

Vol. 53 – N. 4

December 2012

# Bollettino di Geofisica

teorica ed applicata

*An International Journal of Earth Sciences*

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## The Earth, its phenomena, and some related methods

Selected papers from the 29<sup>th</sup> annual conference  
of the Italian Group for Solid Earth Geophysics

Prato, October 26-28, 2010



Istituto Nazionale di Oceanografia  
e di Geofisica Sperimentale

ISSN 0006-6729

## Preface

The special issue “The Earth, its phenomena and some related methods” of the *Bollettino di Geofisica Teorica ed Applicata* includes manuscripts of some of the oral presentations at the 29<sup>th</sup> annual conference of the Gruppo Nazionale di Geofisica della Terra Solida (GNGTS), held in Prato (Italy), from October 26 to 28, 2010.

The GNGTS was established in 1978 as an offshoot of the Italian “Consiglio Nazionale delle Ricerche” (CNR) to promote, develop, and coordinate research in the field of solid Earth geophysics. The GNGTS comprises various sections: seismology, geodesy and gravimetry, geothermy, crustal geophysics, mining and environmental geophysics as well as seismic exploration. In the past years, in spite of its limited budget, the GNGTS financed various research activities and sponsored multi-disciplinary projects, mainly devoted to the study of the Earth’s crust. About 500 researchers refer to the GNGTS and meet yearly in Autumn for a national assembly: a point of reference in the life of Italian geophysics. Although the institution closed in December 2000, the annual conference continued to be held reaching its silver anniversary in 2006. The peer-reviewed proceedings of the national conferences have been published since 1997 in special volumes, and on CD-Roms, mainly in Italian. These documents are also available at the GNGTS web site ([www2.ogs.trieste.it/gngts](http://www2.ogs.trieste.it/gngts)). Since the year 2000, it has been decided to publish selected papers from these conferences in an international geophysical journal, for a better dissemination of information about GNGTS activities with a view to an international audience.

The present volume results a picture of the nowadays Italian research focused on the Earth and its phenomena, as well as more specifically on the geophysical methods that constitute the study tools. These two frames, namely geodynamics and tectonics, on one side, and applied geophysics, on the other, in which GNGTS was historically divided, are becoming throughout the years, even more continuous, and this volume is a clear example of it.

We start from two multidisciplinary studies, encompassing morphobathymetry, multichannel seismic or chirp sub-bottom profiles, and core and CTD samples analysis, aimed at detecting seismogenic faults offshore: in the first case, the study of Gasperini *et al.* (2012) is focused on the characterization of seismogenic faults in the Marmara Sea related to the North Anatolian fault system, whereas Loreto *et al.* (2012) are aimed at detecting a structure in the Gulf of Sant’Eufemia, possibly responsible for the destructive earthquake of 1905. Morphobathymetric studies are also at the basis of the high resolution terrain digital model of the Palinuro Seamount, offshore the Salerno Gulf (Milano *et al.*, 2012), important basis for the study and characterization of this structure. We move then onshore, along the Appenninic Chain, with the study of Pastori *et al.* (2012) on the presence of anisotropic effects in the earthquake sequences in Val d’Agri, Alto Tiberina Fault, and L’Aquila, the results of which are interpreted in terms of stress principal axes and possible presence of fluids. The two papers that follow may be considered complementary. The first one, Galli *et al.* (2012), uses geological indicators, as the trench excavation and

vation and radionuclides analysis, in order to establish recent activities of the Magnola Fault (Abruzzi, NW of the Fucino Plain) that could be responsible for the 1915 Avezzano earthquake. A warning not to overmuch emphasize the tectonic influence on morphology, and hence morphology as fault indicator, comes from the exhaustive review work of Bartolini (2012), that gives a critical reading of various geological features. Geomorphology, more that stresses or fluid presence, appears to influence the anisotropic behaviour of the coda waves analysed by La Rocca *et al.* (2012) in two different arrays on the Gran Sasso, one on the surface and the other at a depth. The last work regarding earthquakes and their effects, is the paper of Föh *et al.* (2012) that presents the interdisciplinary of a natural hazard project in the Valais (Switzerland) through seismological, geodetic and modelling studies.

We smoothly move to works more focused on geophysical and mathematical methods to solve geophysical problems with the work of Barzaghi and Ferulano (2012) that, through the use of instruments located in an active well, recorded and located microseismic events and, in particular, evidenced microseismic activity related to acidification actions. Geophysical methods to afford different problems are the base of the three manuscripts that follow. Mazzotti *et al.* (2012) present and analyze the advantages of using quaternions, i.e., hypercomplex numbers introduced by Hamilton in 1844, for a better exploitation of the information contained in multicomponent seismic data, showing the improvement of the resulting processed data. Böhm *et al.* (2012) focuses on an automatic procedure that integrates the seismic refraction standard method with the diving wave tomography, showing the results on the detection of the bedrock in a landslide. The paper of Piegari *et al.* (2012) shows the results of the application of a cellular automaton model to simulate volcanic eruptions. An integrated study, based on electromagnetic, electric resistivity and very low frequency electromagnetic methods, performed by Gervasio *et al.* (2012) is applied to a better characterization of thermal waters in north-eastern Friuli (Italy), whereas the airborne electromagnetic method is illustrated by Viezzoli *et al.* (2012) through many examples from different parts of the world, mainly on groundwater salinization problems.

Reading the volume, one has the perception of GNGTS as a vivid and dynamic research group, that affords the study of the solid Earth, of its structures, phenomena and resources looking also to a continuous innovation, in methodologies, instruments, or in the way standard methodologies are used and integrated to solve a problem.

We wish to thank Dario Albarello, Andrea Argnani, Maurizio Bonafede, Ettore Cardarelli, Anna Del Ben, Ciro Del Negro, Daniela Di Bucci, Michele Dragoni, Paolo Galli, Davide Gei, Stefano Gori, Stefano Grimaz, Eugenio Loinger, Enzo Mantovani, Marco Mucciarelli, Francesca Pacor, Roberto Paolucci, Riccardo Petrini, Lorenzo Petronio, Michele Pipan, Gaetano Ranieri, Giovanni Santarato, Stefano Solarino, and Umberta Tinivella who participated in the selection and reviewing process of the papers and that contributed to greatly improve the quality of this volume.

## REFERENCES

- Bartolini C.; 2012: *Is the morphogenetic role of tectonics overemphasized at times?* Boll. Geof. Teor. Appl., 53, 459-470.
- Barzaghi L. and Ferulano M.F.; 2012: *Borehole microseismic in deep live oil wells: an example.* Boll. Geof. Teor. Appl., 53, 509-521.
- Böhm G., Francese R. and Giorgi M.; 2012: *Integrated refraction seismics and tomographic study of a gravitational collapse phenomenon.* Boll. Geof. Teor. Appl., 53, 539-550.
- Fäh D., Moore J.R., Burjanek J., Iosifescu I., Dalguer L., Dupray F., Michel C., Woessner J., Villiger A., Laue J., Marschall I., Gischig V., Loew S., Marin A., Gassner G., Alvarez S., Balderer W., Kästli P., Giardini D., Iosifescu C., Hurni L., Lestuzzi P., Karbassi A., Baumann C., Geiger A., Ferrari A., Laloui L., Clinton J. and Deichmann N.; 2012: *Coupled seismogenic geohazards in Alpine region.* Boll. Geof. Teor. Appl., 53, 485-508.
- Formisano L.A., La Rocca M., Del Pezzo E., Galluzzo D., Fischione V. and Scarpa R.; 2012: *Topography effects in the polarization of earthquake signals: a comparison between surface and deep recordings.* Boll. Geof. Teor. Appl., 53, 471-484.
- Galli P., Messina P., Giaccio B., Peronace E. and Quadrio B.; 2012: *Early Pleistocene to late Holocene activity of the Magnola fault (Fucino fault system, central Italy).* Boll. Geof. Teor. Appl., 53, 435-458.
- Gasparini L., Polonia A., Del Bianco F., Favali P., Marinaro G. and Etiope G.; 2012: *Cold seeps, active faults and the earthquake cycle along the North Anatolian Fault system in the Sea of Marmara (NW Turkey).* Boll. Geof. Teor. Appl., 53, 371-384.
- Gervasio I., Della Vedova B., Cassiani G., Dazzan E. and Deiana R.; 2012: *Characterization of Bagni di Lusnizza (Udine) sulphureous water resources by integrated geophysical methods.* Boll. Geof. Teor. Appl., 53, 559-580.
- Loreto M.F., Zgur F., Facchin L., Fracassi U., Pettenati F., Tomini I., Burca M., Diviaco P., Sauli C., Cossarini G., De Vittor C., Sandron D. and the Explora Team of Technicians; 2012: *In search of new imaging for historical earthquakes: a new geophysical survey offshore western Calabria (southern Tyrrhenian Sea, Italy).* Boll. Geof. Teor. Appl., 53, 385-401.
- Mazzotti A., Sajeva A., Menanno G.M., Grandi A. and Stucchi E.; 2012: *Application of quaternion algorithms for multicomponent data analysis: a review.* Boll. Geof. Teor. Appl., 53, 523-537.
- Milano G., Passaro S. and Sprovieri M.; 2012: *Present-day knowledge on the Palinuro Seamount (south-eastern Tyrrhenian Sea).* Boll. Geof. Teor. Appl., 53, 403-416.
- Pastori M., Piccinini D., Valoroso L., Wuestefeld A., Zaccarelli L., Bianco F., Kendall J.M., Di Bucci D., Margheriti L. and Barchi M.R.; 2012: *Crustal fracturing and presence of fluid as revealed by seismic anisotropy: case histories from seismogenic areas in the Apennines (Italy).* Boll. Geof. Teor. Appl., 53, 417-433.
- Piegari E., Di Maio R. and Scandone R.; 2012: *Effects of different rock density profiles on magma ascent and on the statistical distributions of simulated eruptions.* Boll. Geof. Teor. Appl., 53, 551-558.
- Viezzoli A., Munday T. and Cooper Y.L.; 2012: *Airborne electromagnetics for groundwater salinity mapping: case studies of coastal and inland salinisation from around the world.* Boll. Geof. Teor. Appl., 53, 581-599.

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