THE BOUGUER GRAVITY FIELD OF THE MEDITERRANEAN SEA : CRUSTAL DEFORMATION AND ISOSTACY

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A new Bouguer Gravity map of the Mediterranean sea and adjacent countries originally prepared as an overlay sheet for the International Bathymetric Chart of the Mediterranean sea has been reprocessed and evaluated. In general, the gravity anomalies and their broad distribution reflect the topographic features; for example, the deep Ionian Basin and the Sardino-Balearic Abyssal Plain are floored by broad positive gravity features in the order of 180 to 200 mgals. The Herodotus Abyssal Plain in the eastern Mediterranean has a gravity maximum of 160 to 170 mgals extending from the Egyptian Coast to the Eratosthenus seamount. Most surrounding continental areas including western Turkey, western Greece, the Calabrian Apennine Arc, parts of North Africa and the western Mediterranean countries are all marked by negative Bouguer gravity features from zero to -180 mgals. We combined deep seismic soundings with associated gravity anomalies and, by computing 2-D density models, we were able to show that most of the deep basins of the Mediterranean sea are floored by old oceanic crust covered by sediments of variable thicknesses exceeding 10 km in parts. The surrounding continental margins of the North Mediterranean basins are all floored by continental crust that varies in thickness between 25 and 40 km depending on the state of deformation that geological processes have imposed on them by compression. Isostacy is mainly distributed along still active compressional fronts which expose strong seismic activity and systematic deepening of the Benyoff Zones from the onshore to the offshore areas. A series of crustal models and the development of the various basins will be presented and discussed.

SEISMICITY AND DEFORMATION OF THE LIGURIAN SEA

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In Autumn 1992, a co-operative seismic programme between German, French and Italian geophysicists was performed in the Ligurian sea and adjacent coastal areas in order to study the seismic activity and tectonic deformation of these geologically complex regions. Forty-four mobile seismic stations onshore and twelve OBS (ocean bottom seismographs) offshore were deployed and the seismic activity was observed for 100 days onshore and 30 days offshore. The evaluation of the data identified 110 events of magnitude greater than 0,9. The obtained accuracy of the epicentral locations is better than 5 km and will be improved after the correct crustal model for this area has been considered. The model is being evaluated from deep seismic soundings offshore Côte d'Azur where the limit between the continental and oceanic crusts was identified. The seismic foci delineated active tectonic lineations and showed that the Sestri Voltagio Zone is particularly active undergoing intense deformation. The trends of the offshore events are still being studied but seem to be associated with salt tectonics and transform faults. The main seismicity offshore was located at depths of 7 to 13 km while onshore, deeper events to a depth of 25 km associated with crustal shortening across the Maritime Alpes were recorded. The evaluation of focal mechanisms is expected to identify the sense of movement between the various blocks of the eastern Ligurian sea.

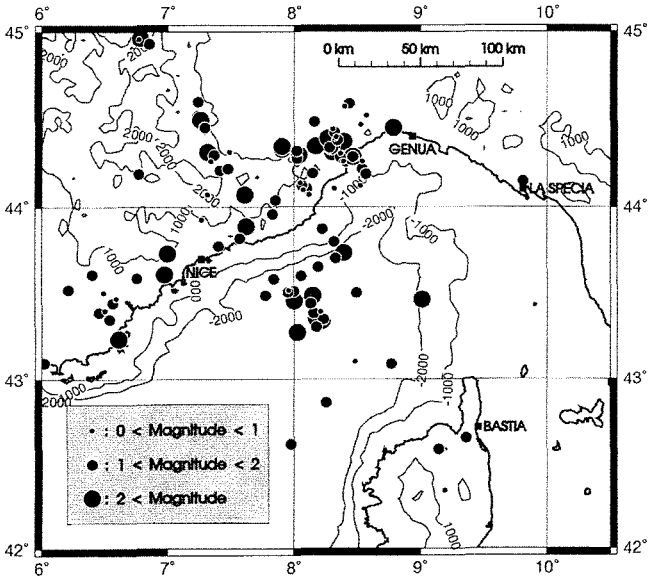

Fig. 1 - Topographic map with locations of earthquakes. Contours are in metres.