SIMULATION OF HURRICANE SANDY USING A COUPLED ATMOSPHERE-OCEAN-WAVE MODEL

PI: David Holland
Rajesh Kumar

NYU Courant School of Mathematical Sciences
Coupled ATM-Ocean-Wave Modeling Framework

- ATM Model (WRF)
- Wave Model (SWAN)
- Ocean Model (ROMS)

Connections:
- U, V, Rain
- Zo
- U, V, Pres, RH, Fluxes
- SS T
- currents
- Hsig, Lwave, Twave
Case Study: Hurricane Sandy

Hurricane Sandy was one of the most destructive

- Formed: October 22, 2012
- Dissipated: November 2, 2012
- Lowest pressure: 940 mb
Simulation Period  =  12 UTC 28 Oct 2012
                 - 12 UTC 30 Oct 2012
Time step         =  180 s

Resolution
dx   =  30 KM
dy   =  30 KM
TIME INTERVAL BETWEEN COUPLING

- TI_ATM2WAV = 1800 s  ! atm to wave coupling interval
- TI_ATM2OCN = 1800 s  ! atm to ocean coupling interval
- TI_WAV2ATM = 1800 s  ! wave to atm coupling interval
- TI_WAV2OCN = 1800 s  ! wave to ocean coupling interval
- TI_OCN2WAV = 1800 s  ! ocean to wave coupling interval
- TI_OCN2ATM = 1800 s  ! ocean to atm coupling interval
SIMULATION OF SANDY USING THE COUPLED MODEL
Coupled simulation is close to the observed pressure (950 mb) at the closest grid point.
Coupled WRF-ROMS-SWAN simulation
WRF SIMULATION

OUTPUT FROM WRF V3.6.1 MODEL

DATA SET: wrf_d01_wrfonly
1. Uncoupled WRF simulation overestimate the surface pressure compared to the observation

2. Coupled WRF-ROMS-SWAN performance is better in predicting the track of the hurricane

3. If coupled with a storm surge model, the performance of the storm surge model may improve