



The ancient harbour system of Terracina (Latium, Italy) obtained by gravity and seismic surveys.

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Historical research has shown that Terracina (Latina, Latium) played a fundamental role in the maritime and land traffic since before the foundation of the colony. The settlement was established where the organized system of maritime, land, coastal, and fluvial transport had the most ideal conditions to constitute an important commercial crossroads, apparently since the beginning of recorded history.

In order to reconstruction the buried archaeological structures attributed to the ancient Roman port, traditionally attributed to Traiano, in the current area of the harbour of Terracina, it was carried out a gravity survey, more than 380 gravity stations. The gravity method enables to recognize the cavity and the structures of the buildings underground through the results of variations density in the subsoil. Seismic tomography treats the problem of identifying a buried structure as a wave propagation process by inverting the linearized wave equation to compute the spatial distribution of the slowness of the velocity. The purpose of our tomographic study is to further test the method and to guide archaeologists in their future excavations by locating and identifying buried structures.

In the residual gravity anomaly map a series of positive anomalies are visible which confirm the round structures and the pier of the buried foundations of the Imperial harbour.

Unfortunately, little remains of the functioning facilities of the harbour's activities. The modern construction of the harbour, in fact, has to be developed around the new inhabitable commercial area, know today as Terracina Bassa or Borgo alla Marina. It had to be developed with a modern infrastructure of a harbor area, as in the construction of the rooms for storage of goods, warehouses, as well as for the thermal baths, hotels and amphitheatre.

Furthermore, there are always the positive anomalies that characterize the area to the north-east of "Montone" hill where archaeological remains are easily visible near Via Lungolinea Pio VI.

A large negative anomaly is situated in correspondence with "Montone". Gravity information shows an average density of the hill approximately 1.10 g/cm³, notably less than the recorded data relative to dry sand, approximately 1.6 g/cm³. The low value founds hits at the possibility of an "emptiness" in the subsoil of "Montone" hill, attributing to the possible ancient buried constructions (the rooms for storage of goods and warehouses). The seismic refraction method provides information on the low frequency component of the model for the shallowest layers. In this way, it is possible to fix the thickness of the surface layer, as well as to determine a velocity model. Use of the refraction method in "Montone" hill has resulted in the determination of the depth of the walls upon which the foundations were built.

The sandy covering would therefore be natural from aeolian origins, like all the dunes present along this area near the southern coast of Latium. This hypothesis is in contrast to the information recorded from 1600 that attributes the formation of the reliefs accumulated to sand having been dredged up from the harbour.