

***Conference Paper SNMREC/CP-10-045***

February, 2010

**Almost Coastal: Base-Load Power from the Florida Current**

**H. P. Hanson**

**S.H. Skemp, G.A. Alsenas, C.E. Coley**

**2010 Ocean Sciences Meeting, Portland, OR**

**American Geophysical Union**

**American Society of Limnologists and Oceanographers**

# Almost Coastal: Base-load Power from the Florida Current

*H. P. Hanson, S. H. Skemp, G. M. Alsenas, C. E. Coley*

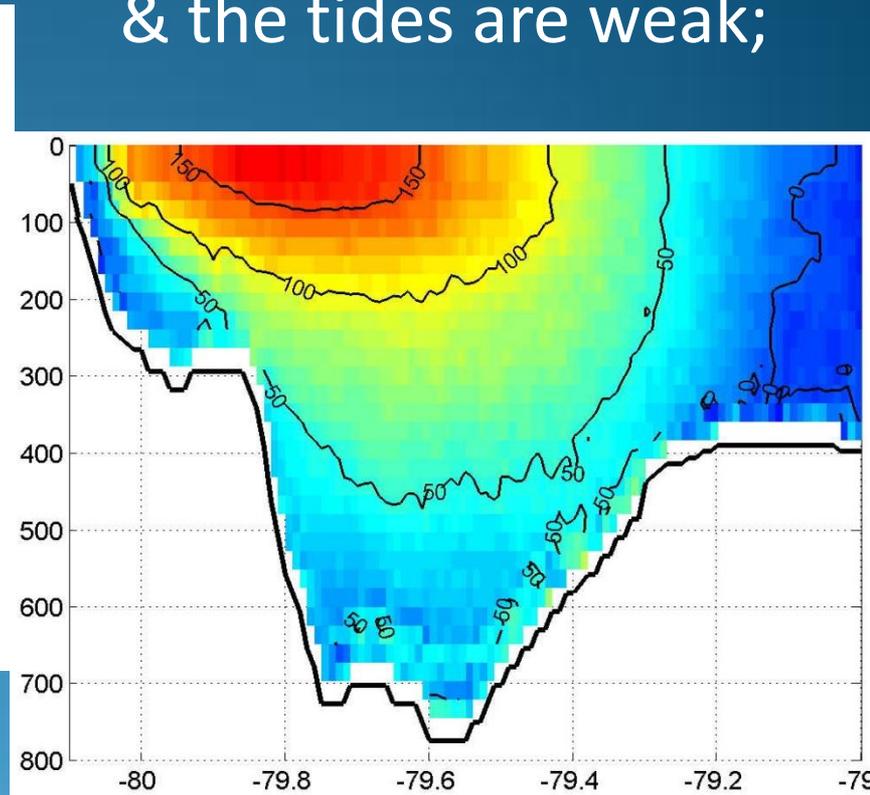
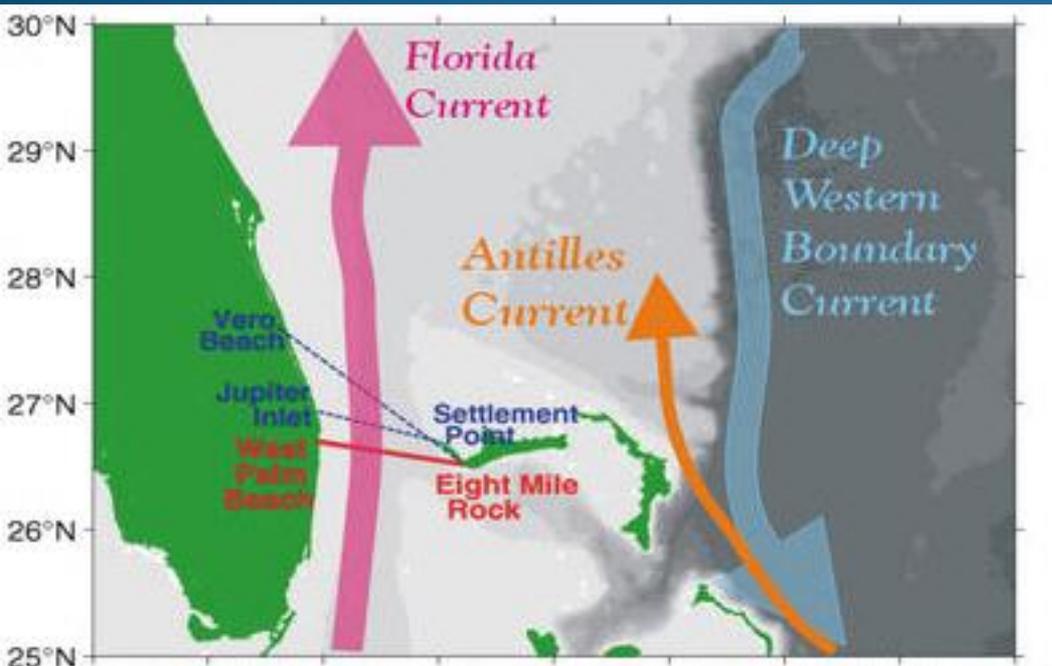
Center for Ocean Energy Technology, Florida Atlantic University, Boca Raton, FL

## Overview

As oil supplies dwindle and as the carbon footprint of coal and gas becomes unacceptable, developing a diverse and robust portfolio of renewable energy sources for the future is becoming increasingly compelling.

The energy in waves, tides, open-ocean currents, and the thermocline can play an important role in such a portfolio.

# In SE Florida... the waves are tame & the tides are weak;



...but we've sure got current.

Moreover, we have a significant thermal potential as well.

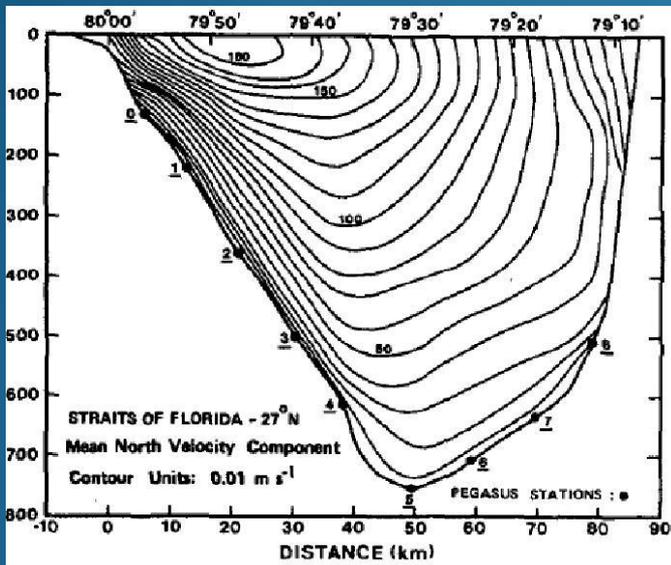
# COET

With funding from the State of Florida and from the US Department of Energy, FAU's **Center for Ocean Energy Technology** seeks to advance the science and technology of renewable oceanic energy extraction.

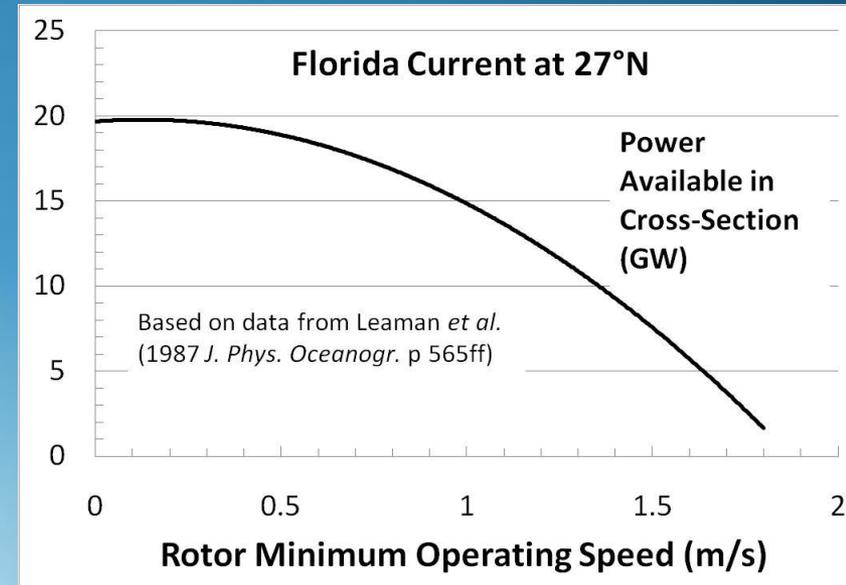
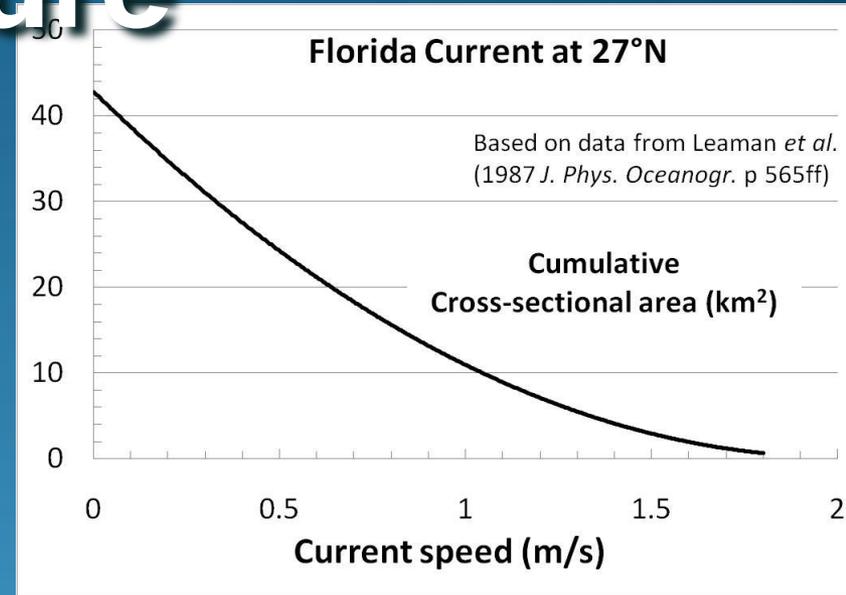
We're starting with the Florida Current and progressing toward OTEC implementation by creating an at-sea test-bed facility for developers' prototypes and by conducting ongoing assessments of the resources themselves. For example...

# Classic Picture

Florida Current cross-section:

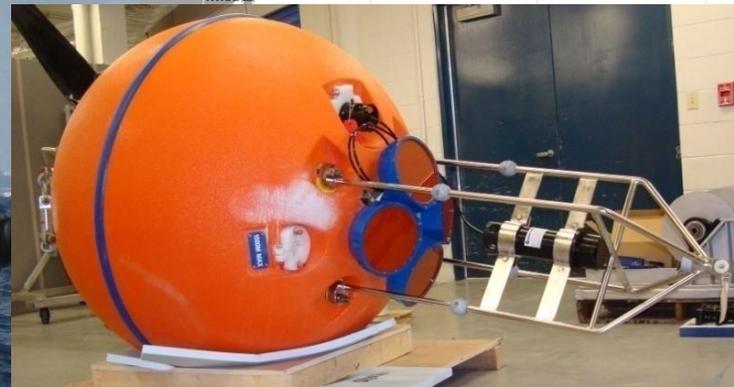
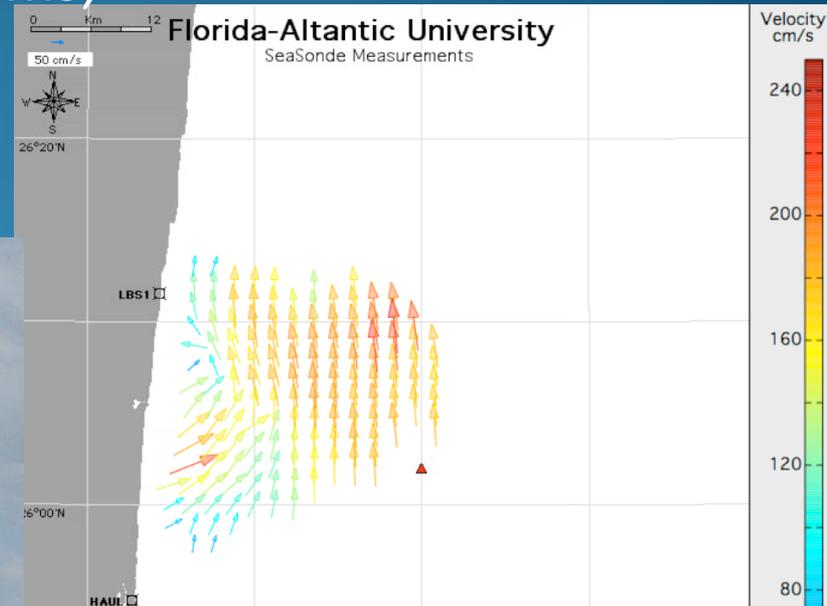


from: Structure and Variability of the Florida Current at 27°N: April 1982 – July 1984. *J. Phys. Oceanogr.* 17.



# New Deployments

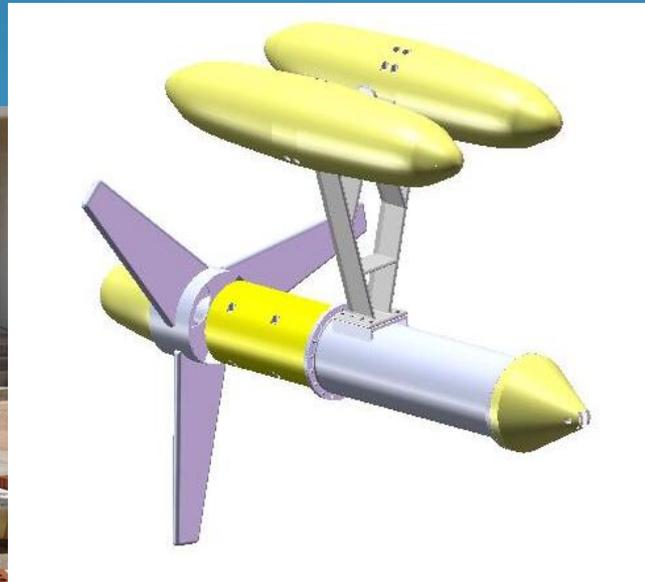
- Bottom- & ship-mounted ocean current profiler systems (ADCPs), with acoustic modems;
- 2 surface current radar (CODAR) stations



# Test Facility

- Demonstrate feasibility of extracting ocean current energy
- Deploy a platform to support ocean energy technology development
- Investigate technology gaps and hurdles
- Study environmental and ecological interactions

COET prototype turbine



Permanent mooring buoy



Deployment platform model



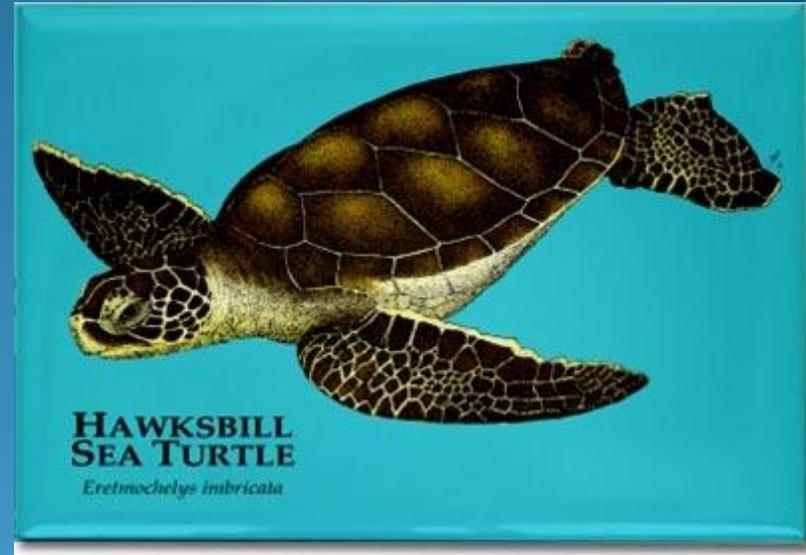
# Technology R&D

- **Prognostics & Health Monitoring**...to track system performance and predict failure modes;
- **Rotor Behavior**...to optimize instrumentation and develop better materials for blades;
- **Corrosion and Biofouling R&D**...to improve system lifetimes
- **System Dynamics & Stability**...to ensure robust test facility.

In addition, economics and policy issues present challenges.

# Environmental R&D

- Wake effects (alteration of currents and waves);
- Alteration of bottom substrates, sediment transport and deposition;
- Alteration of benthic habitats;
- Noise & electromagnetic fields;
- Chemical toxicity;
- Strikes and entanglement;
- Inadvertent FADs issues;
- Interference with animal movements and migrations;
- User conflicts (shipping; fisheries).



# Summary

Oceanic sources can help meet future demand for clean, affordable, and reliable renewable energy. Open-ocean current systems offer base-load potential to augment tidal, wave, and offshore wind generation.

We at COET look forward to working with developers and our colleagues in the ocean-energy community to advance this important new technology.