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Sediment Transport using Grain Size Trend Analysis: A Case Study in SW of Portugal

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As an embayed coast, the main sediment sources are fluvial discharges, sea-cliff erosion and sand carried by longshore currents^[1]. The particles are transported in suspended load or bedload pattern under the coactions of tidal currents and waves.

In response to sediment transport processes, the spatial variations in the grain-size parameters exist, that reflect the net particles transport trend and the dynamic conditions. Thus, the grain size trend analysis was developed to study the net sediment transport.

The study area is an embayed coast from Troia to Sines in SW of Portugal. There is a cape in the south end while the north end is a mountain belt with 35 km in length and 500 m in height^[2]. A river with small discharge lies in the north. The tidal range varies between 1.5~3.5 m while the swell and winds from the west and northwest are dominant^[3]. Therefore, the study area is sheltered from persist winds from north in summer and exposed to the storm waves from southwest in winter.

The surficial sediment was sampled in the shallow water in 1980, 1983 and 1985, respectively. In order to obtain the important sediment source and sediment transport trend, three approaches were used: (1) the EOF (Empirical Orthogonal Function) analysis technique; (2) the McLaren Model; (3) grain size trend analysis. The wave is dominant in the study area. The result of EOF analysis shows that the most important sediment source is cliff erosion. The sediment eroded from cliffs during storms and high waves was transported off-shore and southward in the south part during high energy effect, in the north part that was carried by longshore current northwards and deposit at the left of the estuarine. The mud discharged from the river met with the west waves and deposited at the lee side of the mountain belt. It would be concluded that the sediment was disturbed and transported perpendicular to the shoreline by the southwest storm waves in winter and along the shoreline by persist wind in summer.

Keywords: Grain size trend analysis; EOF; embayed coast; SW Portugal

References

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