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Reconstruction of a 3D geological model of the quaternary deposits filling the Cassino intramontane basin (central Italy)

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The aim of this work is to show how classical geological investigations and geophysical measurements can be combined with implicit 3D modelling to reconstruct detailed geological models of quaternary intramontane basins and to describe the relationship between the different lithological bodies composing the post-chain filling deposits. To this aim, has been chosen the urban area of Cassino in southern Lazio ((central Italy). The area is located at the end of the Latina Valley, and it is bordered by the carbonate structures of Mt. Cairo to the NW, Venafro Mts. to the NE and SE, and several main tectonic elements mainly in Apennine development. For reconstructing the lithostratigraphic structure of subsoil, about 200 stratigraphic surveys and about 100 seismic noise measurements were analyzed and homogenized. These have been correlated with the deposits and depositional environments described in the literature. Seven main stratigraphic units were recognized. The results show that the carbonate bedrock is very articulated because of tectonics. On its top, lies a clay and sandstone unit attributable to the Frosinone Flysch (Upper Miocene), followed by a complex of alloantigen series attributable to a generic Messinian sea-lake environment (Lower Pliocene). These sediments are covered by the lacustrine sequence of the *Lirino* Lake, formed by an alternation of clayey silt and sand with gravel, with thicknesses ranging from a few meters near the carbonate reliefs up to about 150 m in the NW of the Cassino urban area. It should be noted that this sequence, close to the relief of Mt. Cassino, is characterized by the presence of layers of gravel and sand attributable to the *Paleo-Rapido* riverbed, today diverted by anthropic activity, which probably constituted an ancient tributary of the *Lirino* Lake, which occupied the Cassino plain in geological times. Traces of the course of the *Paleo-Rapido* riverbed can also be observed in the buried morphology of the carbonate Bedrock. The characterization of the subsoil has led to the definition of a conceptual geological model that highlights the persistence of the condition of the river-lake environment at least until the end of the Late Pleistocene.