



Sediment deposit dynamics along and across the Lebanese continental shelf and slope

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The geomorphology, drainage systems and predominant lithologies of western Lebanon are briefly described as a background for sediment transportation into the eastern Mediterranean. Fragmentary past and current bathymetric work over offshore Lebanon is reviewed and a simplified compilation of bathymetric maps is presented, correlating and interpreting the different survey results. It reveals a narrow continental shelf about 3 km in width, with two wider areas in the northern and southern part of the country. The shelf break generally occurs at about 100 m depth. Submarine canyons are common, most of which are seaward continuations of important land valleys, but some prolong land-fault lines. Many continue down the continental slope, dividing into distributaries. Hydrological data indicate that over $2,525 \times 10^6$ m³ of surface-water runoff annually discharges into the sea through the perennial streams of western Lebanon. Preliminary work suggests that these contribute appreciable loads into the Mediterranean. Overall marine net sediment transport is northwards by the longshore current and predominant WSW waves, but investigations in progress indicate that the submarine valleys provide avenues for across-the-shelf and down-slope movement of this sediment.

Using high resolution bathymetric data with full multi-beam coverage already collected through a combined mission between Lebanese Navy Hydrographic service and SHOM at the bay of Jounieh (Lebanon), and in the framework of an international project between the Lebanese Navy, the Lebanese National Center for Marine Sciences, the University of Ferrara and the Italian Hydrographic Institute, it was possible to generate quantitative terrain attributes and terrain features. These attributes and feature classifications were used for describing, interpreting, and classifying the geomorphology in the Lebanese submarine environment analysing the digital bathymetric model, studying general and specific geo-morphometry, and finally considering the possible application of the results for geo-hazard characterization. This research datasets was integrated with previous data collected for the area by high resolution multibeam echo-sounders. The datasets followed by generating a digital bathymetric model which was post-processed and corrected from errors and artefacts. This research will review both the use of general (i.e. terrain attributes) and specific (i.e. terrain features) marine geo-morphometry integrated with a sediment map classification (backscatter calibrated with ground truthing) of the area of Jounieh Bay.

We will try to propose a model of canyon erosion produced by turbidity currents on the basis of the above geo-morphometric investigations of Jounieh submarine canyon, and to demonstrate how canyons in active margins, like the Lebanese continental margin, fail to reach steady state because of a continuous adjustment to perturbations associated with tectonic displacements and base-level change.