: INGV is asking the government to hire 400 people without explaining to do what. The requirements about the people needed must be defined. It seems that the current temporary researchers were hired in an inconsistent way, some linked to the projects, but they remained even when a project was concluded, in part because the new law froze everything.

Massulli says that Ministry will authorize more conversions only if a rationalization of the permanent positions will be made. Money (Italian government money) is less than in previous years. Italy must find the funds for the research in Europe.

A new government document probably will correct the current doc that declares that personnel costs could arrive to 80% of the balance. And INGV has now 66% of the balance.

Zollo recognizes that the Rapporto 2008 – Section projects – seems to go in the right direction, to search funds outside. In a deep analysis, the projects seem not to be focused on the main INGV activities. It is possible to find outside funding (Europe or wherever) but it may divert INGV partially far from the main activities. Reading the Rapporto 2008 and the projects pages it appears it is easier to find funds for atmosphere, oceans and climate studies.

Massulli highlights that INGV administrative personnel cost is in correct proportion to the researchers personnel costs. Massulli explains that other Italian research institutions have a different proportion, where administrative personnel costs are higher in comparison with the researcher costs. On the other hand from INGV numbers seem that administrative costs are a little bit high and that there is strong variation among Sections.

CCS encourages an open selection to hire the new researchers in INGV.

## Summary of CCS comments on the Rapporto 2008

- number of publications is still too low (first time in the recent year that CCS noticed an increase) medium at least 1 per researcher only JCR
- JCR becomes difficult for the technologists. Find alternatives for quality contribution by technologists
- Too low cooperation among the sections for the publications
- Web products are now not considered as publications , but web products must be increased (Stucchi)
- The affiliation of every publication to the OG is fake. (Stucchi)
- No control if some products (papers) are missing. (Zollo)
- Table of the publications divided by section is more informative than the one divided by OG. Zollo confirms that in his opinion INGV still mostly works through Sections.
- Missing number of the researchers per sections that contribute in a publication (this number appeared in the past years Rapporto). This is necessary to normalize the number of the publications tables. I.e. analyzing the current results it appears that Pisa has got 2 papers/researcher – RM1 only 0,5 (assuming only research and technologist personnel).
- Average cost of published paper is suggested (Barberi)
- Internal check on quality of databanks, frequency of access, utility. Topic currently underestimated (Stucchi)

Suggestion of hiring people for the Milano Section (due to the special situation with Pavia), apart from the current limits, should be examined. MI-Pavia session should be larger by about 10 units in addition to the current structure.

Rapporto 2008 is missing the chapter of the relationship with the universities. This is a very weak point of the report (Zollo). Strong link must be present between INGV researchers and Universities. There are currently personal links, but must be more programmatic and organized at the Institutional level. A systematic approach is recommended (Barberi).

Strategy of the financing structures of the projects must be clarified (Zollo).

Civil Protection strongly pushes in the direction of link between INGV + Universities. But missing is the strategy of the interaction. And this is an anomaly between INGV and other European institutions (Zollo).

Dziewonski, in response to a suggestion by Civetta, recommends that jurisdiction of the coordination of the projects must be led by INGV members (the official responsibility must be left to INGV) and in strict coordination with members from Universities.

## APPENDIX D

### Statistical tables on personnel and scientific productivity

Table D1. Permanent and temporary employees

Personale di ruolo				Personale non di ruolo			
A	ricercatori		215	A	ricercatori		107
B	tecnologi		79	B	tecnologi		60
		TOTALE	294			TOTALE	167
C	dirigenti		2	C	dirigenti		1
D	tecnici		141	D	tecnici		76
E	amministrativi		27	E	amministrativi		21
F	altro		90	F	altro		17
		TOTALE	260			TOTALE	115
	E/(A+B)		9,2%		E/(A+B)		12,6%
	(E+F)/(A+B)		39,8%		(E+F)/(A+B)		22,8%
Rapporto tra il personale non di ruolo e il personale di ruolo							
		ricercatori				49,8%	
		<b>tecnologi</b>				<b>75,9%</b>	
		dirigenti				50,0%	
		<b>tecnici</b>				<b>53,9%</b>	
		<b>amministrativi</b>				<b>77,8%</b>	
		altro				18,9%	
			TOTALE			50,9%	

n.b.: in grassetto i valori superiori alla media

Table D2. Permanent and temporary employees, continued

Incidenza del personale non di ruolo per singola sezione				
complessiva				
		non di ruolo	di ruolo	incidenza %
	AC	21	64	24,7%
	CNT	51	103	33,1%
	RM1	40	79	33,6%
	<b>RM2</b>	<b>32</b>	<b>57</b>	<b>36,0%</b>
	NA	18	100	15,3%
	<b>CT</b>	<b>39</b>	<b>62</b>	<b>38,6%</b>
	<b>PA</b>	<b>32</b>	<b>25</b>	<b>56,1%</b>
	<b>MI</b>	<b>13</b>	<b>19</b>	<b>40,6%</b>
	<b>BO</b>	<b>26</b>	<b>29</b>	<b>47,3%</b>
	<b>PI</b>	<b>9</b>	<b>16</b>	<b>36,0%</b>
	TOTALE	281	554	33,7%
su ricercatori e tecnologi				
		non di ruolo	di ruolo	incidenza %
	AC	3	6	33,3%
	<b>CNT</b>	<b>28</b>	<b>47</b>	<b>37,3%</b>
	RM1	32	61	34,4%
	<b>RM2</b>	<b>23</b>	<b>35</b>	<b>39,7%</b>
	NA	8	47	14,5%
	<b>CT</b>	<b>24</b>	<b>32</b>	<b>42,9%</b>
	<b>PA</b>	<b>12</b>	<b>16</b>	<b>42,9%</b>
	MI	8	15	34,8%
	<b>BO</b>	<b>20</b>	<b>22</b>	<b>47,6%</b>
	<b>PI</b>	<b>8</b>	<b>13</b>	<b>38,1%</b>
	TOTALE	166	294	36,1%

n.b.: in grassetto i valori superiori alla media

Table D3. Comparison of administrative and scientific personnel

Incidenza del personale amministrativo (e altro) per singola sezione				
		amministrativo	pers. scientifico	incidenza %
	<b>AC</b>	<b>44</b>	<b>9</b>	<b>83,0%</b>
	CNT	14	75	15,7%
	RM1	5	93	5,1%
	RM2	9	58	13,4%
	<b>NA</b>	<b>50</b>	<b>55</b>	<b>47,6%</b>
	CT	12	56	17,6%
	<b>PA</b>	<b>14</b>	<b>28</b>	<b>33,3%</b>
	MI	4	23	14,8%
	BO	2	42	4,5%
	PI	0	21	0,0%
	TOTALE	154	460	25,1%
Incidenza di borsisti, assegnisti e dottorandi sul personale scientifico di ogni singola sezione				

	borsisti ecc.	pers. scientifico	incidenza %
AC	0	9	0,0%
CNT	15	75	16,7%
RM1	33	93	26,2%
<b>RM2</b>	<b>25</b>	<b>58</b>	<b>30,1%</b>
NA	12	55	17,9%
CT	18	56	24,3%
<b>PA</b>	<b>25</b>	<b>28</b>	<b>47,2%</b>
MI	8	23	25,8%
<b>BO</b>	<b>16</b>	<b>42</b>	<b>27,6%</b>
<b>PI</b>	<b>14</b>	<b>21</b>	<b>40,0%</b>
TOTALE	166	460	26,5%

n.b.: in grassetto i valori superiori alla media

Table D4. Scientific productivity by Section

Produttività per sezioni (in rapporto al personale scientifico)						
	pubblicazioni	personale totale	rapporto	sole JCR	personale totale	rapporto
CNT	54	90	0,60	28	90	0,31
RM1	109	126	0,87	<b>80</b>	<b>126</b>	<b>0,63</b>
RM2	<b>83</b>	<b>83</b>	<b>1,00</b>	43	83	0,52
NA	<b>71</b>	<b>67</b>	<b>1,06</b>	<b>44</b>	<b>67</b>	<b>0,66</b>
CT	<b>76</b>	<b>74</b>	<b>1,03</b>	<b>46</b>	<b>74</b>	<b>0,62</b>
PA	27	53	0,51	24	53	0,45
MI	<b>40</b>	<b>31</b>	<b>1,29</b>	<b>22</b>	<b>31</b>	<b>0,71</b>
BO	42	58	0,72	21	58	0,36
PI	<b>42</b>	<b>35</b>	<b>1,20</b>	<b>35</b>	<b>35</b>	<b>1,00</b>
TOTALE	544	617	0,88	343	617	0,56
	pubblicazioni	personale dipend.	rapporto	sole JCR	personale dipend.	rapporto
CNT	54	75	0,72	28	75	0,37
RM1	109	93	1,17	<b>80</b>	<b>93</b>	<b>0,86</b>
RM2	<b>83</b>	<b>58</b>	<b>1,43</b>	43	58	0,74
NA	<b>71</b>	<b>55</b>	<b>1,29</b>	<b>44</b>	<b>55</b>	<b>0,80</b>
CT	<b>76</b>	<b>56</b>	<b>1,36</b>	<b>46</b>	<b>56</b>	<b>0,82</b>
PA	27	28	0,96	<b>24</b>	<b>28</b>	<b>0,86</b>
MI	<b>40</b>	<b>23</b>	<b>1,74</b>	<b>22</b>	<b>23</b>	<b>0,96</b>
BO	42	42	1,00	21	42	0,50
PI	<b>42</b>	<b>21</b>	<b>2,00</b>	<b>35</b>	<b>21</b>	<b>1,67</b>
TOTALE	544	451	1,21	343	451	0,76
	pubblicazioni	peronale di ruolo	rapporto	sole JCR	peronale di ruolo	rapporto
CNT	54	47	1,15	28	47	0,60
RM1	109	61	1,79	<b>80</b>	<b>61</b>	<b>1,31</b>
RM2	<b>83</b>	<b>35</b>	<b>2,37</b>	<b>43</b>	<b>35</b>	<b>1,23</b>
NA	71	47	1,51	44	47	0,94
CT	<b>76</b>	<b>32</b>	<b>2,38</b>	<b>46</b>	<b>32</b>	<b>1,44</b>
PA	27	16	1,69	<b>24</b>	<b>16</b>	<b>1,50</b>
MI	<b>40</b>	<b>15</b>	<b>2,67</b>	<b>22</b>	<b>15</b>	<b>1,47</b>
BO	<b>42</b>	<b>22</b>	<b>1,91</b>	21	22	0,95
PI	<b>42</b>	<b>13</b>	<b>3,23</b>	<b>35</b>	<b>13</b>	<b>2,69</b>
TOTALE	544	288	1,89	343	288	1,19

n.b.: in grassetto i valori superiori alla media

Table D5. Cost of publication by General Objective

Costi e produttività degli "obiettivi generali"				
dati in migliaia di euro				
	costo personale	finanziamenti	incidenza del costo	del personale
OG1	10.750	8.647	124,3%	
OG2	3.346	3.083	108,5%	
OG3	6.437	4.503	142,9%	
OG4	3.196	2.917	109,6%	
<b>OG5</b>	<b>5.933</b>	<b>1.005</b>	<b>590,3%</b>	
TOTALE	29.662	20.155	147,2%	
	finanziamenti	pubblicazioni	valore pubblicazione	-
<b>OG1</b>	<b>8.647</b>	<b>144</b>	<b>60</b>	
<b>OG2</b>	<b>3.083</b>	<b>79</b>	<b>39</b>	
OG3	4.503	235	19	
OG4	2.917	86	34	
OG5	1.005	38	26	
TOTALE	20.155	582	35	
	costo personale	pubblicazioni	costo pubblicazione	-
<b>OG1</b>	<b>10.750</b>	<b>144</b>	<b>75</b>	
OG2	3.346	79	42	
OG3	6.437	235	27	
OG4	3.196	86	37	
<b>OG5</b>	<b>5.933</b>	<b>38</b>	<b>156</b>	
TOTALE	29.662	582	51	

n.b.: in grassetto i valori superiori alla media