

Shallow Water Temperature Response Due To Passing Hurricanes in Onslow Bay, NC, 1999



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- VI. Entire Time Series
 - A. M1 and M3 Temperatures
 - B. M3 Temperature Difference
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Introduction

Dennis

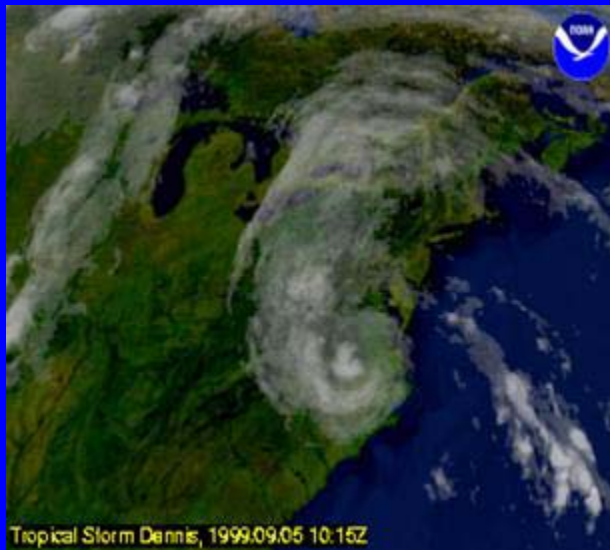


Image From: <http://www.nnvl.noaa.gov/cgi-bin/index.cgi?page=items&ser=100182>

Floyd



image From: <http://www.nnvl.noaa.gov/cgi-bin/index.cgi?page=items&ser=100135>

Irene

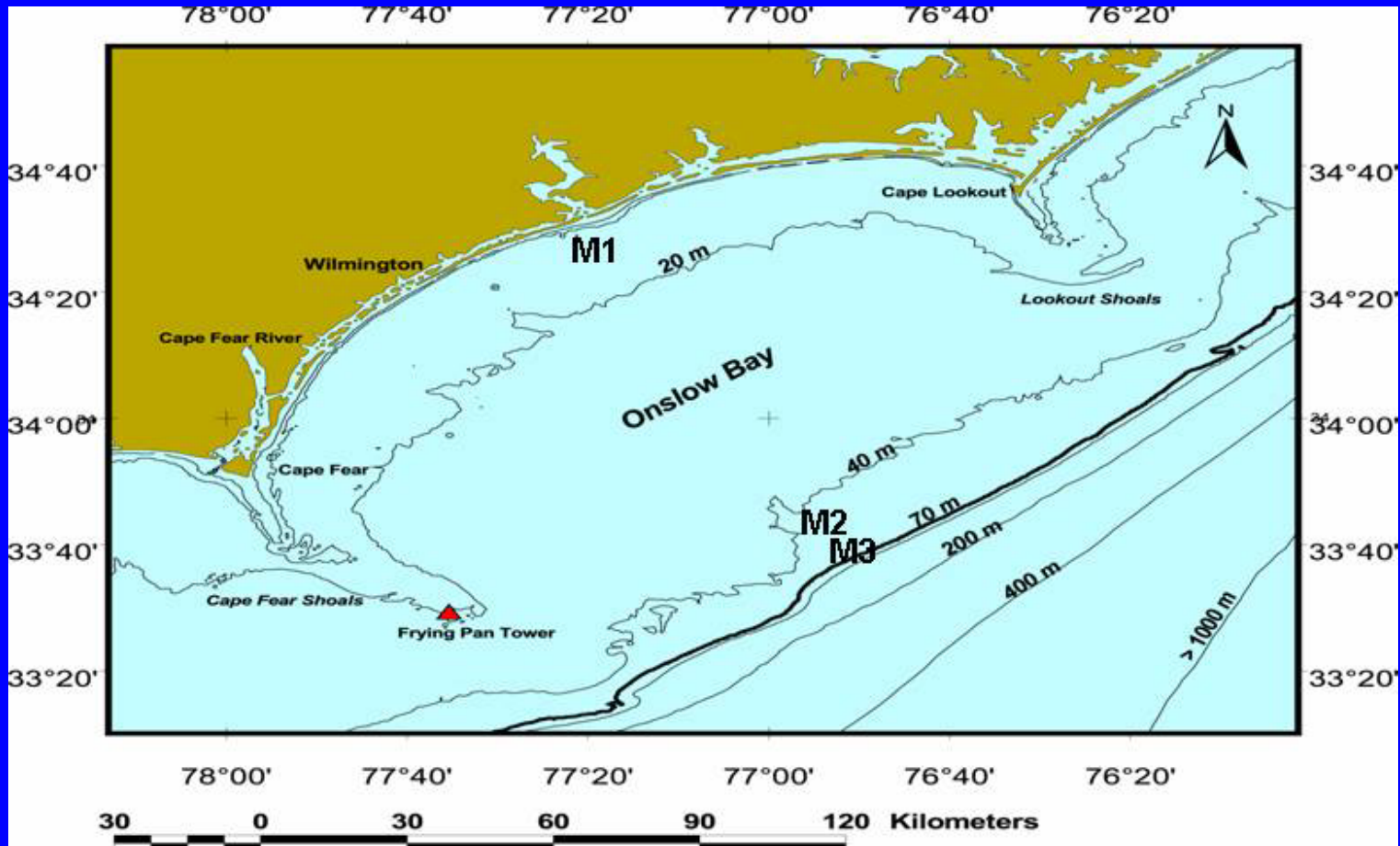


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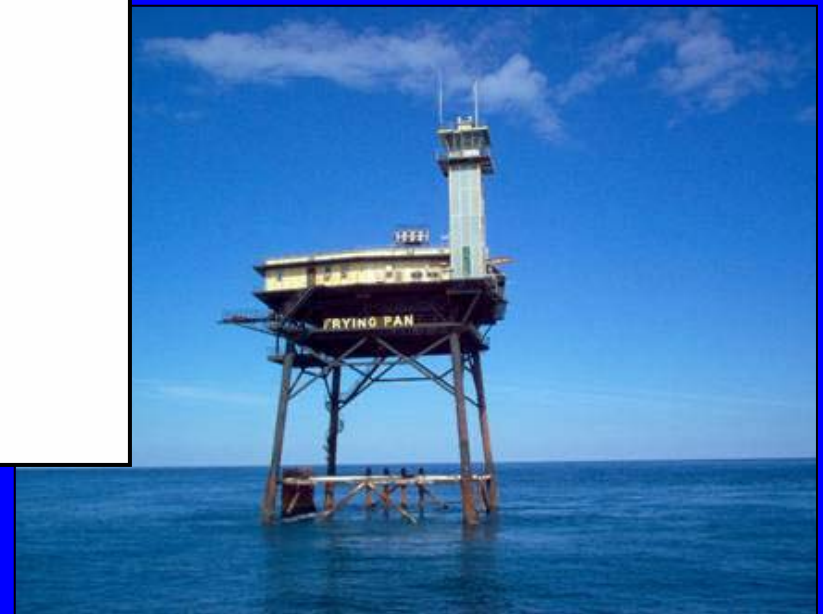
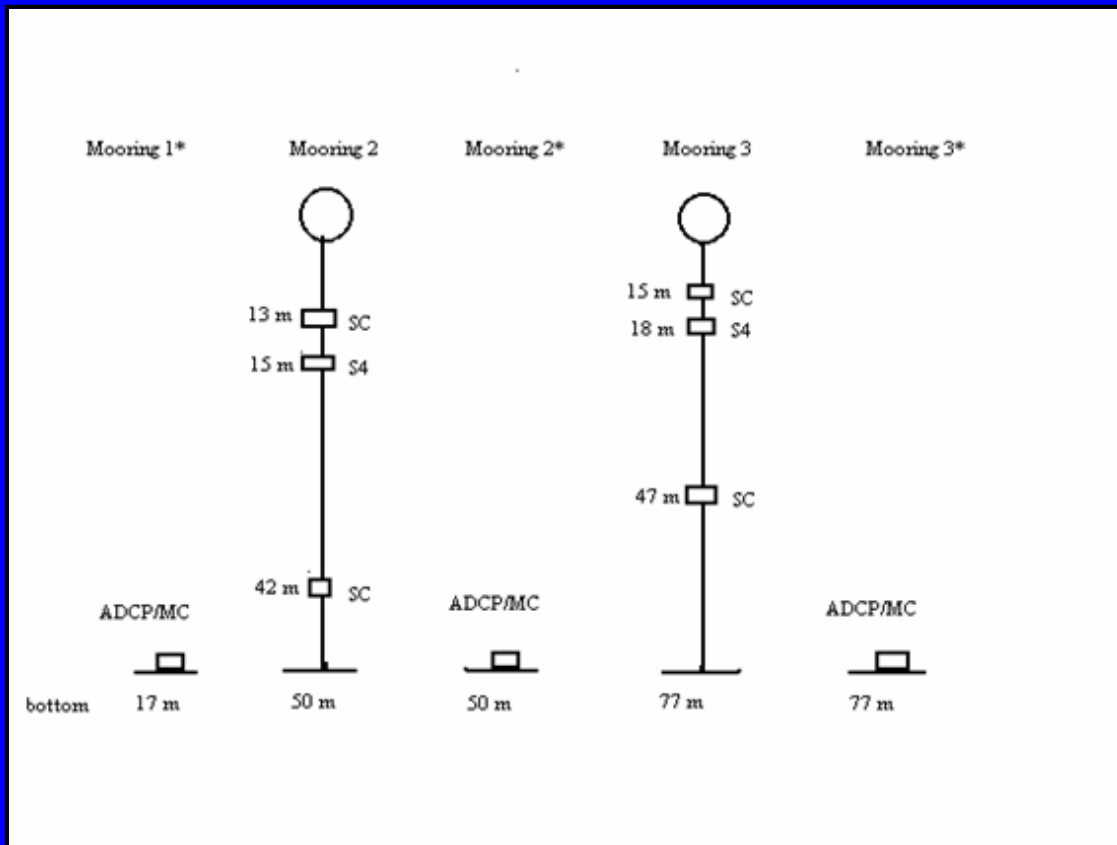
Objectives

- Analyze the short and long term effects on temperature stratification due to the passing of each of the storms
- Understand the impacts if any the storms had on each other and the influence of the Gulf Stream on the overall temperature response

Study Area



Instrumentation



Hurricane Dennis

- 8/30/99-9/4/99
- Category II
- 38 m/s Maximum Winds
- 21 km/hr Translation Speed
- 115 km East of M1
- 20 km East of M3

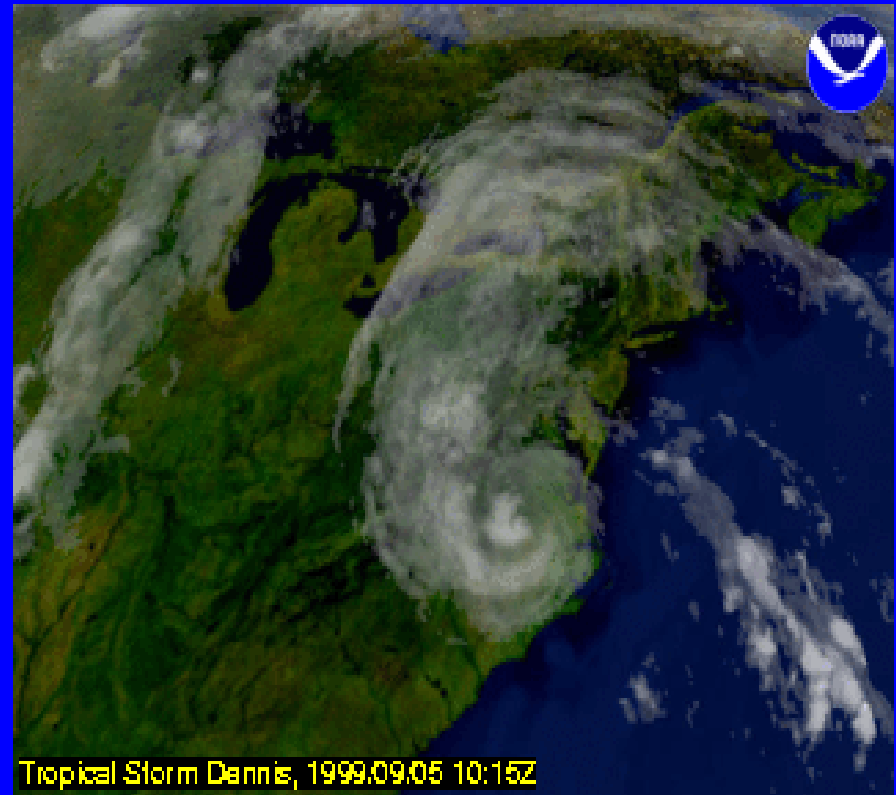


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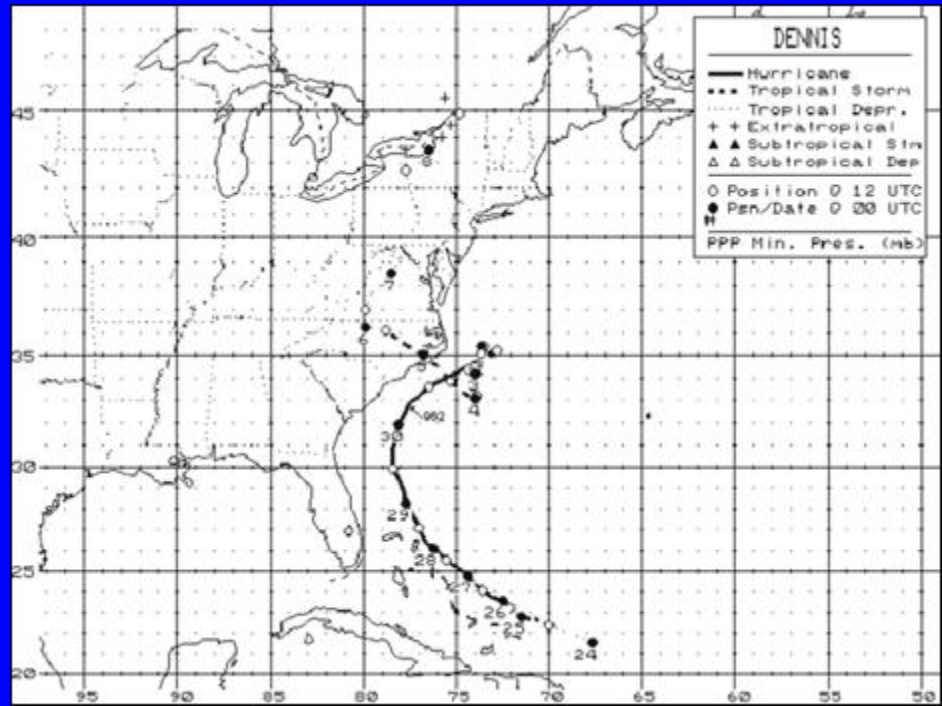
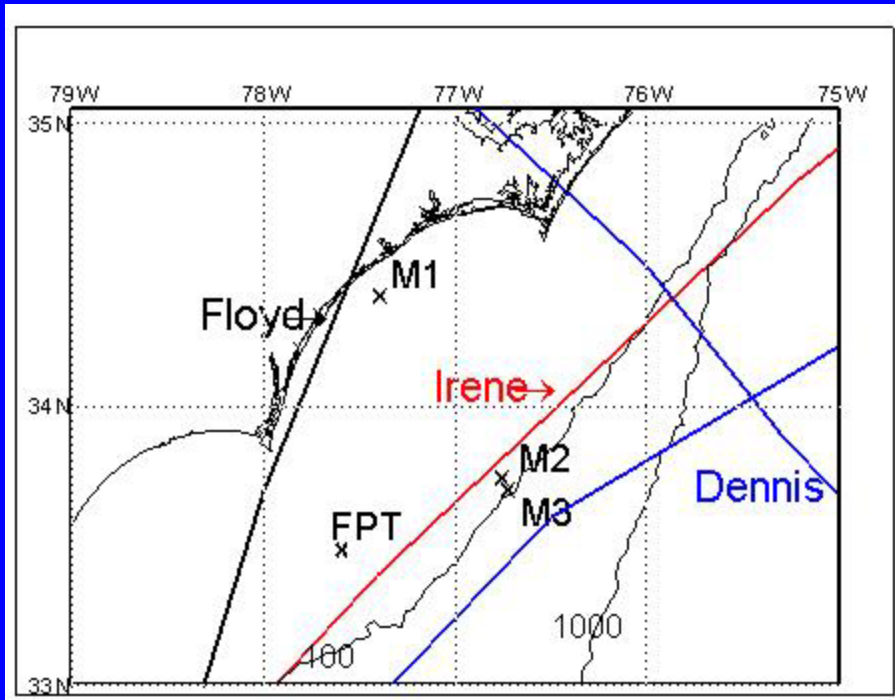
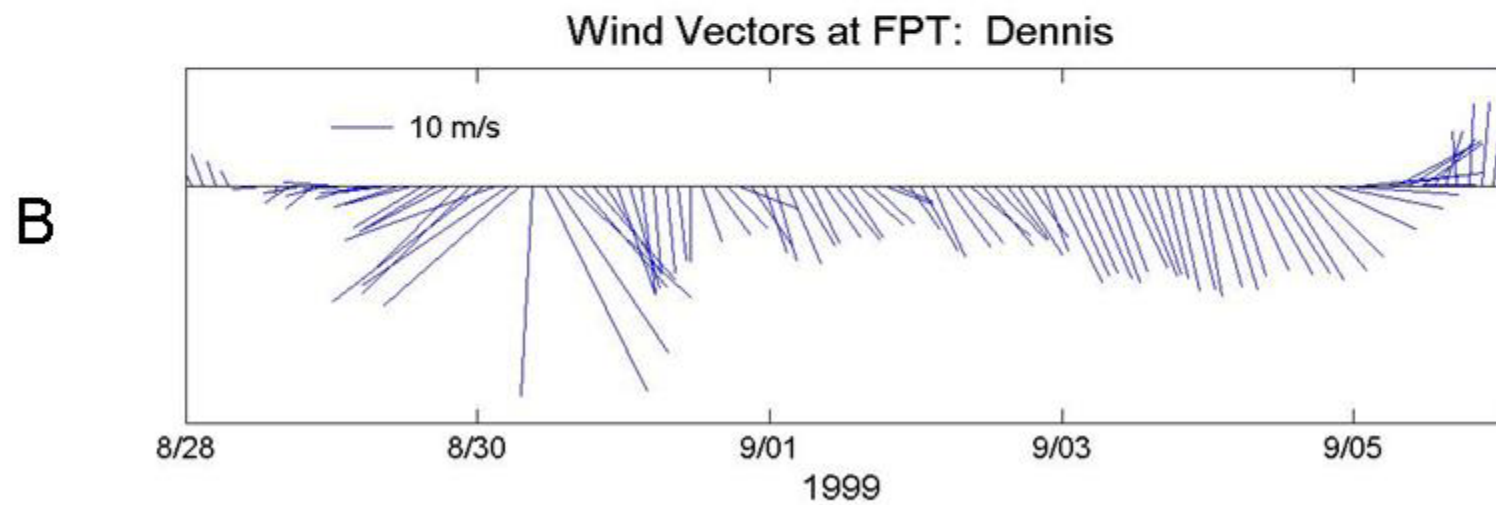
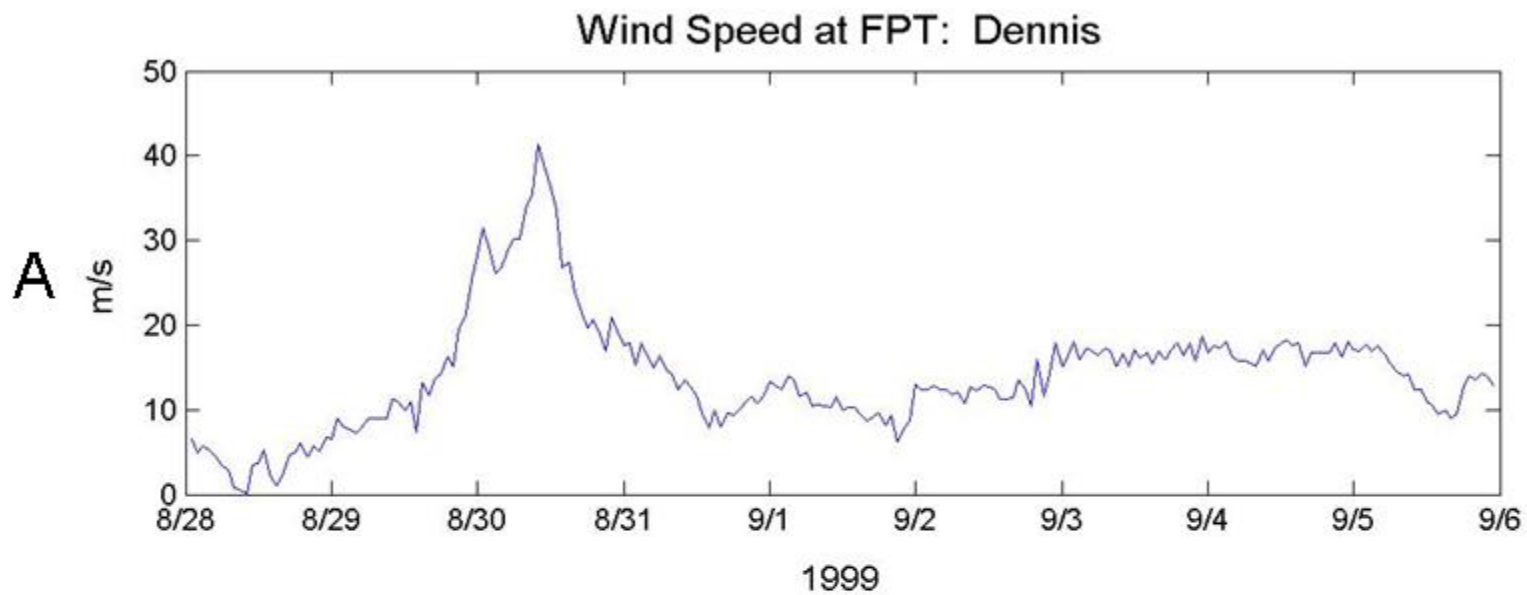
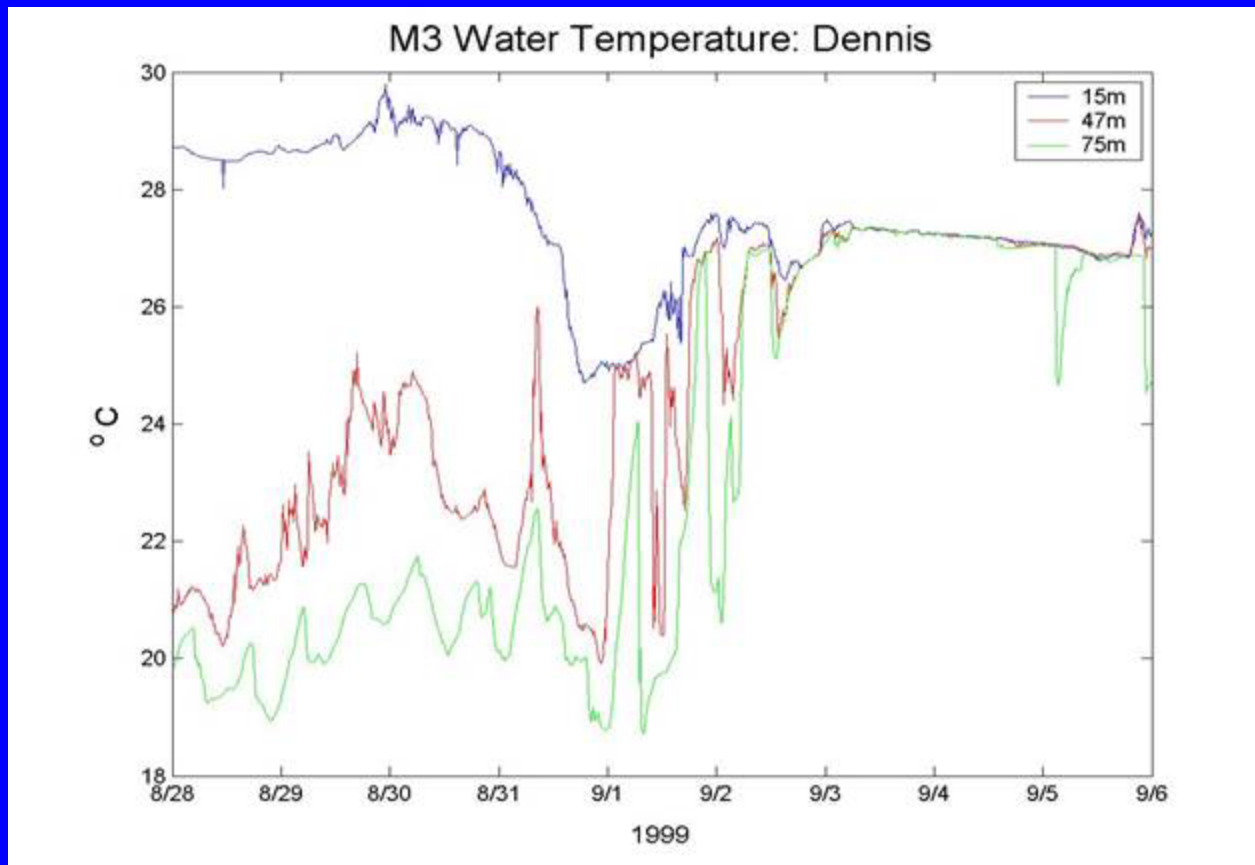


Image From: <http://www.nhc.noaa.gov/prelims/1999dennis1.gif>

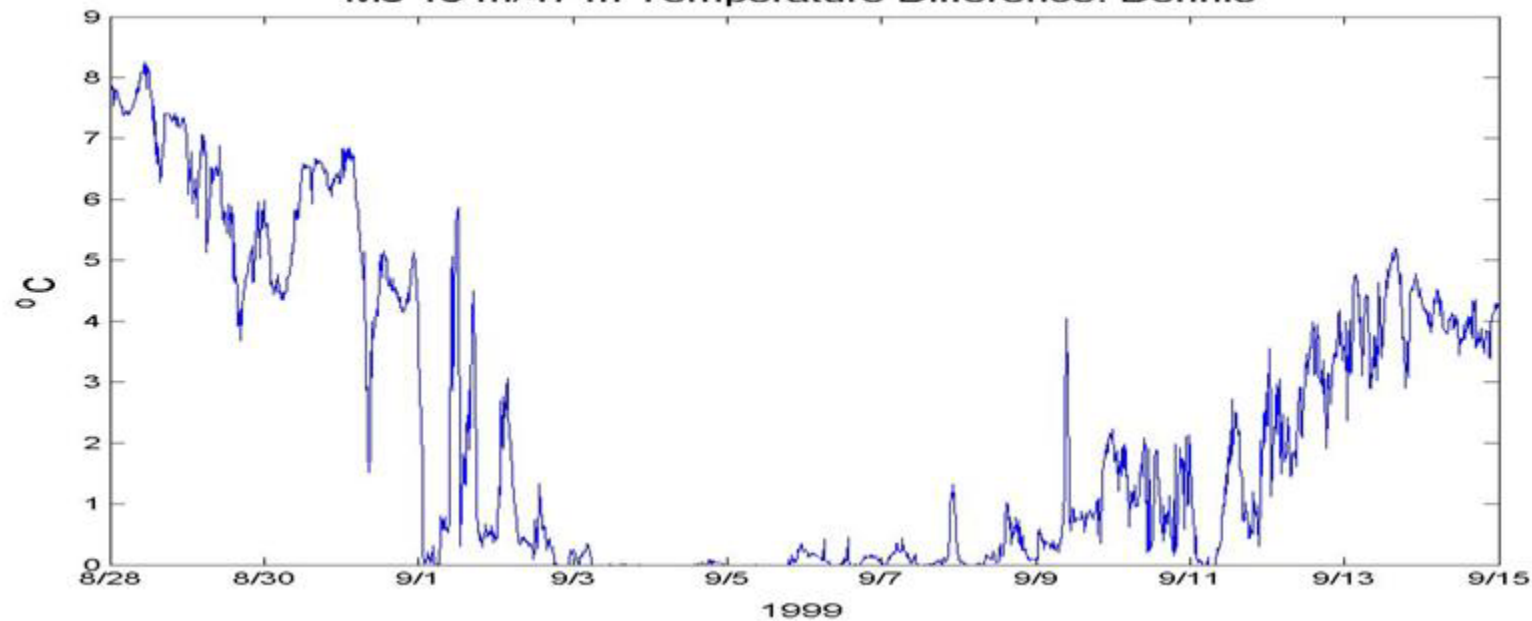


M3 Temperature Response: Dennis



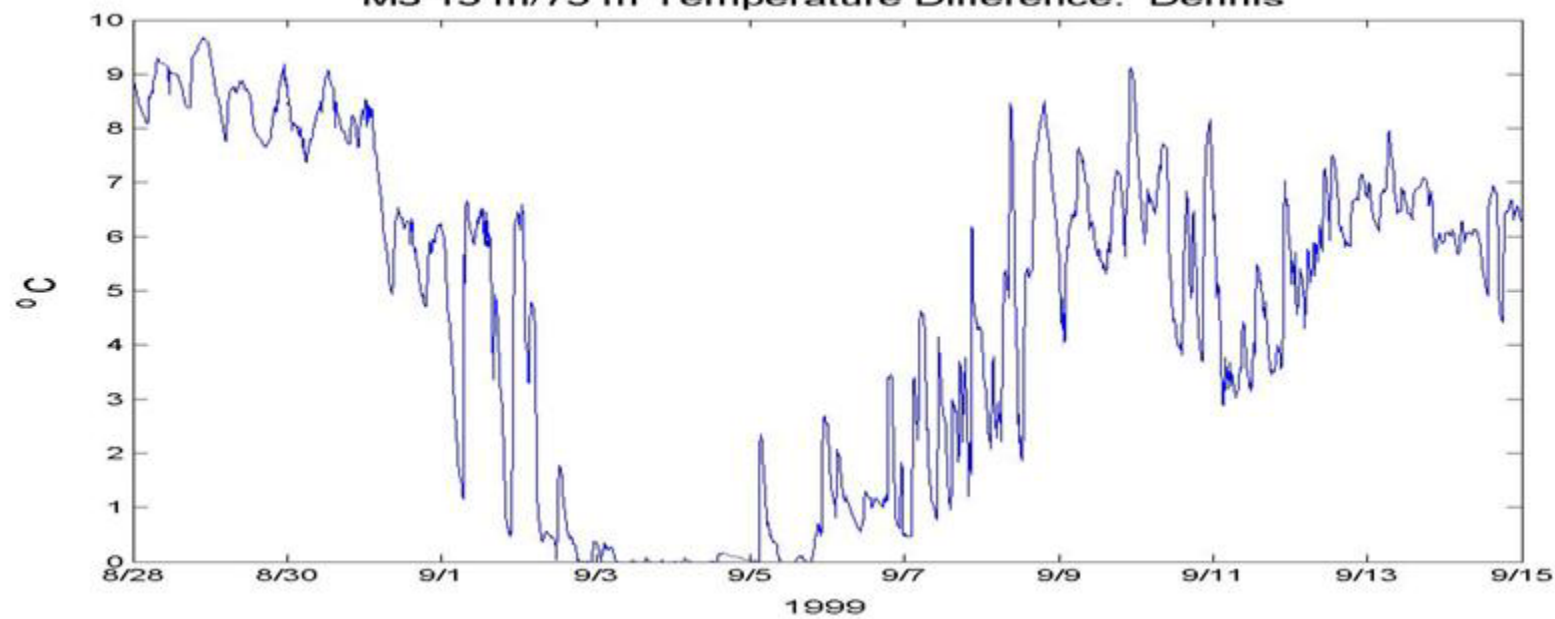
M3 15 m/47 m Temperature Difference: Dennis

A

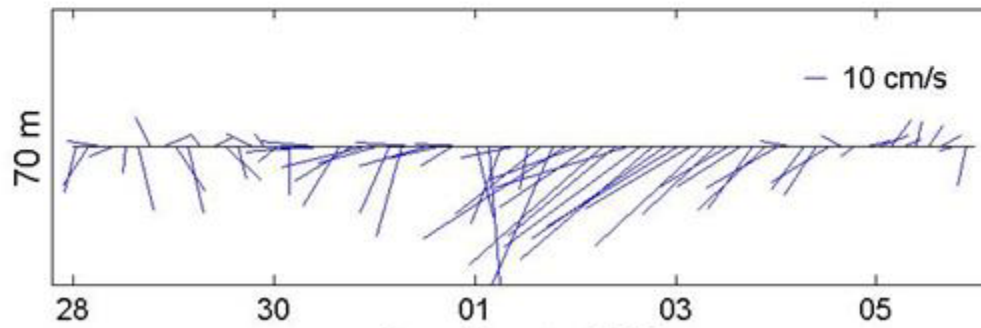
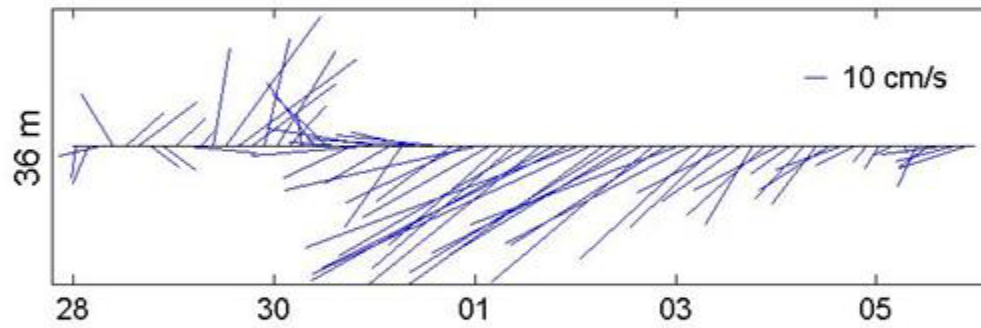
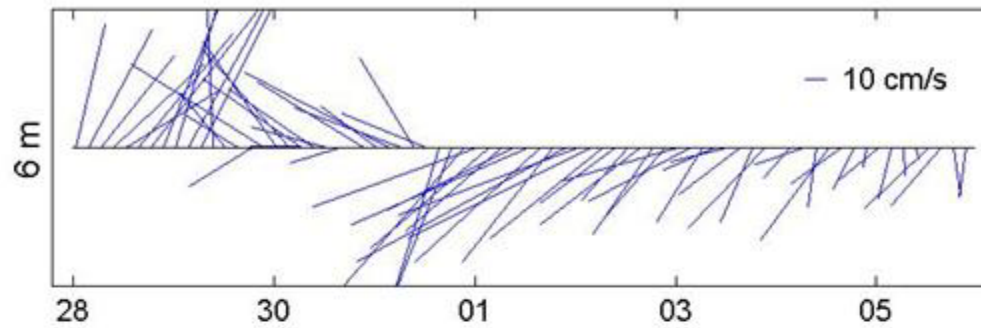


M3 15 m/75 m Temperature Difference: Dennis

B



M3 Current Vectors: Dennis



Aug./Sept. 1999

Summary: Dennis

- Dennis elicited a huge oceanic response because it stalled off the coast and the winds remained over Onslow Bay for an extended period of time
- Southwestward movement of entire water column
- Elimination of stratification
- 15 m/47 m temperature difference never rebounds to pre-Dennis conditions
- Highly damped inertial response in temperature, none in flow

Hurricane Floyd

- 9/16/99
- Category III
- 44 m/s Maximum Winds
- 32 km/hr Translation Speed
- 16 km West of M1
- 105 West of M3

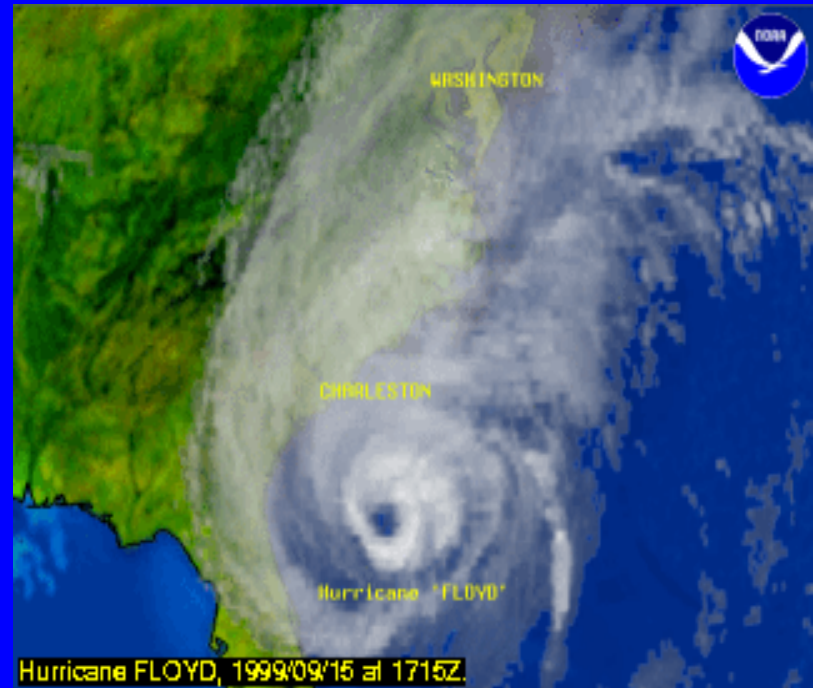
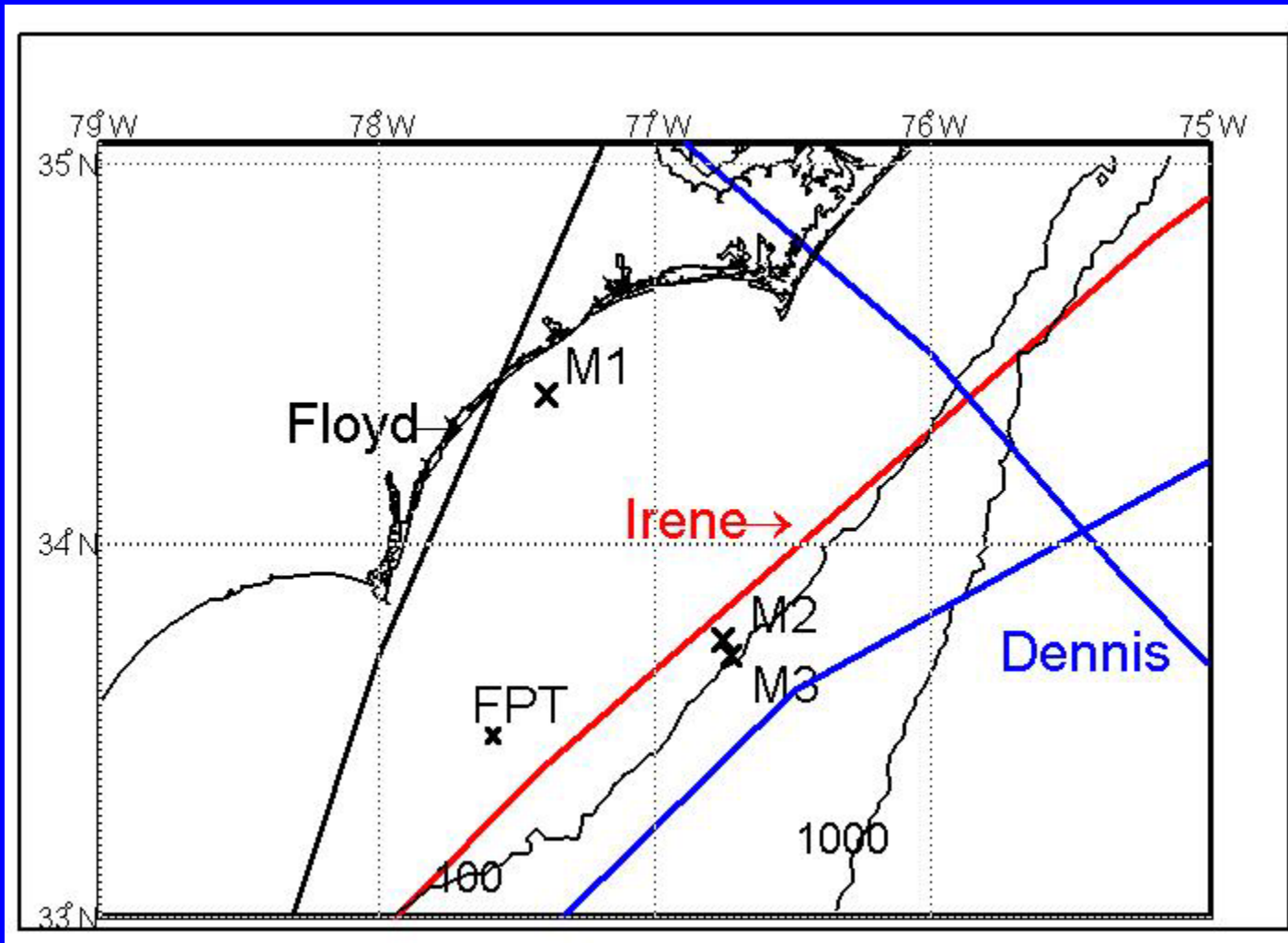
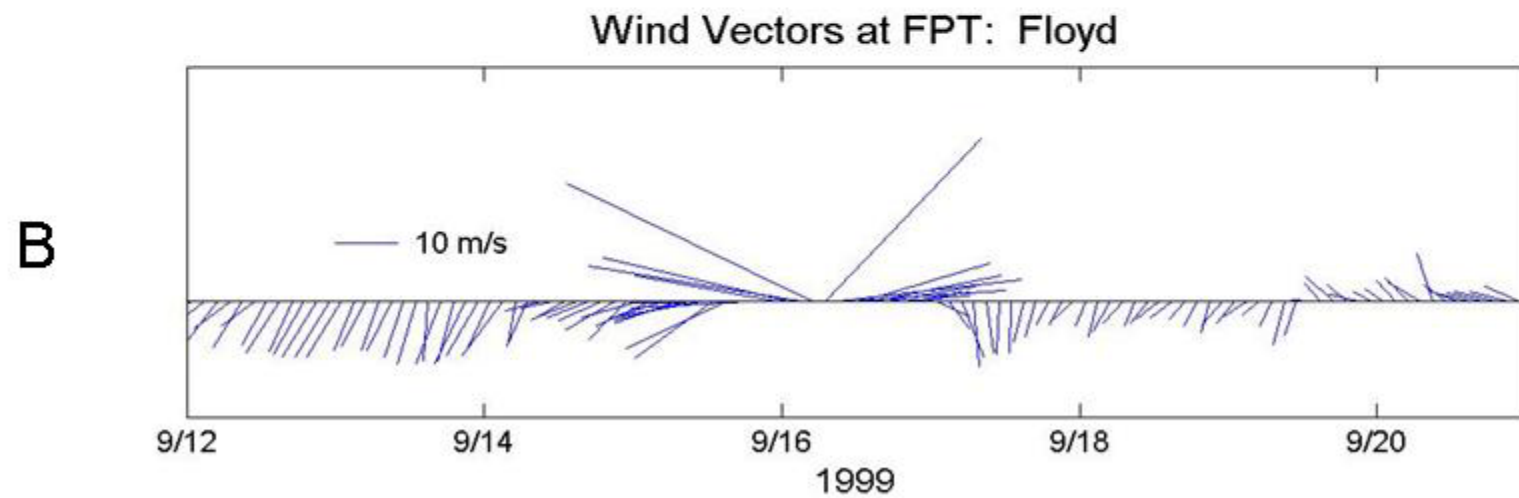
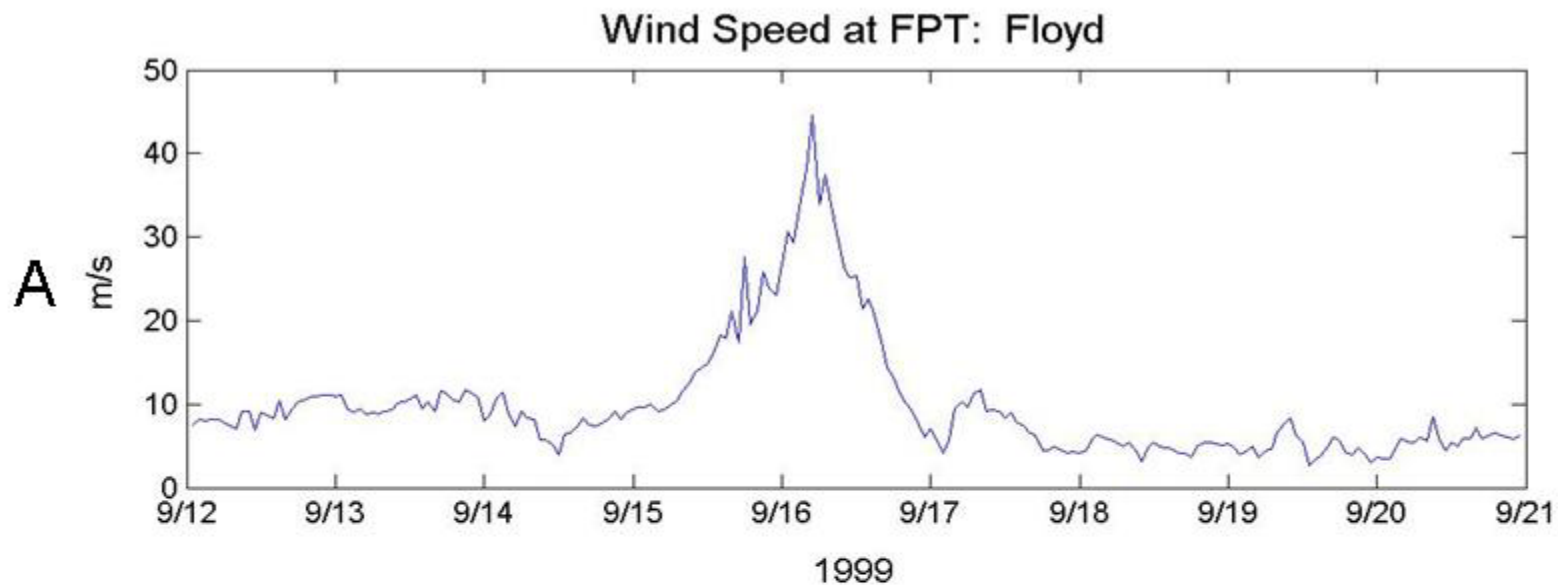


image From: <http://www.nnvl.noaa.gov/cgi-bin/index.cgi?page=items&ser=100135>





Summary: Floyd

- Very fast translation speed
- The thermal structure of the ocean was different before Floyd than it was for Dennis - less stratified
- Another decrease in the temperature difference between 15 m and 47 m

Hurricane Irene

- 10/17/99-10/18/99
- Category I
- 25 m/s Maximum Winds
- 19 km/hr Translation Speed
- 86 km East of M1
- 11 km West of M3

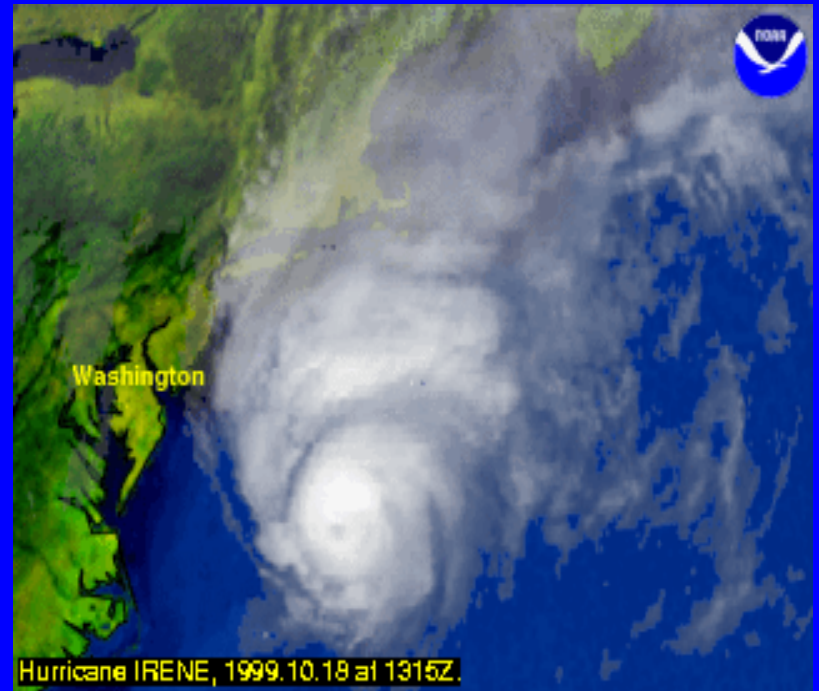
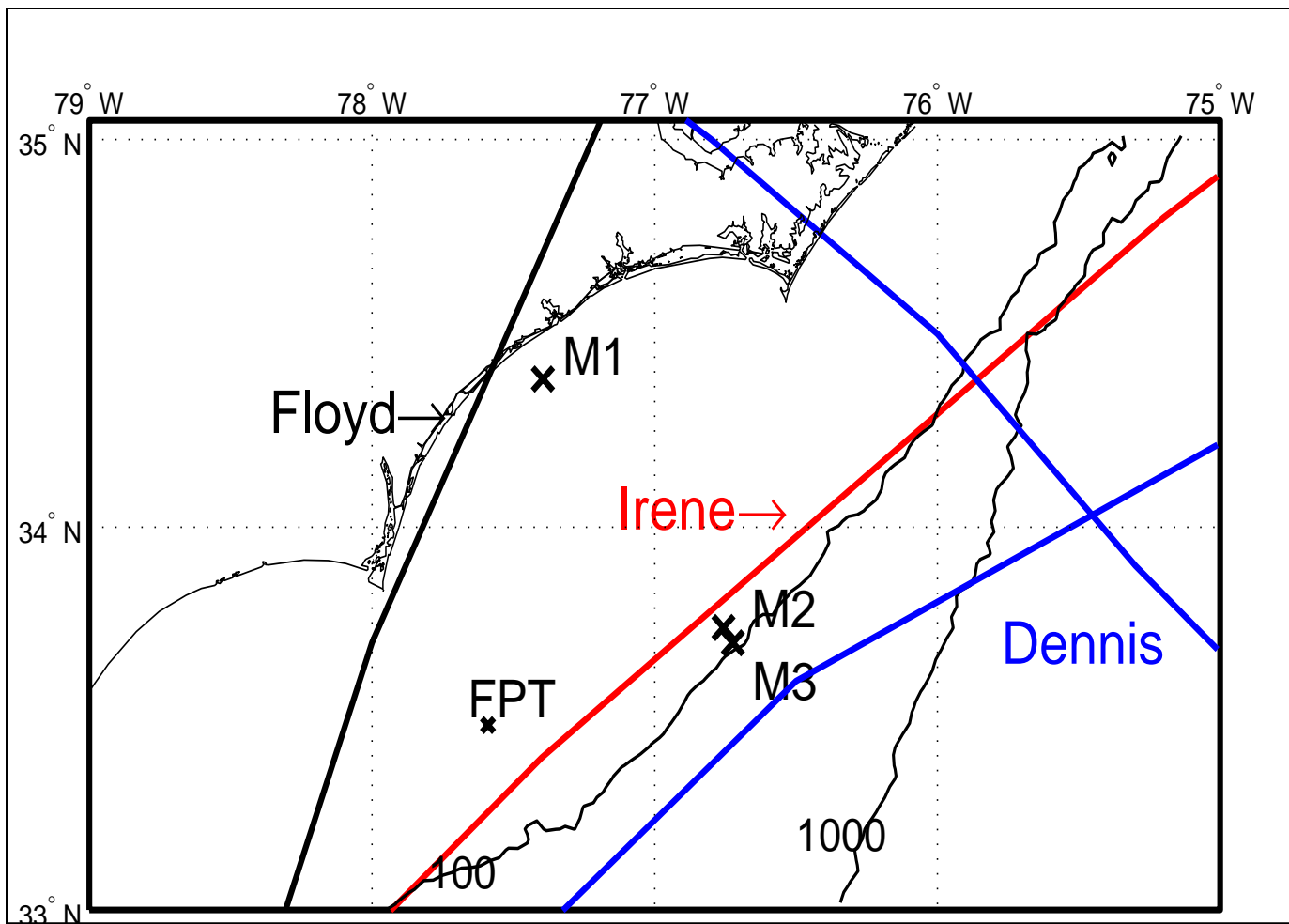


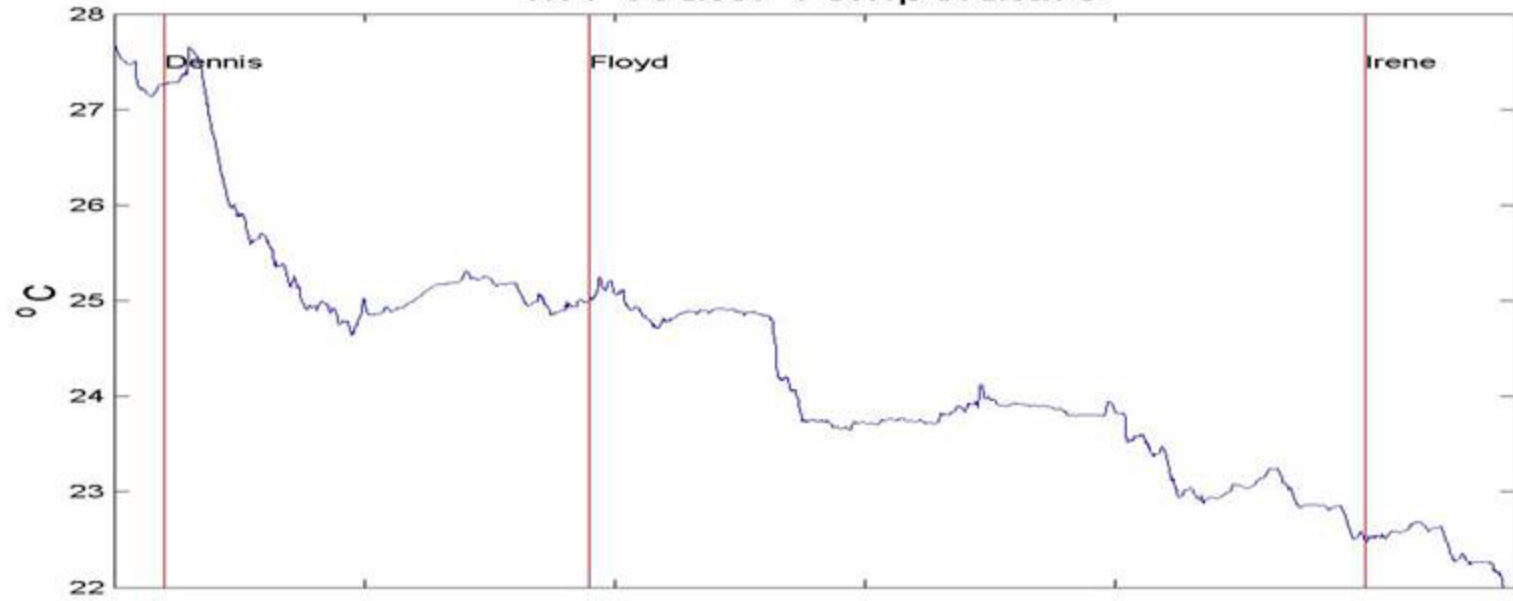
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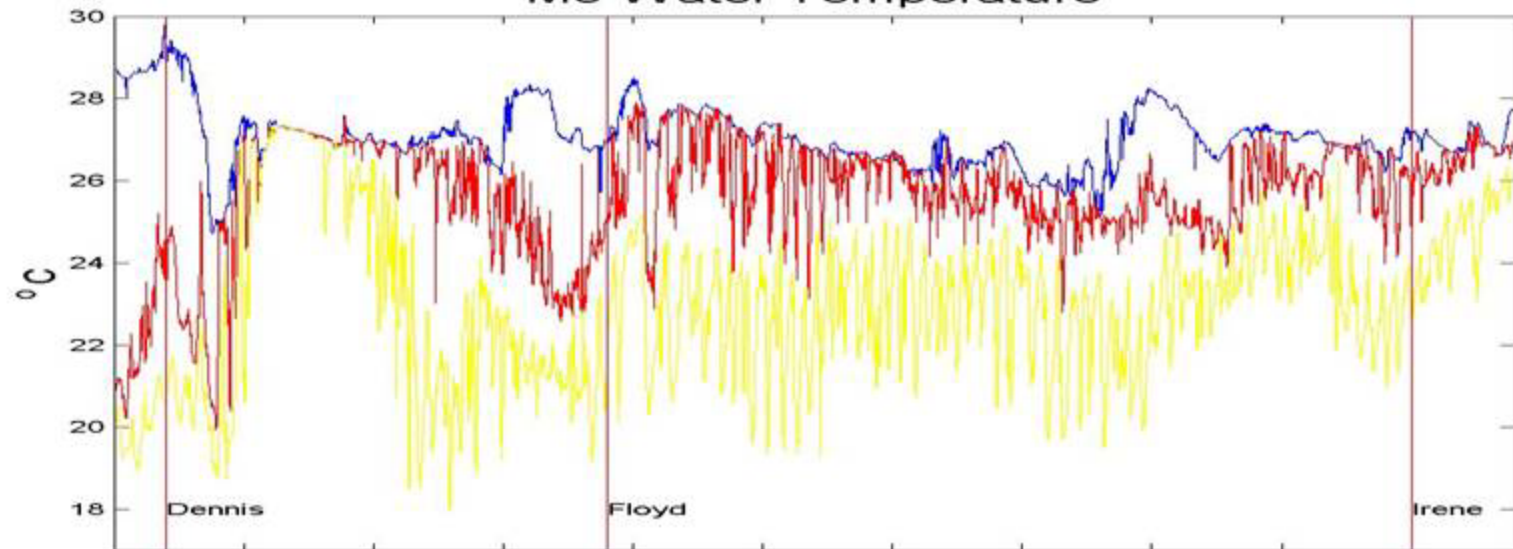
Summary: Irene

- Weakest of the three storms
- Started with minimal stratification in the upper 47 meters
- Temperature response was not significant

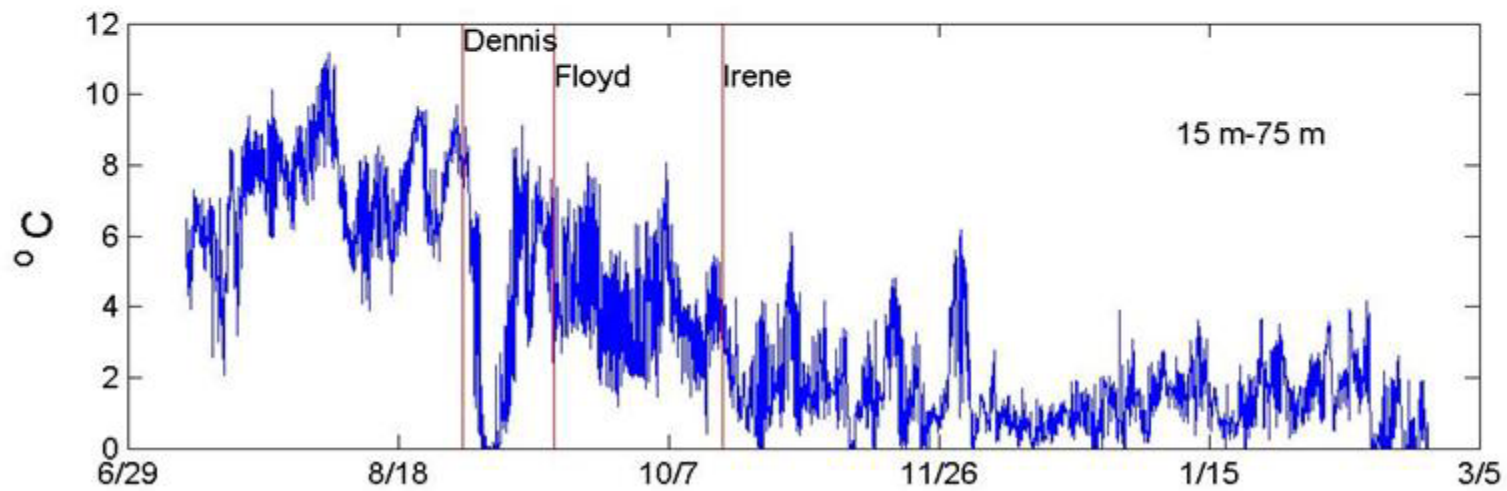
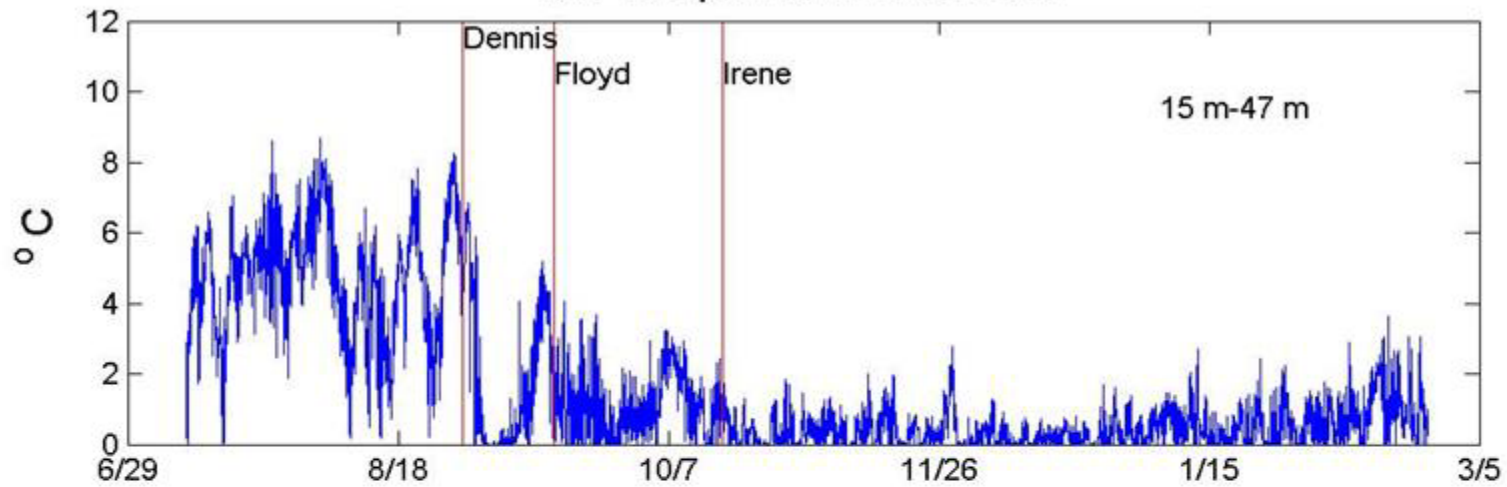
M1 Water Temperature



M3 Water Temperature



M3 Temperature Difference



1999/2000

Conclusions

- Only Dennis had significant inertial response associated with it.
- All three storms contributed to the diminishing of stratification in the upper 47 m
- Hurricanes as singular events can disrupt the thermal structure of the ocean temporarily
- Thermal structure at M3 did not cool significantly (as compared to M1, most likely due to the influence of the Gulf Stream)

Acknowledgements

- Dr. Russ Herman, and Dr. Leonard Pietrafesa
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- Jim Epps, Research Technician at NCSU
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Questions?

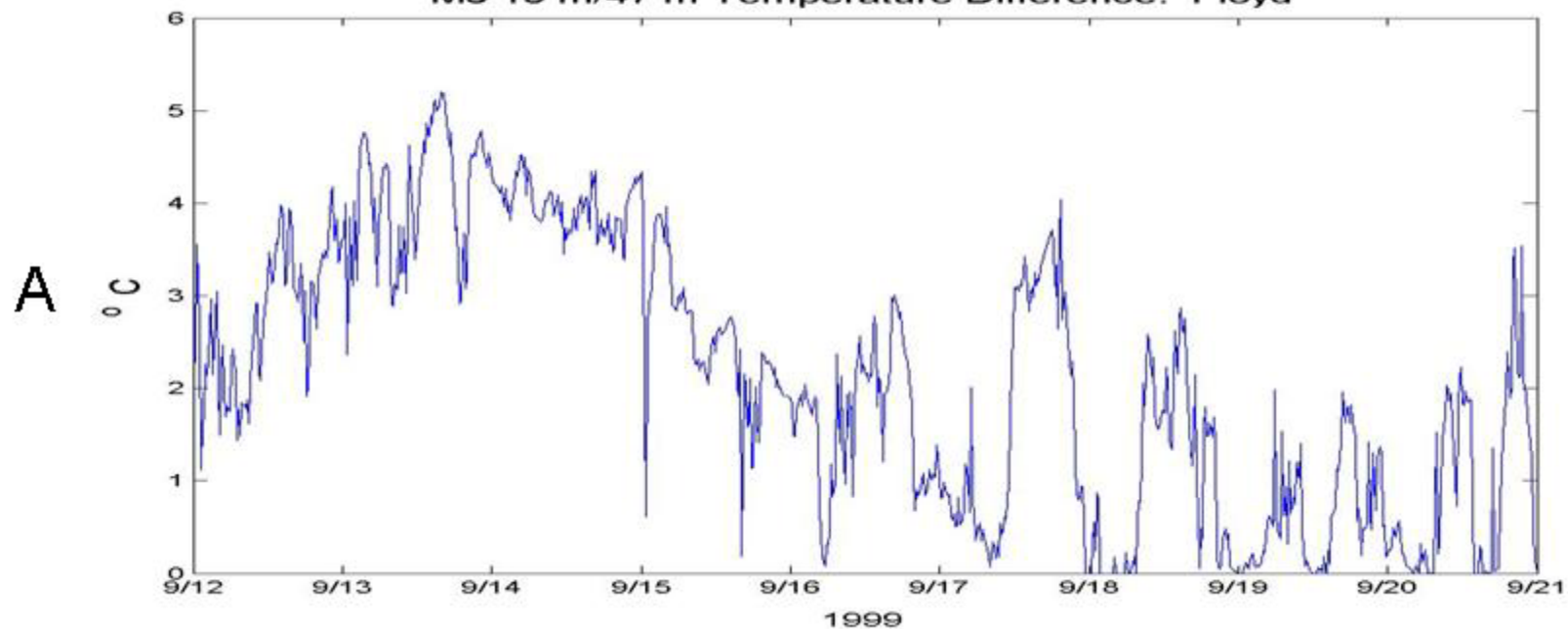
This presentation was created by Ben Speckhart for this consortium and also for my master's thesis.

Temperature response was one of several aspects of shallow water response studied for these hurricanes. However, because it was the most significant, temperature response was used for this presentation.

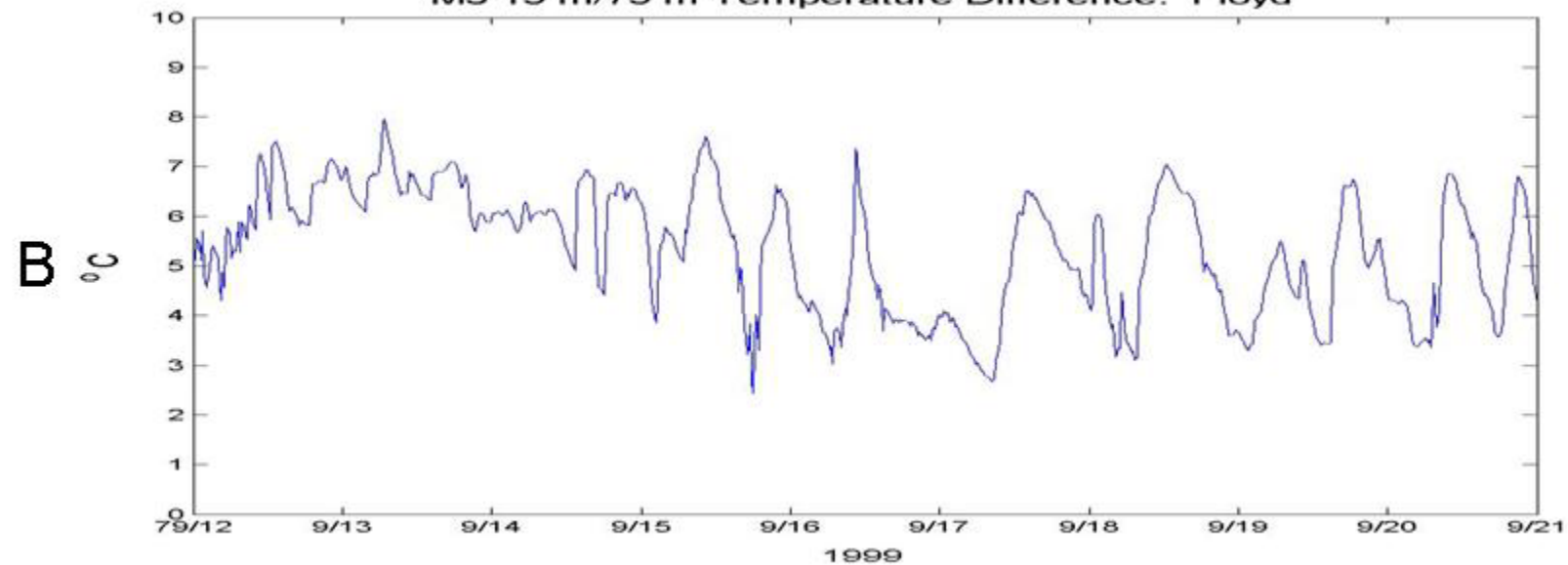
If you have any questions or comments please call or email me at:
(910)509-4290 or
bls6306@hotmail.com



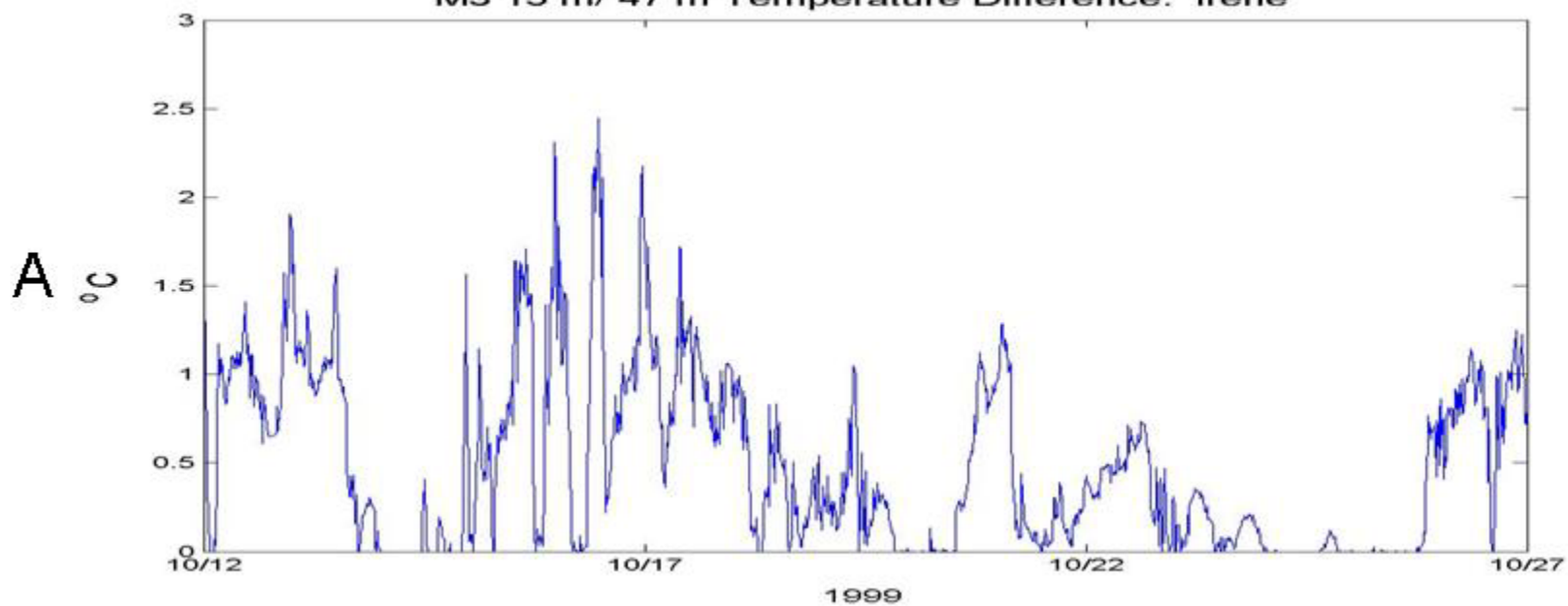
M3 15 m/47 m Temperature Difference: Floyd



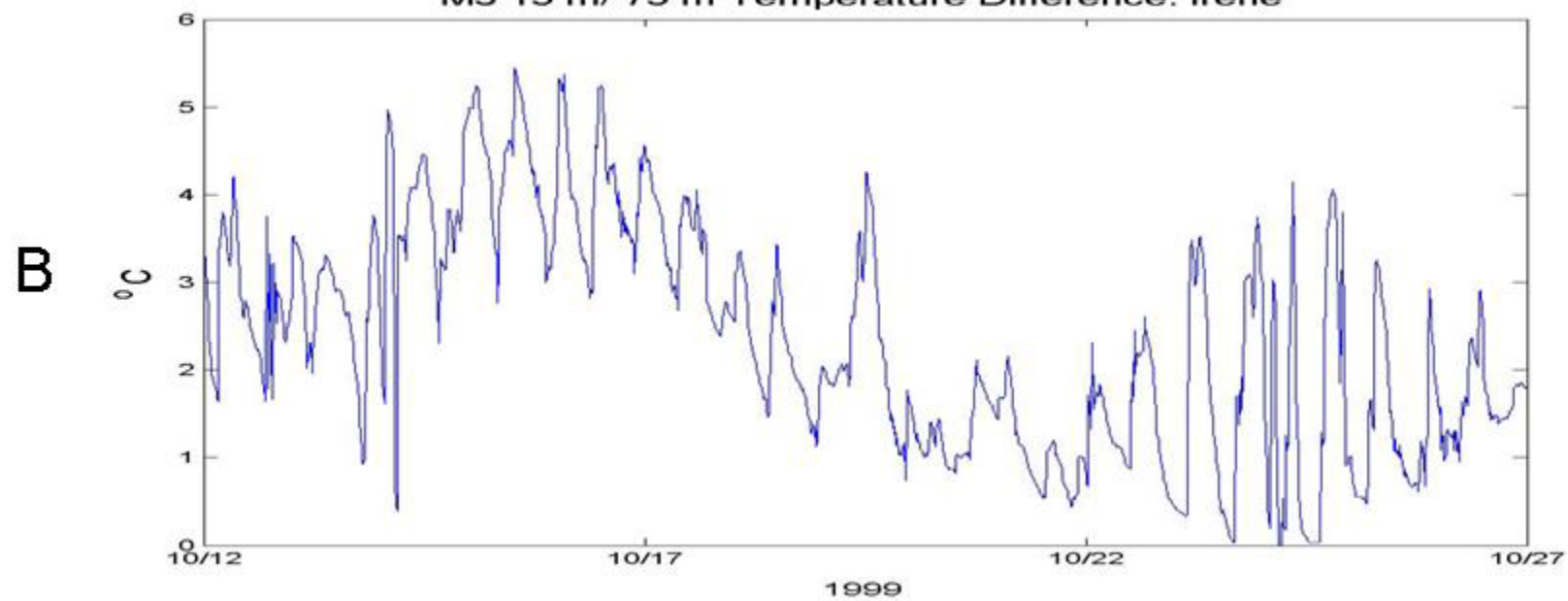
M3 15 m/75 m Temperature Difference: Floyd

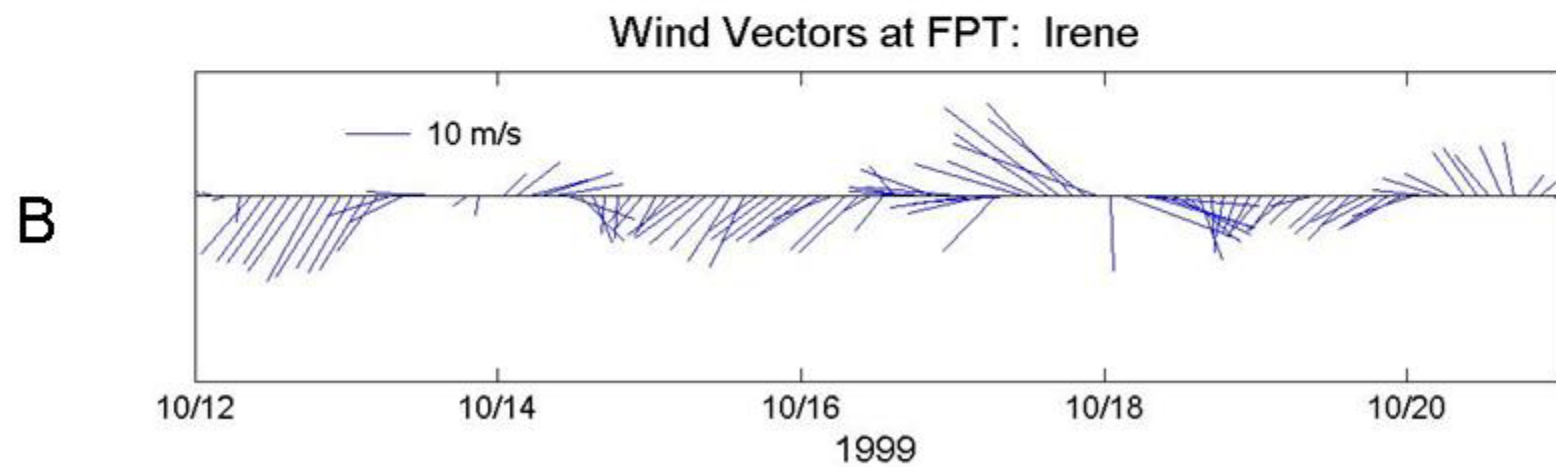
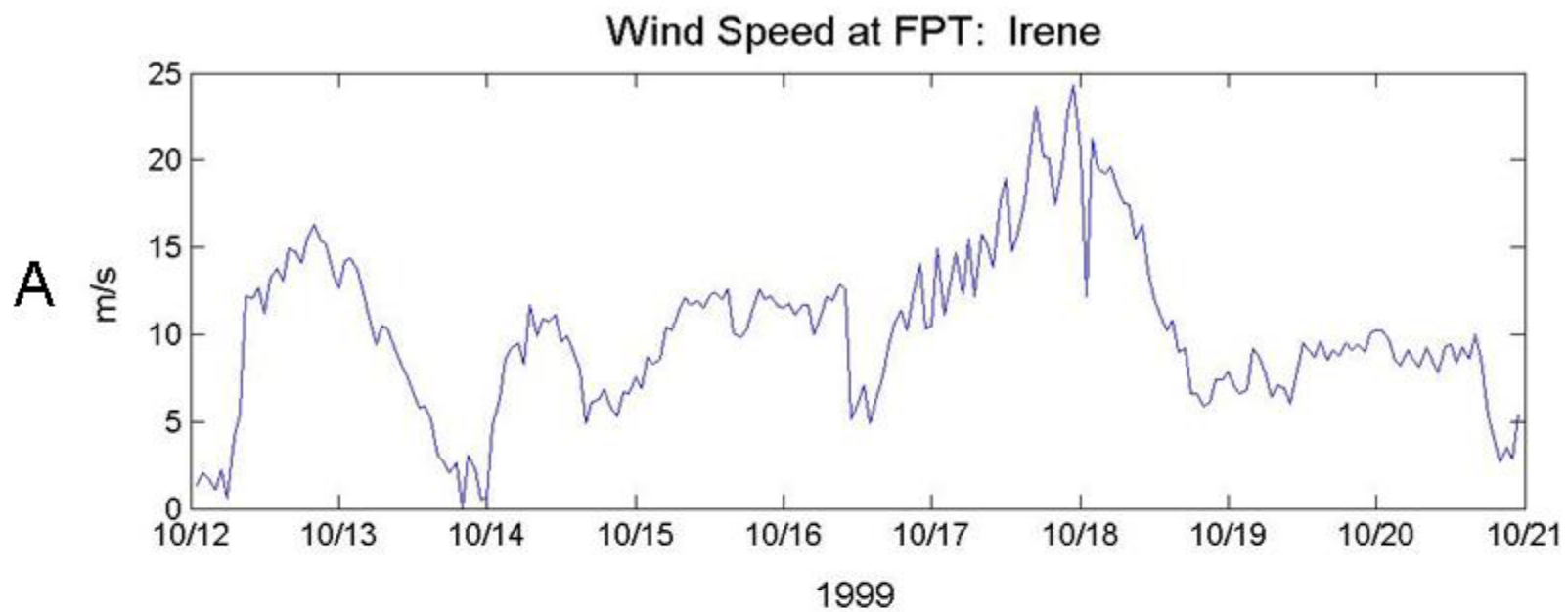


M3 15 m/ 47 m Temperature Difference: Irene

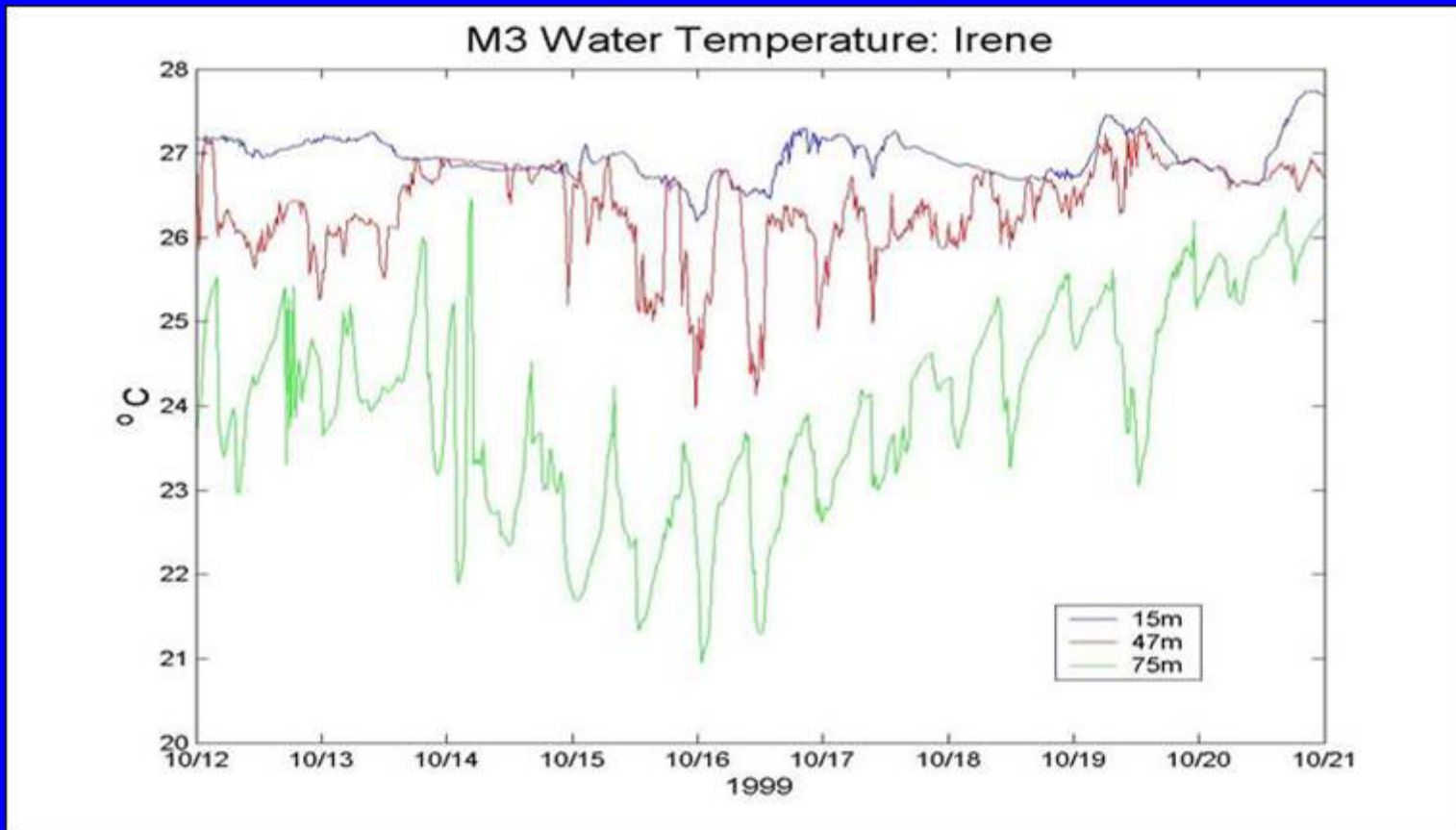


M3 15 m/ 75 m Temperature Difference: Irene

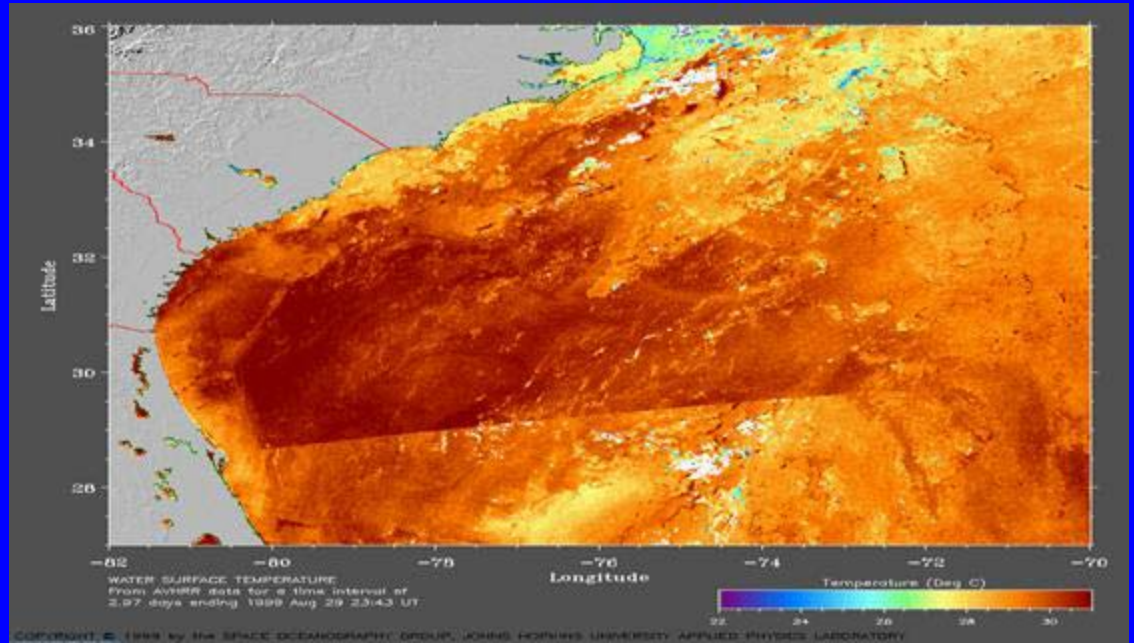




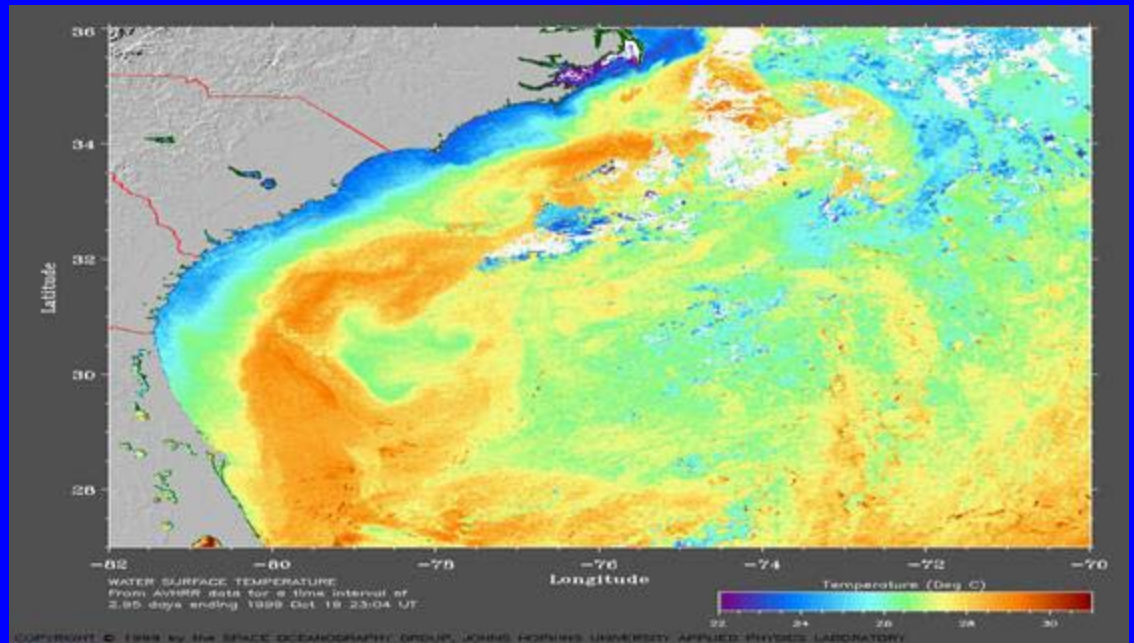
M3 Temperature Response: Irene



Pre-Dennis SST →



Post Irene SST →



M3 Temperature Response: Floyd

