Announcing the Final Examination of Alfredo Ruiz for the degree of Master of Science

Time & Location: December 23, 2010 at 10:00 AM in ENGR-2 324
Title: WEB-BASED TIDAL TOOLBOX OF ASTRONOMIC TIDAL DATA FOR THE ATLANTIC INTRACOASTAL WATERWAY, ESTURARIES AND CONTINENTAL SHELF OF THE SOUTH ATLANTIC BIGHT

A high-resolution astronomic tidal model has been developed that includes detailed inshore regions of the Atlantic Intracoastal Waterway and associated estuaries along the South Atlantic Bight. The unique nature of the model’s development ensures that the tidal hydrodynamic interaction between the shelf and estuaries is fully described. Harmonic analysis of the model output results in a database of tidal information that extends from a semi-circular arc (radius ~750 km) enclosing the South Atlantic Bight from the North Carolina coast to the Florida Keys, onto the continental shelf and into the full estuarine system.

The need for tidal boundary conditions (elevation and velocity) for driving inland waterway models has motivated the development of a software application to extract results from the tidal database which is the basis of this thesis. In this tidal toolbox, the astronomic tidal constituents can be resynthesized for any open water point in the domain over any interval of time in the past, present, or future. The application extracts model results interpolated to a user’s exact geographical points of interest, desired time interval, and tidal constituents. Comparison plots of the model results versus historical data are published on the website at 89 tidal gauging stations. All of the aforementioned features work within a zoom-able geospatial interface for enhanced user interaction.

In order to make tidal elevation and velocity data available, a web service serves the data to users over the internet. The tidal database of 497,847 nodes and 927,165 elements has been preprocessed and indexed to enable timely access from a typical modern web server. The preprocessing and web services required are detailed in this thesis, as well as the reproducibility of the Tidal Toolbox for new domains.

Major: Civil Engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 2006, University of Central Florida

Committee in Charge:
Dr. Scott C. Hagen, Chair, Civil, Environmental, & Construction Engineering
Dr. Manoj Chopra, Civil, Environmental, & Construction Engineering
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Dr. Peter Bacopoulos, Civil, Environmental, & Construction Engineering

Approved for distribution by Dr. Scott C. Hagen, Committee Chair, on December 6, 2010.

The public is welcome to attend.