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PROJECT S4: ITALIAN STRONG MOTION DATABASE Task 2: Geological-geotechnical catalogue of ITACA sites

THE NEW ITACA MONOGRAPH: MAIN FEATURES AND DATA COMPILING Di Capua G.¹, Lanzo G.², Peppoloni S.¹, Scasserra G.²

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Goal

The activities carried out within Task 2 aim to collect, organize and synthesize geological, geomorphological, geotechnical and geophysical data for the location site of the Accelerometric National Network (RAN) stations in Italy, managed by the Department of Civil Protection. Knowledge of geological and geomorphological context, and the mechanical and dynamic characteristics of the stations subsoil is an important factor for studies on the attenuation laws and the choice of accelerograms related to the subsoil category provided by seismic code. Having to produce on a large number of sites (over 600), this knowledge have to be rationalized and homogenized so as to arrive at a common and comparable level of information. With this goal has been organized and implemented the activities within Task 2.

Philosophy

The station monograph carried out within the past S6 INGV Project had tried to fill the gap in the knowledge of the characteristics of station sites, with the advantage of providing a first screening on the quantity and quality of data available for most of the RAN stations; but it turned out to be uneven and incomplete since not provided a robust standard for the collection, homogenization, representation and synthesis of data. This problem has been addressed by the Task 2, which has produced a **new standard monograph for the ITACA stations**. This document is the first product of the S4 Project (deliverable D3) and can be downloaded from the project website (<http://esse4.mi.ingv.it>). The new ITACA monograph follows a careful philosophy, because on the one hand provides a minimum level of information, homogeneous for all station sites, the other takes into account the physiological lack of information about the subsoil. In addition, the new format requires attention to data that previously were not considered.

Monograph structure

The new ITACA monograph consists in the following 12 cognitive modules, and various sub-modules (between brackets):

- 1) General information.
- 2) Geographical information (Location, Coordinates, Cartography).
- 3) Geomorphology (Site morphology, Landslides).
- 4) Geology (Cartography and fields for geological cross section and fault proximity).
- 5) Geomechanical information.
- 6) Geotechnical & Geophysical information (Test summary and location, Stratigraphic profile, In situ tests, Laboratory tests).
- 7) Microtremor H/V spectral ratio.
- 8) Earthquake H/V spectral ratio.
- 9) Site classification (EC8 – NTC2008) (Lithostratigraphic classification, estimated and based on in-situ measurements, Topography classification).
- 10) Synthesis of information (divided into Information relevant to site classification, Geological, geomorphological and geomechanical information, Other information relevant to seismic site response, Distinctive features of site response).
- 11) References.
- 12) Enclosures.

Novelties

The main improvement on characterization is related to the module containing information on the geomorphology, with particular reference to the **site morphology** (with the selection of standard situations) and the presence of morphogenetic processes (**landslides**) in the site or in the proximity of the station. Another significant innovation is the possibility to indicate the proximity of **tectonic elements**. Finally, one last addition to the monograph is the inclusion of a module to summarize **geomechanical data** from surveys on rock sites. At the end of the monograph there are important boxes that synthesize all the information that are relevant for **site classification** using different methodologies. All data that have no place within the forms, modules and sub-modules can be put in the annexes. The monograph has been prepared in English language in order to make available and readable information from international scientific and technical users.

Compiling

A first test of compilation was carried out for 4 station sites that had different quality and quantity of data. Afterwards from ITACA database (616 stations) were selected stations that recorded seismic events with $ML \geq 5.0$ (164 stations). From this subset were finally extracted the ones which recorded the 1980 Irpinia-Basilicata earthquake (16 stations). These stations are well characterized by a geological, geophysical and geotechnical point of view. The presence of landslides in the station sites has been controlled by consulting the maps produced by the IFFI Project (Inventory of Italian Landslides: <http://193.206.192.244/cartanetiffi/>). The compilation of the 16 new monographs has been completed and included in the ITACA database. After the L'Aquila earthquake occurred on April 6th 2009, components of Task 2 (RU2 and RU6) were involved in surveys on 57 stations that recorded the mainshock and a report was prepared (http://esse4.mi.ingv.it/images/stories/Classificazione_Sito_Stazioni_RAN_AQ.pdf, only in Italian), containing also a preliminary site classification. The new monograph has been compiled for these stations and date are being included in ITACA database using a web form (as Referees Committee requested).

Example of compiling: recording station at Sturmo (1980 Irpinia earthquake)



**Post - L'Aquila earthquake surveys:
recording stations in L'Aquila**