Predicting Past and Future Impacts of Sea Level Rise on Coastal Habitats and Species: Integrating Hydrological and Ecological Models

Special Session, GEER 2010, Naples, FL

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Past and Future Impacts of Sea Level Rise on Coastal Habitats and Species
Objective

Integrate hydrological and biological models into new models to predict SLR impacts and support management decisions
Climate-induced SLR (global) vs. Relative SLR (local)
Modeling Approach

1. Focus on development of a numerical hydrological model based on FTLOADDS and output of salinity, hydroperiod, etc for ecological response models.

2. To Forecast future SLR, we must be able to hindcast past SLR and hydrology and validate output against historic vegetation photos

3. Focus on a few important relative SLR issues
- restoration scenarios
- hurricane disturbance
- vegetation regime change
- shoreline change
FISCHS
SLR Integrated Models

Current
FTLOADDS hydrology models
Observed data for period of record
Hurricane Wilma
Vegetation & land elevation change mechanisms
Output for HSI, SESI and other models

Hindcast
Modified BISECT hydrology model
Observed & interpolated climate & SLR data
Historical hurricanes
Validate output against historic vegetation charts & photos

Forecast
New core model from Hindcast
Downscaled climate & SLR data
Management-specified scenarios
Output appropriate for HSI, SESI and other models
Eric Swain

FTLOADDS
Hydrology models, SLR and hindcast simulations
Dennis Krohn

Inferring Effects of Historic Extreme Storms from Hindcast Models
Sea Level Rise and storm surge effects on coastal vegetation regime change
Tom Smith

Historical coastal vegetation and shoreline change

Mangrove dynamics
Brad Stith

Application to HSI and SESI Models:
Sea grasses and Manatee example