
This is a profound and extremely valuable contribution that deals with the identification of various bottom types (morphostructures) along the southeast Atlantic continental shelf, off Broward County, Florida. While the need to refine geological models of the inner continental shelf remains a high priority in marine geology, there is also an applied bent to such undertakings. For example, in Florida the need to understand regional framework geology and geomorphology of the sea floor is becoming more critical to the needs of coastal engineers and regulatory agencies. This is manifest in the increasing activities on the continental shelf viz exploitation of offshore sand resources, oil exploration, waste disposal, fishing, etc.

In this thesis, eleven morphostructures were delineated in the study area on the basis of geological and geophysical surveys, toposheets, bathymetry maps, and interpretation of aerial photographs. A comprehensive composite map was developed from bathymetric, seismic and side scan data and served as a base map for delineation of submarine morphostructures. The coastal mapping effort in this study was conducted by first determining the distribution patterns of landforms and then attempting to order those patterns in a framework that facilitates recognition of cognate zones. This and previously published work, suggests that the concept of coastal process zones is a way to approach the interpretation of coastal landforms in terms of dynamic processes, either singly or in combination, as they relate to the morphology of landforms. Each of the morphostructures was delineated in an effort to understand the basic theme of the coastal classification attempted. The climatic effect on the evolution of this coast is evident in the form of coral/algal reefs, which played an important role in the evolution of the Florida coast and in controlling the geomorphic elements of this coastal tract. These parabathic reefal ridges on the continental shelf trending in almost north-south direction mark the paleoshoreline positions. Out of the eleven geomorphic units identified, nine are parabathic whereas the remaining two, viz. reef gaps and sandwaves are diabathic.

Megascopic studies of the vibracore logs confirm the presence of mixed carbonate-siliciclastic sand in the study area. The siliciclastic fraction of the sediment is mostly fine quartz whereas shell fragments, shell hash and coral fragments constitute the carbonate fractions. The skeletal carbonate fractions (angular shell fragments/shell hashes) add considerably to the overall mean grain size of the sediment. Spatial distribution of the sediments on the basis of mean grain size indicates that in the inter-reefal flat, sediments have been reworked by several processes acting simultaneously. The morphostructures (e.g. reefs, reef gaps, etc.) have played an important role in the sediment distribution pattern of the study area. The shapes and sizes of coral fragments within the sand indicate that they have not been transported long distances and are apparently caused by the overtopping of the interreefal flats during sea-level rise.

Most probably these rubble zones are signatures of higher energy associated with excessive wave action possibly during hurricanes. The gastropod and pelecypod shell beds and interbedded finer sediments also indicate high-energy conditions and are interpreted as storm deposits.

Much of this work indicates that there is a definite relationship between morphostructures and coastal processes, which influenced the surficial sediment distribution pattern of the seafloor in this area. This is a significant contribution in itself in that previous studies have dealt primarily with the sedimentology of the area to locate and evaluate sand deposits to be used for shore protection and restoration projects. The recent development in mapping of various submarine bottom types is based primarily on interpreting data from modern tools viz. differential global positioning systems, side scan sonar imagery, seismic data from chirp sonar, bathymetric data, and interpretation of aerial photographs. Combined, these have made the mapping rather fast and accurate.

It is noteworthy that this study is the first of its kind where attempts have been made to correlate the mapped morphostructures with local coastal processes. Application of this concept in the study area has helped in correlating the distribution pattern of the various coastal landforms with dynamic coastal processes. Zonation of these coastal processes has also been attempted as they relate to morphostructures of the study area.

In summary this work provides an excellent blueprint for comparative works to be carried out in other areas. The advantages of genetically classifying coastal features are many fold including providing a sound physical basis for management, permitting recognition of coastal process zones which was heretofore not possible, places studied coastal segments in a regional or global context, and facilitating an increased understanding of coastal development (geomorphology) which might otherwise not be obtained. This is an outstanding thesis and one that every graduate student and researcher working in the same topical area should be aware of and it sets a very high standard.

Gregory W. Stone
Louisiana State University