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STUDY AND ANALYSIS OF MOND DELTA MORPHOLOGY

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Geomorphology

Geomorphology by definition, is a manifestation of coastal processes in time and place with a range that has been recorded in the geological records. Today, due to constraints of time and place and also, from the viewpoint of considering all parameters in numerical models, geomorphology observations has a decisive role in a qualitative evaluation of phenomena.

Delta

Delta is formed where the river sediments, fill the mouth river valleys located below the water level and compromise a projection. Generally, only one percent of the total coastline in the world is formed of deltaic coasts [2]. However, about 25 percent of the world population lives in coastal and deltaic wetlands [Syvitsky et al.] and 21 of the 25 world's largest rivers which provide 31 percent of the total alluvial deposits, have specific deltas that have been developed into the beach [Milliman and Meade, 1983; Meade, 1996].

Sediment supply and Nearshore currents

Generally two sources of sediment contribute to the development of coastlines. Marine sediment budget and fluvial sediments carried by the rivers during the Holocene are the main sources of sand in the river mouth of tidal basins [1]. Rivers with high sediment budget, like Amazon, Fly, Ganges-Brahmaputra, and Hooghly, due to high marine sediment supply compared with potential sediment transport of tidal currents, form a river delta above the high tide level [4].

However, sediment distribution and transport along the coastline, is formed by the nearshore currents. These currents are produced by the component of waves parallel to the coastline. Guyana currents which flow northward over the mouth of the Amazon River, transport fine sediments off the coast of Suriname towards the shores of Trinidad (Gibbes, 1970). Deposition of these sediments has formed extensive shore mudflats, and sand sorted from the fine grained sediment by waves forms low beaches and cheniers [2].

Mond region

Mond region is located in Bushehr province between longitudes 51 10' and 54 28' east and latitudes 27 20' and 29 51' north near the North Pars gas field with a 59 trillion cubic feet reservoir [Y]. Its main branch length is estimated to be 750 kilometers long. Its basin with an

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average level of 1024 meters above the sea level and an average slope of 15.88%, has an area of about 40128 square kilometers and annually delivers 11608015 cubic meters sediments to its mouth [2]. According to Wentworth grading system [3], 12% of these sediments, that is about 1.4 million cubic meters is estimated to be classified as sand. The offshore wave climate shows the dominance of northwest waves which have transported about 1.29 million cubic meters sediments along the coastline during recent years [4]. Hence, deposition of about 0.11 million cubic meters is estimated in the region which causes the development of sand spits downstream of the river mouth.

Sedimentology

A wide field sampling was conducted in this study to examine the morphology of the area. 13 samples from the south coastline of the river mouth and 5 samples from the riverside were taken. After grading analyses, marine and river samples were washed over the sieve #200 and the portion on the sieve was investigated under the microscope (Fig.1). The particles of marine sediments were numbered in each sample and 3 parameters were defined and monitored for each sediment particle; sediment particle source which was determined by comparison with the river side samples to be either carbonate or non-carbonate, sediment particle size in terms of millimeters, and sediment particle roundness that has been determined by a parameter between 1 to 4 (with increasing the roundness parameter the particle becomes more rounded). After sedimentology studies on these 13 marine samples consisting 1209 sediment particles, the pattern of changes of these parameters along the coastline was investigated. To investigate the sediment transport along the upstream of the river mouth, a comparison was conducted among a river sample and a marine sample, taken from the river mouth, with a sample from upstream of the river mouth.

Analysis and conclusion

Analyzing the results shows that sediment particles roundness increases moving downstream from the river mouth (Fig. 2). On the other hand, non-carbonate source of the sediments decreases moving far from the mouth. The percentage of fine sediments also increases moving downstream along the coastline. According to the similarity among the upstream sediment particles and the sediment particles at river mouth, it is concluded that a sediment transport towards upstream direction also exists. Due to the results of grading analyses, local wave data and sediment input rate from the river, a developing sedimentation pattern is observed which can be confirmed by aerial photos. Sedimentology investigations and the dominance of non-carbonate sediments in samples reveal that the input sediment of Mond River is the most important sediment supply affecting the morphology of coastal area.

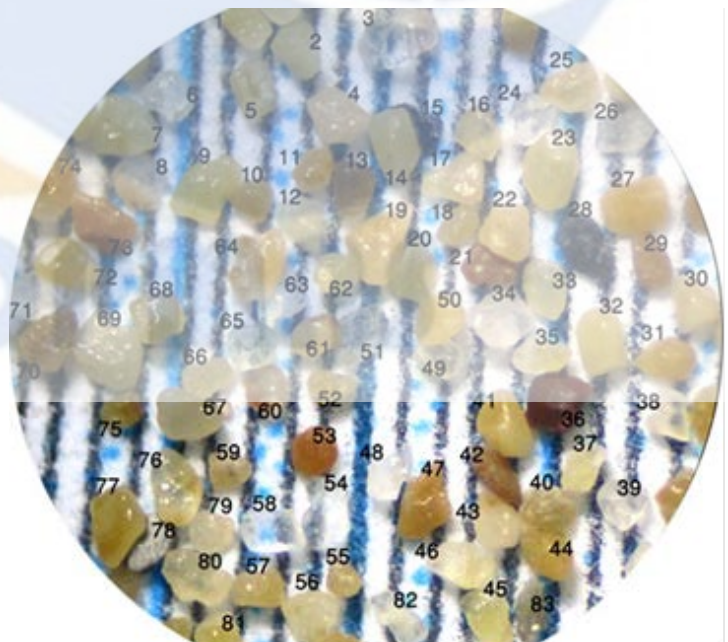


Fig.1) Sedimentology of sample #93 under the microscope

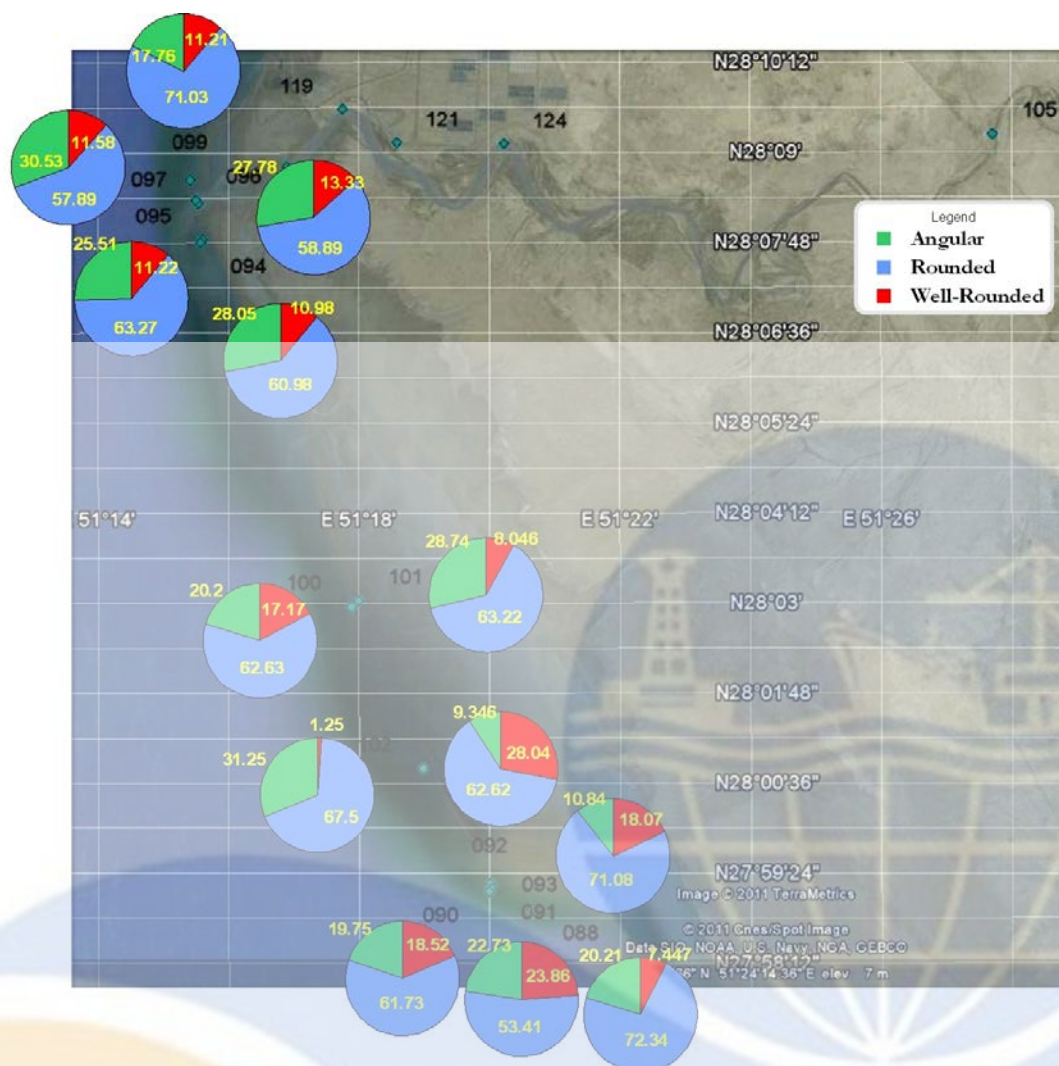


Fig. 2) Increase of the roundness of sediment samples with the increase of the distance from the river mouth.

References

- [1]- Beets, J.D., van der Valk, L. and Stive, M.J.F. (1992) Holocene evolution of the coast of Holland. Mar. Geol. 103: 423-443.
- [2]- Bird Eric. Coastal Geomorphology: An Introduction, Second Edition. 2008 by John Wiley & Sons, Ltd
- [3]- C K Wentworth, "A scale of grade and class terms for clastic sediments", J. Geology V. 30, 377-392 (1922).
- [4]- Dronkers Job. Dynamics of Coastal Systems: Advanced Series on Ocean Engineering – Volume 25. By World Scientific

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