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Subsurface 3D modeling of Pantelleria island (Italy) using gravity data.

Luca Samperi¹, Giovanna Berrino², and Filippo Greco¹

¹Istituto Nazionale di Geofisica e Vulcanologia, Sez. Osservatorio Etneo, Catania, Italy

²Istituto Nazionale di Geofisica e Vulcanologia, Sez. Osservatorio Vesuviano, Napoli, Italy

Pantelleria is a 84 km² extended volcanic island located in the Mediterranean Sea between Sicily (Italy) and Tunisia. Previous studies described that in Pantelleria island both tectonic structures and the volcano-tectonic features had a common tectonic origin controlled by a NW-SE directed extension in accordance with the regional trend of the Sicily Channel arising interest for multiapproach investigations.

Indeed, in the last decades this area has been field of widespread analysis useful for the investigation of the volcano-tectonic and tectonic activity, as well as for geodetic study and resources exploration.

Our approach focused on the gravimetric analysis of Pantelleria island and in particular we provided a 3D inverted model of the area, starting from in-situ gravity measurements. The 250 m model resolution has been endorsed by the presence of a total of 290 measurement stations, distributed both onshore and offshore and acquired during some field surveys up to 2006; 236 of them were already published and inverted in past using 2.5D modelling. Input data consisted of a database containing Bouguer anomaly data reduced using a density of 2500 kg/m³ and referred to the Geodetic Reference System 1980 (GRS80) Ellipsoid.

As a result, the 3D modelling allowed exploring density differences through the about 4 km depth, emphasizing interesting geological structures.

Such results would help any drilling program in the island (e.g. for geothermal purposes), lead to more successful drilling programs, and serve as well-constrained geologic input to improve the accuracy of future numerical (e.g. reservoir) models.