

## **Chapter 7**

### **Conclusions**

The conclusions resulting from this investigation are enumerated below, in terms of the broad research questions from Chapter 1, which were the impetus for this study.

#### Spatial Extent and Spatial/Temporal Changes in Sedimentary Features

- Linear, shore oblique sand bodies extend westward on the West Florida Shelf, from 5-25 km west of Clearwater Pass, up to 19 m water depth. General orientation of the sand bodies, northwest-southeast, did not change with distance from the coast.
- Spatially, the morphology of the sand bodies changes with increasing water depth. The sand bodies in the midshelf region are larger and more widely spaced ( $10^3$  m) by an order of magnitude than those in the nearshore area ( $10^2$  m). Sediment thickness is 3.0-3.5 m in both the midshelf and nearshore sand bodies.
- Sedimentary properties are significantly different in the midshelf area compared to the nearshore. The sands in the MS area are finer and better sorted, and have lower and less variable carbonate content than those in the IRB area.
- Temporally, the first order features, the sand bodies, in the IRB and MS areas did not change in overall shape or size. On seasonal/annual time scales, overall sedimentary morphology remains constant from the nearshore to the midshelf. However, some significant movement was seen along the ridge-trough borders, but not in consistent directions or magnitudes throughout either study area.

- Secondary features, such as high backscatter troughs and low backscatter fine sediment features, did show evidence of sediment movement through migration or through change in size over seasonal/annual time scales.

#### Hydrologic Processes Affecting Sediment Movement

- Mean current velocities are sufficient to initiate sediment movement by standard prediction models, but only a small percentage of the time, and only over a small range of fine grain sizes. Tidally induced mean currents do not play a significant role in shaping the observed sedimentary morphology on the West Florida Shelf.
- Weak frontal passages do not affect mean bottom current velocities significantly. There was no increase in predicted sediment movement based on these bottom current data.
- Temporal variations in the distribution of sediments were not evident in either study area over the study periods. Hydrologic processes acting on the sediments did not redistribute them in terms of grain size, sorting, carbonate or fine material content.
- Data were insufficient to effectively compare the hydrologic processes in the nearshore and midshelf areas. Mean current velocities were similar.
- Other factors, such as biological communities (e.g., algal mats), may have hindered sediment transport even during those times when current velocities were of sufficient magnitude to initiate sediment movement.
- Sub-surface sedimentary structures in box cores showed evidence of past transport events. Parallel laminations of fine sediments, above dipping coarse shell layers, indicated transport by combined flow in the top 10 cm of sediment.

### Geotechnical/Geoacoustic Relationships

- 500 kHz side-scan backscatter data are strongly correlated with mean grain size. However, all of the variation in backscatter intensities cannot be attributed solely to grain size variations. Other quantifiable factors, such as carbonate content, influence the acoustic signature significantly.
- The relationship between sedimentary properties and acoustic backscatter data were not effectively modeled by multiple regression. The variability in the side-scan signal was not fully explained by variations in the sedimentary properties. A multiple regression equation(s) could not be used to predict sedimentary properties from measured acoustic backscatter.
- Evidence that unquantified environmental factors may influence the backscatter intensity measured in the IRB and MS data complicates models of sediment classification from acoustic signature.

### Relationship Between Spatial Scales

- The high degree of variability over small spatial scales (10's-100's of meters) makes it difficult to generalize large-scale (1000's of meters and larger) sedimentary characteristics or morphology from data collected at small scales on the West Florida Shelf.
- The evidence for localized forcing mechanisms controlling sediment transport in areas of the West Florida Shelf renders hydrologic data collected at single sites insufficient for predicting or modeling large scale sediment transport.

