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INTEGRATED GEOMORPHOLOGICAL MAPPING OF THE EMERGED AND SUBMERGED NORTHERN AREA OF MALTA

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Terrestrial and marine datasets referring to northern Malta (central Mediterranean Sea) have been collected and coupled in the frame of an international project funded by the EUR-OPA Major Hazards Agreement of the Council of Europe. One of the main outputs of the project is an integrated geomorphological map of the land and seascape of coastal areas of the northern sector of Malta. Existing geomorphological maps produced within the same project were used as a base for the mapping of the terrestrial areas. As regards submerged areas, several multibeam suveys were carried out offshore the eastern coasts of the archipelago and offshore the north-western coast of Malta to acquire high resolution bathymetry and backscatter data; a LiDAR-derived DEM of the northern area of Malta was used to cover the white zone between the bathymetric survey and the coastline. This large dataset allowed seafloor morphological features to be mapped and recognized by means of bathymetric analysis and geomorphological interpretation. The seafloor sediments were analysed through grab samples collected offshore the eastern coasts of Malta and through the analysis of the acoustic textures characterising the seafloor backscatter imagery (TexAn implemented by the University of Bath, UK) to produce a sediment distribution map. The submerged geology was inferred by drawing geological sections based on the Geological Map of the Maltese Islands – Sheet 1 Malta. By exploiting all these data, an integrated geomorphological map of the northern area of Malta (from Marfa Ridge to the Great Fault) and the surrounding seafloors have been produced. The map clearly shows the differences characterising the eastern and the western sides of the island. On the western side, the main features are related to gravity-induced processes responsible for the occurrence of different types of coastal landslides prolonging under the sea level and making up the main landforms of the narrow continental shelf. On the eastern side of the island, the main features are related to fluvial and marine processes. Actually, the continental shelf is clearly cut through by a drainage network that is likely to have developed during sea level lowstands of the Last Glacial Maximum, when the sea level was about 130 m lower than at present.
A deep understanding of the processes acting on the coastal zones (such as landslides) and of the geomorphological evolution these areas are essential for coastal hazard assessment, also in a framework of climatic changes. Moreover, the maps constitute the basis for marine habitats mapping and for a better management of resources and ecologically important areas (e.g., Natura 2000 sites and Marine Protected Areas).