

Florida Keys National Marine Sanctuary

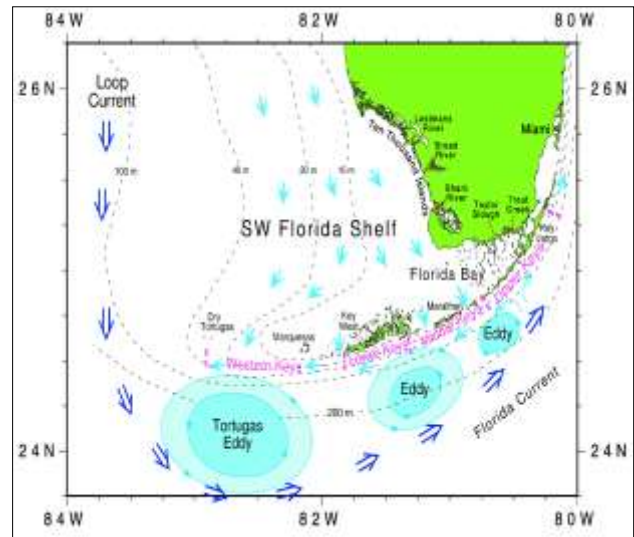
Physical Oceanography

Management Issue

There is a need to further develop the Florida Keys circulation model in order to better understand regional oceanographic connectivity at varying spatial and temporal scales.

Description

Regionally, the Florida Keys are hydrologically linked with the Everglades and Florida Bay, the Gulf of Mexico, Atlantic Ocean, and the remainder of the South Florida ecosystem. Although components of the regional circulation are known, there is a need for a comprehensive study on the long-term and short-term variations in circulation, ultimately leading to the development of a Florida Keys circulation model. The complex topography and geology of the Florida Keys, combined with the seasonally variable interactions between multiple water masses in the region, make for highly variable flow patterns that are difficult to predict. Timing, strength, and direction of flow patterns are critical to water quality and distribution and dispersal of marine life from areas within and outside the Florida Keys National Marine Sanctuary (FKNMS or Sanctuary). Improved understanding of circulation patterns requires continued and enhanced physical oceanographic monitoring and modeling and greater use of remote sensing.



Regional currents (double axis arrows) and mean tidal flow patterns (single axis arrows) of South Florida and the Florida Keys. Map Credit: Lee et al., 2002

Questions and Information Needs

- 1) How do regional and local water circulation patterns influence water quality in the Florida Keys?
- 2) How do regional and local water circulation patterns influence larval dispersal in the Florida Keys?
- 3) What is the influence of local and regional currents on recruitment, growth, and survival of key species?
- 4) Can we use physical oceanographic processes to gain insight into biological processes, such as coral bleaching, larval transport, fish spawning and recruitment events, marine debris transport, etc.?
- 5) How will local water circulation patterns be affected by climate change?

Scientific Approach and Actions

- Maintain or expand the existing SEAKEYS network of C-MAN monitoring buoys to provide a long-term data set of physical oceanographic parameters
- Correlate existing water circulation monitoring projects with remote sensing, which may provide a cost-effective way of tracking circulation patterns and validating model predictions
- Develop predictive larval recruitment, dispersal, and connectivity models that include sources, sinks, larval concentrations, and larval behaviors
- Develop an internal circulation model for the FKNMS that will interface with other models and tie together local, regional, and larger-scale patterns necessary to understand and predict larval transport, advection of nutrients and as well as pollutants

Updated: 12/02/14

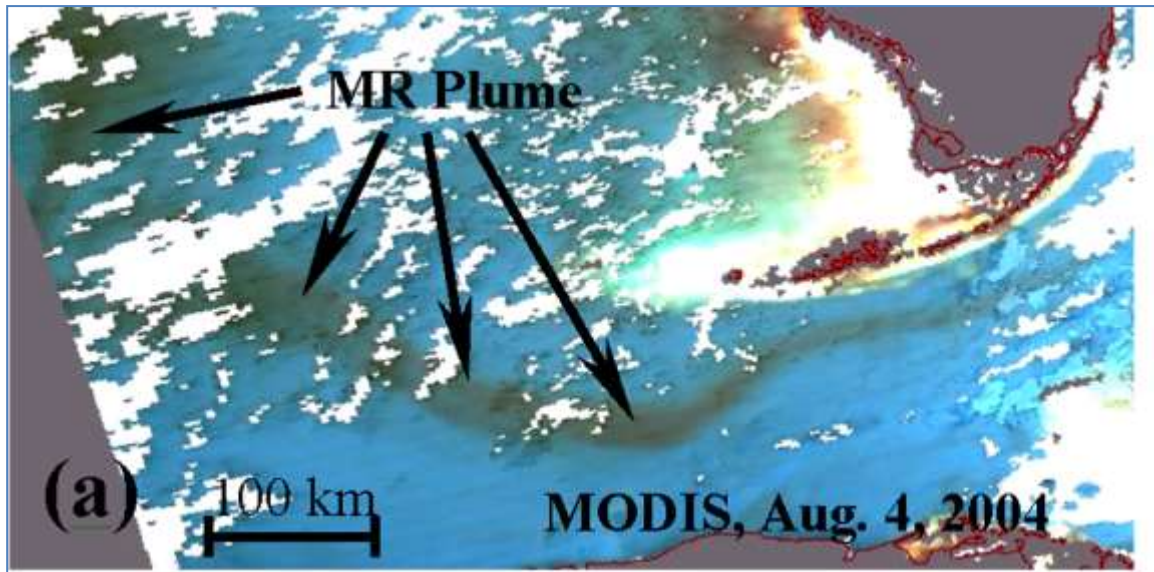
For More Information -- <http://www.sanctuaries.noaa.gov/science/assessment>

Potential Key Partners and Information Sources

NOAA Fisheries, NOAA's Atlantic Oceanographic and Meteorological Laboratory, the Florida Fish and Wildlife Conservation Commission, the University of Miami, NOVA Southeastern University, Florida International University, Mote Marine Laboratory, the University of South Florida, and volunteers.

Management Support Products

- Circulation model for the FKNMS that will interface with other models and tie together local, regional, and larger-scale patterns necessary to understand and predict larval transport, advection of nutrients and as well as pollutants.



Mississippi River water in the Florida Straits in summer 2004. (Credit Hu et al., 2005)

Planned Use of Products and Actions

- This information will directly support the Water Quality Protection Program (WQPP) of the Florida Keys National Marine Sanctuary. Specifically it will help “recommend priority corrective actions and compliance schedules addressing point and non point sources of pollution to restore and maintain the chemical, physical, and biological integrity of the Sanctuary, including restoration and maintenance of a balanced, indigenous population of corals, shellfish, fish and wildlife, and recreational activities in and on the water” (Florida Keys National Marine Sanctuary and Protection Act of 1990).
- Use results to develop or enhance education and outreach products

Program References

FKNMS Management Plan

- Strategies W.21, W.33, W.34, W.35

ONMS Performance Measures

- By 2015, 100% of the sanctuary system is adequately characterized

Other Documents

- FKNMS Comprehensive Science Plan (2002)
- Florida Keys National Marine Sanctuary and Protection Act of 1990
- FKNMS Condition Report (2011)

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