
Marine stations from EGOAS (2012).

Prior researches’ data were referred to IGF 1930 datum and, their adopted gravity correction procedure was not consistent to each other (considering Bouguer density and the calculation of the terrain correction).

Data homogenization was attempted by: (i) reforming them to the IGMF71 datum (ii) checking and correcting (whenever possible) for errors, (iii) applying crossover correction through common gravity bases and (iv) recalculating the terrain correction (TC) coefficients using the same topographic data sets for all gravity stations and the same procedure (TC) was calculated the time in three phases, for radius up to 1500 m, a detailed 25m DTM was used, while for radius between 1500 m and 250 m a 50m DTM was used, and finally for radii from 2523m up to 167m a 1 km DTM was used. For both Bouguer plate correction and TC density value of 2.67 g/cm3 was used.

The homogenized data was enriched with data from EDM2008 satellite, gravity model (Pauls et al, 2008) for the marine area; computed and distributed by Bureau Grunetimmer (2011) (values averaged over 2.3 arc minute by 2.3 arc minute).

EDM2008 were used for coarse-filling the gaps in the marine area. The final grid for the gravity anomaly map was calculated with grid space interval 150 x 150 m.

Magnetotelluric (MT) Survey

The Magnetotelluric (MT) survey was conducted during the summer of 1999 (Lagios et al), providing a total of 34 soundings. A proper investigation was performed to the acquisition of five cartesian components of the natural EM field over the nominal frequency bandwidth 130-0.01 Hz. Robust processing methods were applied in order to obtain Earth response functions with acceptable levels of uncertainties.

The spatial analysis attempts to extract information about the configuration of the induced natural EM fields, which, in turn, depend on the geometry and configuration of lateral heterogeneities in the geoelectric structure. The spatial analysis of the impedance tensor used herein is the Canonical Decomposition of Yee and Paulson (1986), which approaches the geoelectric structure as the equivalent of a breitvoigt material at low frequencies and large scales.

MT RESULTS

Shallow structure: Polarization ellipse of the maximum electric field and the real IV, averaged over the frequency interval 20 – 1 Hz. The configuration of the electric field indicates that the shallowest part of the geoelectric structure has dominantly 2D attributes with approx. N330°-90° oriented structural trends. At northern Thera, the data indicate TM mode reduction over the resistive part of a quasi 2D structure, the interface apparently being located at the area of the channel between Thera and Therissa.

At Akrotiri peninsula the data show two distinct areas: Near Cape Faros the response indicates TE mode induction over the conductive side of a 2-D structure; Near Akrotiri town, TE mode is observed as well, albeit with respect to a N90°-50° oriented structural trend.

The sole sounding at Nea Kameni cannot be interpreted with confidence, as it has attributes consistent with a 2-D geoelectric structure.

In tectonically active zones, 2-D geoelectric structure image tectonic processes due to the episodical development of electrical conductivity anomalies in response to faulting.

Deep structure (approx. 2 – 5 km) : Polarization ellipse of the maximum electric field and the real IV averaged over the frequency interval 0.5 – 0.01 Hz. The deeper structure also has prevailed 2-D attributes, without being sensibly 2-D, and appears to be simpler and counter-clockwise rotated version of the shallower structure. Only one large scale structural trend with N300°-320° strike is detected and comprises a relatively broad elongate conductor centred at the Kammeni islands. This zone is delineated by the TM mode at Akrotiri peninsula and N-NW Thera and the TE mode at the Kammeni islands.

3-D GRV Inversion

In this implementation, the pyroclastic deposits were considered to be a single object with a density contrast of -2.7 g/cm3 against the metamorphic basement rocks. This contrast is plausible and reliable according to density measurements given in the Table Above. The upper surface of the model (topography of the pyroclastics) was kept constant and the lower surface (topography of the basement) was allowed to vary.

The results of three wells (Fykanis, 1994), drilled at the southern part of Thera, that reached the metamorphic basement, were also used to control the model (by keeping fixed the depth of the lower surface at their position).