Giulio Iovine

Scientist at CNR-IRPI (National Research Council – Institute of Research for the Geo-hydrologic Protection) of Cosenza, ITALIA

afferent to:

Macroarea: E “Earth and Environmental Sciences”, Area: E.1 “ Earth Sciences ”, Ambits: E.1.2 – “Geology, geochemistry and geophysics of solid Earth”; E.1.3 – “Hydrology, applied geology, geotechnics, pedology”; E.1.4 – “Methods of Earth observation and description and geomorphology”.

Sectors SSD: GEO/05 (Applied Geology) & GEO/04 (Physical Geography and Geomorphology).

Sectors ERC: PE10 – Earth system science: physical geography, geology, geophysics, atmospheric sciences, oceanography, climatology, ecology, global environmental change, biogeochemical cycles, natural resources management. PE10\_5: Geology, tectonics, volcanology.

* Head of the Organizational Support Unit (U.O.S.) of Cosenza of CNR-IRPI, from 17.01.2011 to 16.06.2015.
* President of the “Area della Ricerca di Cosenza” of CNR, in 2012 and 2014.
* Graduated in Geological Sciences on 29 March 1988, with a thesis on “The activity of Vesuvius from 1631 to 1944: analysing the volcanic hazard in the Vesuvian area” - Supervisor: Prof. L. Lirer, Vote: 110/110 cum laude.
* Lecturer of “Applied Geology” at the University of Calabria from the academic year 2013-14, and from 2002-2003 to 2006-2007. Lecturer of Geotechnics in the academic year 2000-2001.
* Since 2003, Convener and Chairman of Scientific Sessions on the theme “modelling and simulation of dangerous phenomena”, and on “innovative techniques of hazard evaluation and mapping, and of risk mitigation”, at international Conferences/Congresses and national Conferences/Congresses.

• Topic (Subject) Editor of the Journal “Earth System Science Data” (ESSD - Copernicus GmbH, Copernicus Publications - ISSN: 1866-3508, eISSN: 1866-3516, Chief Editors: David Carlson & Hans Pfeiffenberger – since its foundation (in 2009).

• Scientific Coordinator of the Journal “Geologi Calabria” (unit of the ORG-C), since the issue n.8(1) (Apr. 2007).

• Member of the Editorial Board and Manuscript Editor of the Journal “Environmental Modelling & Software” (EMS, Elsevier - ISSN: 1364-8152, Impact Factor (2008): 2.659, Editor-in-Chief: A.J. Jakeman, since Mar. 2007.

• Member of the Scientific Board of the Journal “Geologia Tecnica & Ambientale” (unit of the National Council of Geologists - CNG), since 2011.

• Member of the Scientific Board of the Journal “Geologi Calabria” (unit of the ORG-C), since 2006.

• Guest-Editor of Special Issues in international Journals (e.g. Computers and Geosciences, Computational Geosciences, Environmental Modelling and Software, Natural Hazards, Physics and Chemistry of the Earth), and national Journals (e.g. Geografia Fisica e Dinamica Quaternaria), on the theme “Modelling and simulation of potential dangerous phenomena, and innovative techniques for evaluating, mapping and mitigating the risk” – since 2003.

• Author of more than 80 scientific publications in Journals and Conference Proceedings; Guest Editor of Special Issues of Journals and of Proceedings; Author of thematic maps and of technical-scientific reports.

RESEARCH INTERESTS

Within the more general topic of “Landslide risk evaluation and mitigation”, the performed research activities concerned:

• Slope dynamics and morpho-evolution. Surveying, mapping and analysis (with GIS) of slope instability, at local and areal scale.

• Landslide activations and sinkholes triggered by either meteoric or seismic events. Effects of landslides in urbanized areas. Evaluation of hazard, susceptibility, vulnerability, and specific risk induced by slope-instability phenomena. Evaluation of conditions of imminent risk.

• Geomorphologic, morpho-neotectonic analyses seismic-induced landslides. Large-scale landslides, Deep-seated gravitational slope deformations, and tectono-gravitational phenomena, either at macro- or meso-scale. Effects on the environment induced by earthquakes.

• Modelling and simulation (mainly through cellular automata) of the spatial-temporal development of flow-type landslides (debris flows, earth flows, debris avalanches). Calibration and validation against real cases, also with parallel computational environment, through genetic algorithms. Sensitivity analyses through genetic algorithms. Susceptibility/hazard mapping.

Essentially, studies of Applied Geology and Geomorphology in the field of gravitational slope evolution were performed, by dealing with issues of geo-hydrological defence and, more in general, of civil protection. The scientific interest migrated from issues of landslide recognition and mapping toward spatial quantitative analyses of morphologic-evolutive characteristics, of possible interferences with the urban environment, and triggering mechanisms (mainly meteoric and seismic). More recently, the relations among tectonic structures and gravitational deformations were investigated, as well as issues of modelling and simulation of landslide phenomena for susceptibility mapping, through innovative and automated techniques of analysis, useful also for managing phases of environmental crisis.

The researches, carried out in several study areas of Southern Apennine and Calabrian Arc (and subordinately abroad), refer to multi-disciplinary co-operations, involving structural geologists, engineers, physicists, mathematicians and computer specialists. Within such investigations, apart from the realization of research activities, the definition of the project line and the co-ordination of the activities of other members of the group were also looked after.

In recent years, scientific contacts with national and international colleagues were also kept, aiming at favouring interactions and cultural exchanges on the research themes of interest, by: organizing conference sessions (as main convenor and/or chairman), editing the proceedings of the conferences, editing special issues in international journals (as guest editor), and in the frame of agreements of scientific co-operation (as responsible or co-responsible).

MOST RECENT ACTIVITIES

• Distribution and type of sinkholes in plan areas of Calabria.

Calabria is among the European regions most severely affected by earthquakes in historic time. Seismic events may induce, apart from direct damage to constructions, even diverse secondary effects on the environment. At CNR-IRPI, regional studies were recently started aimed at inventorying and mapping environmental effects caused by major seismic events, by also realizing a specific data base. In such a context, a close examination was performed aiming at analysing evidence and verifying reports of cases of seismic-induced liquefactions, and to related sinkholes. The study was carried out by examining seismologic data bases and specific literature, and through archive researches and interviews to experts. As regards the sites affected by the sinkholes, available stratigraphic, geotechnical and hydrogeological data were also examined, and actual geomorphologic characteristics were evaluated by means of field surveys and airphoto-interpretations. Accordingly, a first plausibility analysis of the historical reports could be made. Moreover, in the vicinity of the village of San Basile (CS), a set of recent sinkholes at Piano dell’Acqua – presumably of meteoric origin - was analysed in detail.

• Modelling and simulation of flow-type landslides through automated computing techniques for risk evaluation and mapping

Examples of event mapping and of susceptibility evaluation for some study areas in the USA (Yosemite Valley, CA, and Nelson County, VA) were realized through simplified (empirical) approaches of analysis and GIS. Afterwards, the development and the application of a cellular-automata model, in co-operation with colleagues of Unical, allowed to realize inventory and susceptibility maps in different study areas of Campania (Pizzo d’Alvano, S. Martino Valle Caudina, and Cervinara). The quantitative comparison among simulated and real cases allowed to calibrate the model, by adopting genetic algorithms in parallel computing environment, and then to validate the model. Again by means of genetic algorithms, sensitivity analyses were performed aiming at verifying the behaviour of the model with respect to geometry, size and orientation of the mesh, of quality of topographic data, and of the main parameters. The overall simplicity of the method, combined with the need of reliable but low-cost and easy-to-collect input data, suggest to adopt this type of approach for preliminary and simplified analyses of susceptibility, and for realizing risk scenarios - even during a crisis. The method revealed to be reliable, and also of international interest: among the others, the National Science & Technology Centre for Disaster Reduction of Taipei (Taiwan) advanced a proposal of scientific co-operation for applying the approach at Taiwan, for risk mapping purposes. The most recent release of the model, inspired from both the geotechnical model and the equivalent fluid approaches, is presently undergoing detailed test against laboratory cases and historic real events. The modelling approach and the method for susceptibility/hazard mapping was presented on occasion of several international conferences, with examples of application published in international proceedings and journals.

• Relationships among deep-seated gravitational slope movements, geologic-structural and neotectonic characteristics, and Radon concentrations in chain areas affected by late uplifting

In Calabria, the researches were based on geomorphologic and structural surveys carried out at both macro- and meso-scale. Information related to macro-seismic and environmental effects caused by the principal earthquakes was also considered. As regards the neotectonic setting and the role of the deep-seated gravitational deformations during the late phases of development of chain areas, the results are highly innovative and, in some respects, even conflicting with literature. The multi-disciplinary studies allowed to recognize a new peculiar type of tectono-gravitative phenomenon (wedge-shaped accommodated structures along reactivating thrust ramps), and to describe its genetic-evolutive mechanisms. Furthermore, in some study areas of the Crati graben and along the northern border of the Sila massif, the availability of data on Radon concentrations also allowed to analyse the relationships among recent/active faults, historic and instrumental seismicity, deep-seated gravitational slope deformations, and Radon anomalies, with interesting results published in international journals.