



ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA



GRUPPO NAZIONALE PER LA DIFESA DAI TERREMOTI

Framework Program 2000-2002

3rd year report by the Evaluation Committee

General comments

Comments are concerning the closure of this GNDT Program, the doubtful future national programme for Italy and the referee's activities.

ALL projects lack internal coordination and there is really a general lack of program coordination.

It is recommended that in future programs, if any, that a "coordination" project is created and has financial control over all projects.

The amount of work developed in the GNDT Program is huge and unless some energies are made available to coordinate and harmonize the outcome, the achievements should be re-fragmented and could affect the project group that undertook the sub-tasks, not even the larger project groups.

The educational projects should be coordinated in their own, and within the program. On their own to get products out and continue to improve them and within the program to use the new findings to develop ideas on teaching modules that are suitable to graduate education.

Organize a cross-synthesis of the outputs and learning of all these projects; select a few transverse topics (GIS, processing and analysis of macroseismic intensity data for different purposes - source studies, attenuation studies, site effects, damage and vulnerability assessments -, relevant ground motion parameters for vulnerability estimates, dealing with uncertainties, accounting of site effects in risk analysis, regional ground motion prediction relationships, various classes of hazard maps, numerical modelling of ground motion, vulnerability curves for different levels of investigation, survey forms, vulnerability of "urban systems"...), appoint some reporters to gather and compare the information from all the relevant projects, identify the key advances and remaining issues, have this text reviewed by the corresponding project coordinators and propose some action plans, including recommendations for a future call for proposals. These synthesis comparative texts could then be published and prove to be very useful as reference documents.

- Regional attenuation laws: are derived by a national institute, but are not used for regional studies. Probably indicates a concern about the reliability of those relationships (trade-off between poorly constrained parameters, with no clear physical meaning): should be discussed in the light of large data sets.
- Probabilistic seismic hazard analysis: identify the main sources of uncertainties and try to establish a plan to reduce them (most effective fields of work may not be the most fancy); also discuss why some regional studies (cf. Western Liguria, Vittorio-Veneto) result in significantly different (larger?) hazard values than national scale studies; this may partly indicate a lack of communication or data availability between teams in charge of national studies and those in charge of regional studies and points out the need for some kind of "national data base", freely available to everybody for consultancy and with a simple procedure for including/checking new data.
- Site effects: specific studies systematically lead to significantly to much larger effects than "broad-scale"/nation-wide/code-oriented studies: need for understanding this apparent paradox, which also is a cause of misunderstanding between seismologists, geotechnical engineers and structural engineers. The non-linear issue has received only very poor attention and should be emphasized in further studies, both experimentally and theoretically. Finally, the consequences of site effects have on the phase of ground motion and hence on differential motion are also worth further investigations.
- Synthetic product on Eastern Sicily is convenient and necessary connections and coordinate activities among several groups operating with separate items in the area should be improved. About 1693 event, there are big arguments between the off-shore and inland locations: organize one specific workshop, identify the key missing observations that would reconcile the viewpoints and launch a program to get these observations.
- Marchetti's dilatometer instrument: looks to be an important development for in-situ measurements of NL parameters, the reliability of which should very carefully assessed, and advertised once proved (cf. comments on Catania's project)
- Vulnerability studies at a national scale were developed under specific request after first year activities in order to improve and complete the original Framework Program. The Committee had a

positive evaluation of the obtained results observing, anymore, that a two year activity is too short to produce a complete and full, satisfying product regarding such economic, social and strategic argument.

- Inventory of buildings/LSU data/ISTAT bias: make available in digital format LSU data, validate existing data bases through careful calibration on a few selected areas with accurate field inventory; look for any systematic bias; look into the approaches through satellite or aerial imagery? Compare the different typological classifications and recommend a common one. Also try to come up with one single set of forms corresponding to different detail levels, ensuring that each one is compatible with the other and modify them once major improvements/steps seem mature and accepted: otherwise, every team uses his own modified version and it is impossible to make comparisons from one study to another.
- Vulnerability curves: homogenize the way to estimate them, to enlarge each time dependent scenario, to have a systematic data base and the way they account for site conditions as well.
- Vulnerability of "urban systems": a number of projects address that non-easy issue and a careful comparison work is needed, starting with a semantic clarification: same words may not have the same meaning in different projects – which is understandable as urban systems are very complex!
- Comparison of the various GIS systems developed within each project, harmonization and selection of a "unique" national system on which all the existing and new data should be gathered. This implies that each project should produce a document (if possible with an a priori common format) describing the design, the functionalities, the limitations and the required data layers for its "own" GIS. Discussions and improvements must be conducted however on the way to display uncertainties in GIS maps: nice colour maps may lead the end-user forget about the fuzziness of contours and borders and the sensitivity to hidden underlying assumptions. The Committee realize it is not an easy task, but it is needed.
- All these results are extremely interesting also outside Italy: the availability of final reports should be as open as possible (on GNDDT Web Site).

Future hypothetical developments

- Encourage and deepen connexions and two-way exchanges between earth scientists/seismologists and engineers (also within the review committee!).
- Benefit from all the investigations performed on Colfiorito to have it as a test site?
- Earthquake triggered landslides: it is amazing that there is presently, nowhere in the world, one record of ground motion along a sliding slope: it is recommended to have an instrumentation policy to install both single seismological stations on poorly stable slopes at many sites in Italy and dense arrays on a few, carefully selected, close to failure slopes (seismological sensors, strain meters, piezometers, ...): this is absolutely mandatory to assess the reliability of the different methods (simple - pseudo-static - and sophisticated as well) and calibrate some of their parameters.
- Given the length of Italian coasts and the importance of off-shore earthquake hazard, time is ready for routine off-shore, deep-sea observations (northern Sicilia, Liguria, Tyrrhenian sea, ...).
- Educational projects: should find a relay in routine civil protection action and should definitely be continued.
- Permanent GPS observations should be encouraged, although it will provide results only in the long run, these results will be very useful.
- Carefully archive, document and make available all the data bases produced by the different projects; investigate how these data bases can remain alive and be continuously fed by new studies/recordings/results.
- Another last comment concerning the review process: the Referees Committee had fruitful exchanges for the initial review of proposals, as after having read reports and confront any different feeling. It was less productive for the year 2 and 3 reviews, since the Referees Committee had each time exhausting days listening to all the projects and not enough time to really confront respective opinions.

Theme 1

Seismic risk assessment on the housing estate at a national scale

Revision of the theoretical and observational grounds of the seismic hazard estimates at a national scale

(P. Gasperini)

This project finally produced interesting results. The project focused on what they know how to do, good quality analysis of intensity data for hazard assessment. Some improvement also in integrated activity with other projects especially in definition of new hazard projects. It is not yet clear what is completed and what is not yet completed. Verification of the magnitude scaling law for instrumental catalogue is not yet completed.

Brief report well and clearly written as we were given is very good; just emphasize the key issues for further investigations. And also improve cooperation/exchanges with other teams working on regional attenuation relationships and processing of intensity data. The techniques developed can be used to supplement paleotectonic and seismic risk studies.

The numerical simulation techniques developed within the Cocco project improve it is likely that the Authors of those simulations may use the Gasperini results in order to study several fundamental seismological items.

The good quality of scientific production is also a new feature in confront with the second year report.