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Sedimentological and morphological approach for the study of coastal dynamics: a case study in the south of the Sicily (Punta Granitola, Portopalo of Menfi).

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A geomorphologic and sedimentologic approach, combined with GIS spatial analysis, was used to investigate a 19 – km long coast sector in Southern Sicily, Italy, affected by important erosion processes. The methodology that we applied allowed the creation of a database involving a range of coastal characteristics helpful to reconstruct coastal processes and general sediment circulations patterns.
The littoral zone studied belongs to the Trapani Province, South East of Sicily, Italy, and is situated between Punta Granitola and Porto Palo of Menfi. Coastal orientation varies from W/SW-E/NE in the western sector, between Punta Granitola and Triscina, to W-E in the central sector between Triscina and Belice River and to W/NW-E/SE between Belice River and Portopalo. In the investigated area houses, roads and other human structures, which have appeared in the last 30 – 40 years, are exceedingly close to shore line. More over at the same time harbours and artificial barrier were constructed. All these human structures have probably halted the littoral transport.
The first goal of this work was the general knowledge of morphological characteristics of shore line and of the broad sediment circulation patterns. To this end the landform characteristic were obtained thought several field observations and the analysis of recent aerial photographs and topographic maps of different years. The ESRI® ArcMap 9.2. software was used for geo-referencing and for the elaboration of the topographic maps and of the aerial photographs. The ESRI® ArcMap 9.2. was later used for integration, digitalization and finally for the analysis of data. All data were presented as Universal Transverse Mercatore Coordinates, with the European 1950 datum (zone 33N). Moreover we performed a preliminary sedimentological study of this coast line. On this base we have identified 7 km of unimodal sand beach, situated between Punta Granitola and Triscina, where we have carried out a more detailed morphological and sedimentological study. In this area 68 transepts orthogonal to the coast line were collected with a total laser station Geodimeter System 600. The 68 transepts were repeated for four seasons. Moreover about 1000 sand samples were collected in the same four seasons. On 711 of these samples we performed the granulometric and compositional analysis. The elaboration of the granulometric data, using the Folk and Ward statistic parameters, was used to study and analyze the local drift. In this sector, that is prevalently oriented W/NW-E/SE and that is partially sheltered by a fear in west, the drift is prevalently from east to west as confirmed by the interpretation of the statistic parameters.