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KEY WORDS: Northeastern Gulf; Gulf of Mexico; Florida; Alabama; Mississippi; Louisiana; physical oceanography; Loop Current; meteorology; circulation; intrusions; continental shelf; remote sensing; hydrography;p seagrass; Big Bend; DeSoto Canyon; MMS; Minerals Management Service; oil; gas

BACKGROUND: The Northeastern Gulf of Mexico, notwithstanding the richness of its shelf waters and its magnificent beaches, is arguable the least studied coastal region offshore the contiguous States. The region is presently being explored for oil and gas, prior to development. A new program of physical oceanographic studies, funded by the Minerals Management Service, may, subject to the availability of funds and programmatic approval, begin in FY 1996. In view of this the Northeastern Gulf of Mexico Physical Oceanography Workshop, jointly funded by the Minerals Management Service and Florida State University was convened.

OBJECTIVES: (1) To assess the state of knowledge of the circulation in the shelf and upper slope region of the northeastern Gulf of Mexico extending from the Mississippi

Delta around, approximately, to Tampa Bay; and (2) to develop a strawman plan of possible experiments.

DESCRIPTION: The workshop was divided into two parts. For the first one and one half days a series of invited speakers provided an overview of the physical oceanography and meteorology in the region and also discussed recent measurements, challenging problems, modeling and ongoing and planned measurements relevant to the study region. Following this background and an overview of some strawman plans formulated and provided to participants before the conference, the last half of the second day and the morning of the third day were spent formulating experimental plans.

SIGNIFICANT CONCLUSIONS: Limited existing data suggest that the wind, the tides, the loop current and freshwater input all contribute to flow on the shelf region of interest. But measurements are few and we do not know answers to many basic questions about the shelf flow and the particle movement in that flow.

STUDY RESULTS: The overview papers identified the main processes which operate on the shelf and upper slope. Nearshore buoyancy flow is more important in the west than east, because fresh water input by the Mississippi River and rivers flowing into Mobile Bay and to the west of it, greatly exceeds that on the Florida part of the shelf. Dynamically we expect the buoyancy flow to be westward, but it seems that some of the Mississippi River water does influence the shelf in the Northeastern Gulf of Mexico (NEGOM) region of interest to the east. Although freshwater input to the Florida shelf is smaller, measurements near the Apalachicola River have shown that buoyancy effects are important shoreward of the 20 m isobath.

Tides in the Gulf of Mexico re modest. Shelf tidal currents in the NEGOM are strongest (˜15 cm s^{-1}) on those sections of shelf which are wide because, in agreement with theory, semidiurnal tides are amplified across wide shelves. Diurnal tides are not amplified across the shelf and tidal sea levels at the coast are either diurnal or mixed depending on the amplification of the semidiurnal tide across the shelf.

Wind-driven currents and sea level fluctuations at "weather" time scales (periodicity of a few days to a few weeks) are strong in winter when the NEGOM shelf is influenced by a series of cold fronts from the north. The dynamics of the wind-driven, coastal sea level fluctuation is well understood but theoretical current prediction should be made and checked with a few available current meter measurements. Long term current measurements are sorely needed to assess the mean, interannual and seasonal flows which seem to be small but are not known over most of the shelf. Such flows are important because even if small they can still transport particles large distances. Particle displacements are important not only to the fate of pollutants but also for the transport of eggs and larvae of commercially important fish

The Loop Current and eddies associated with it appear to influence mainly the outer continental shelf although in the region of the DeSoto Canyon, Loop Current water, probably trapped near the surface, has been observed to penetrate nearly to the coast.

Satellite sea surface temperature patterns suggest eddy activity over the mid Mississippi-Alabama continental shelf at some time and unidirectional sheared flow at others.

Because of the unlikely availability of funds for a large comprehensive experiment like the western Gulf of Mexico LATEX experiment, the workshop focused on formulating plans for a series of smaller experiments. In order to stimulate thought before the workshop and discussion at the workshop, several strawman plans [see Appendix A] were formulated and provided to conferees before the workshop began. At the workshop, three working groups in three breakout rooms considered plans for inner, mid and outshelf experiments. There was considerable discussion of the DeSoto Canyon because of the current drilling for natural gas in the region. The workshop included biologists, chemists and geologists and meteorologists and during discussions mutually beneficial collaborations became apparent

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