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Preliminary results of near-surface geophysical survey in Lefkada town (Greece).

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Investigation of the subsurface structure of Lefkada town using a multi-disciplinary geophysical approach.

In this paper we present the preliminary results of a near-surface geophysical research carried out on Lefkada island, for the investigation of the geological setting of Lefkada town. The geophysical survey has also been extended in selected locations of Peratia region (Fig. 1), for a more accurate perspective of the subsurface geological structure.

The post-alpine formations that outcrop throughout the broader study area, mainly consist of alluvial deposits (Fig. 1). Coastal sandy deposits and beach rocks are observed along the shoreline, whilst lagoon deposits are cropping out at several locations surrounding Lefkada town. Miocene deposits of sandstones and marls are observed at the south-eastern and south-western areas, on both sides of the canal. The alpine basement consists of the *Pantocrator Limestones* and with *Dolomites of Upper Triassic* formations that are cropping out at the southern-western part of the study area and at the eastern area, respectively. The active fault system that bounds the northern margin of *Pantocrator Limestones* (Lekkas *et al.,* 2001) is trending along NW-SE direction and dipping towards NNE, beneath the alluvial deposits and the downtown area that is located at the south coast of the lagoon.

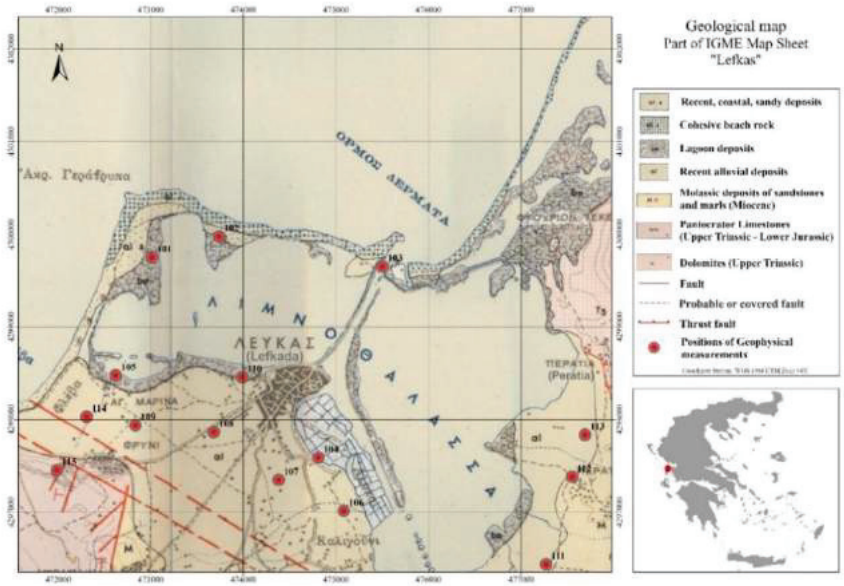

Figure 1. Geological map of the study area (Bornovas, 1964) along with the sites of the geophysical measurements.

Methodology

In the context of the near-surface geophysical investigation of the subsurface structure of Lefkada town we acquired geophysical measurements at fourteen (14) selected sites (Fig. 1). At each site we executed three (3) different techniques, in order to have a multi-disciplinary approach. More specifically, we carried out i) an electrical resistivity tomography (ERT) of 47 meters length (Fig. 2), ii) a seismic refraction tomography (SRT) of 23 meters length (Fig. 2) and iii) a multichannel analysis of surface waves (MASW) measurement at the midpoint of the previously mentioned seismic line. The ERT and SRT lines were designed in a frame to share the same midpoint, since successful combination of geoelectrical and seismic methods has been reported in suburban and coastal environments (Calamita *et al,* 2019; Hammock *et al.,* 2021).

In Figure 3, the results of the ERT at measurement site 114 illustrate a relatively homogeneous conductive zone (<25 Ohm.m) as a first geoelectrical layer, down to an absolute elevation of -1,5 meters. A more resistant formation, more than 35 Ohm.m, was investigated across the bottom part of the section.

At the same site, regarding the seismic measurements processing, two seismic layers were investigated (Fig. 4); the upper one with thickness almost 3,0 meters and V_1=660 m/s and the underlying one with V_2=1.600 m/s.

Figure 2. Geophysical field measurements at site 101 (left) and site 111 (right).

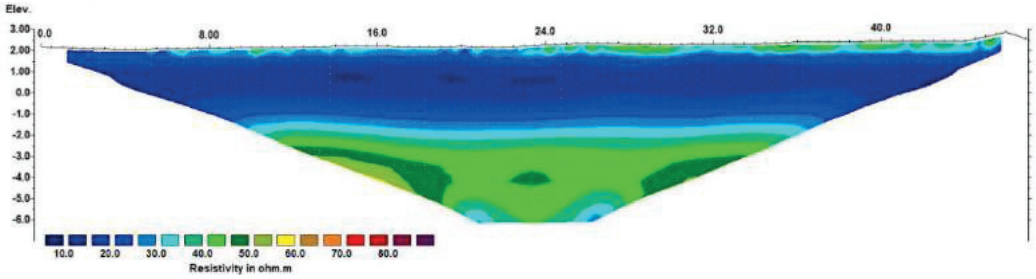

Figure 3. Electrical resistivity tomography at measurement site 114.

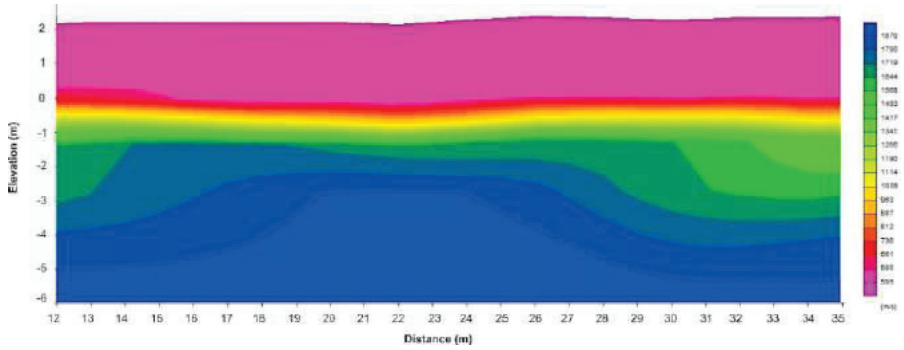

Figure 4. Seismic refraction tomography line at site 114. Distance axis is referred to ERT meters.

Conclusions

Interpreting the geoelectrical measurements at site 114, it seems that we managed to determine the marl formation with a mean resistivity value of more than 35 Ohm.m and seismic velocity of 1.600 m/s. Its upper boundary at the illustrated tomograms of Figures 3 and 4 is estimated to be at -1,5 meters absolute elevation. The preliminary interpretation of all the acquired geophysical measurements, reveal that the marl formation has been investigated at similar absolute elevations, across all the non-coastal sites of Lefkada town, as long as at the sites at Peratia region. On the other hand, at the coastal sites of Lefkada town, the marl formation has not been found down to the investigation depth of the present study. This could be explained by the existence of a possible fault zone parallel to the one illustrated in Figure 1.

Acknowledgements

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