

EGU21-16192

<https://doi.org/10.5194/egusphere-egu21-16192>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



An integrated methodological approach for the three-dimensional modeling of the subsurface structures: the case of Borgo Montello, in Latina, Italy.

Klodian Skrame^{1,3}, Diego Albini^{2,3}, Carlo Moriconi^{2,3}, Christian Comotti^{2,3}, Redi Muci¹, Oltion Fociro¹, and Jeton Pekmezi¹

¹Polytechnic University of Tirana, Faculty of Geology and Mining, Department of Applied Geology and Geoinformatics, Tirana, Albania (klodian.skrame@fgjm.edu.al)

²Geosurveys Srl, Gualdo Tadino (Perugia), Italy

³GeoHazard Sh.p.k, Tirana, Albania

In this work, it is intended to highlight the indispensable significance of the geophysical surveys on the hydrogeological research and on the seismic risk mitigation.

This paper describes the acquisition methodologies, the instrumentation used, the techniques and methods of inversion / interpretation and the results of a hybrid geophysical survey carried out for the reconstruction of the 3-D geological modeling of the Borgo Montello case study, in the Province of Latina, in Italy.

The aim of the study was to test the use of hybrid geophysical surveys in order to obtain a detailed geological-stratigraphic and hydrogeological modeling of the subsoil, its interpretation in terms of flow model and to identify the relationships between the parameters that define the geological-hydrogeological-stratigraphic model with the local seismic ground motion amplification of the site.

From a geological point of view, the study area is composed by two main geological formations. The most superficial one is characterized by sedimentary deposits linked to the filling of the Pontine depression: composed by alternations of clays, silty clays and silts, with a subordinate component of silty sands. The second lithological type is linked to the deposition of pyroclastic deposits from the Lazio volcano and in particular from the deposits of reddish pozzolane alternating with thickened tuff, the so-called "Tufo lionato".

A research approach that integrated different geophysical methods, as: resistivity, induced polarization electrical tomography and seismic refraction and high resolution reflection methods were carried out to reproduce the thickness and the extension of the over mentioned deposits.

Afterwards, having obtained 5 independent models (seismic reflection section, seismic refraction section, electrical resistivity tomography, electrical tomography and local seismic amplification section) the authors proceeded, through the k-means algorithm methods, for the analysis of the bivariate dataset cluster, in order to identify the relationships between the 5 sets of variables. The

proposed methodology was focuses on characterizing the aquifer potential by using simultaneously all the geophysical parameters obtained together with the stratigraphic data, in order to reduce the uncertainties and ambiguity in the interpretation of the geophysical data for a better modeling of the subsoil.

The obtained results were compared with a collection of existing boreholes, well logs, geotechnical and geophysical data. The 3-D geological models match quite well with the information determined from these previous works.

Lastly, based on the three-dimensional modeling of the subsurface structures, a Local Seismic Response study was carried out.