

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

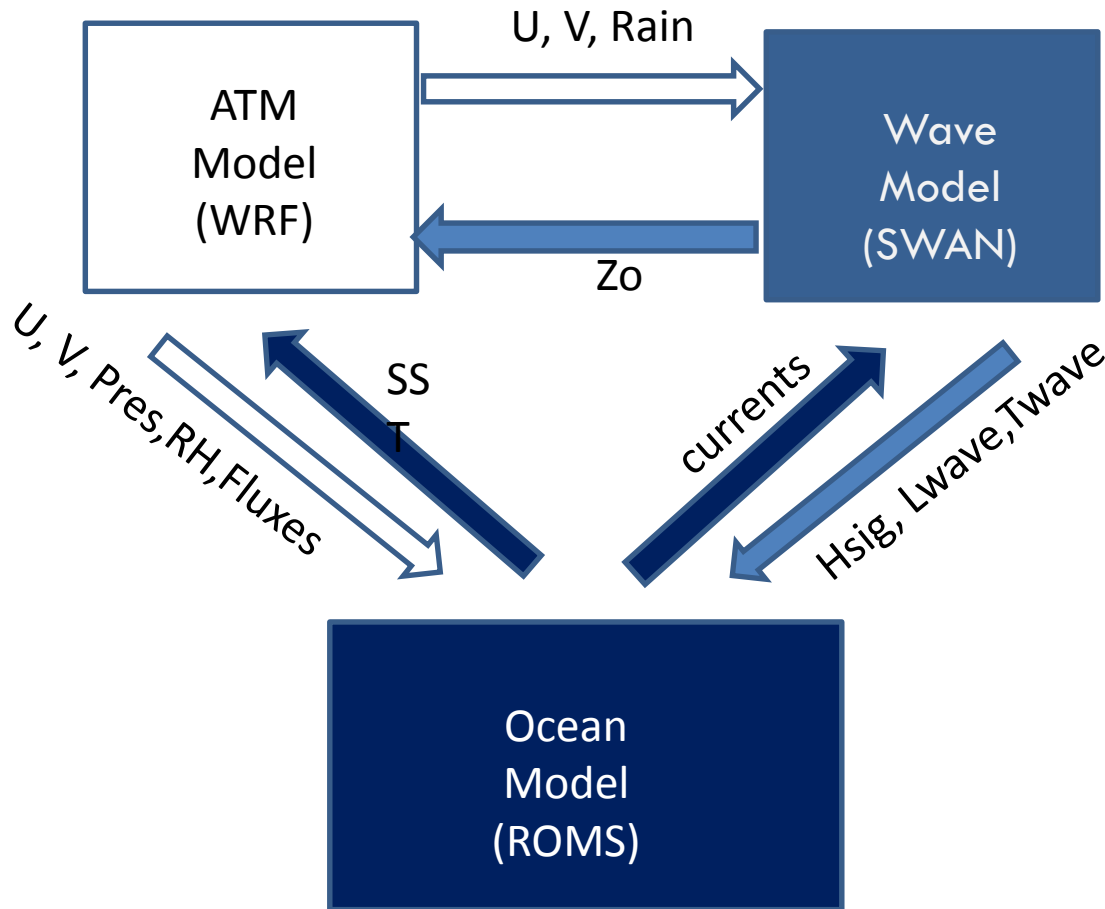
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RESILIENCY INSTITUTE FOR
STORMS & EMERGENCIES

COUPLED ATM-OCEAN-WAVE MODELING FRAMEWORK



CASE STUDY : HURRICANE SANDY

Hurricane Sandy was one of the most destructive

- Formed : October 22, 2012
- Dissipated : November 2, 2012
- Lowest pressure : 940 mb

WRF MODELING

Simulation Period = 12 UTC 28 Oct 2012
- 12 UTC 30 Oct 2012

Time step = 180 s

Resolution

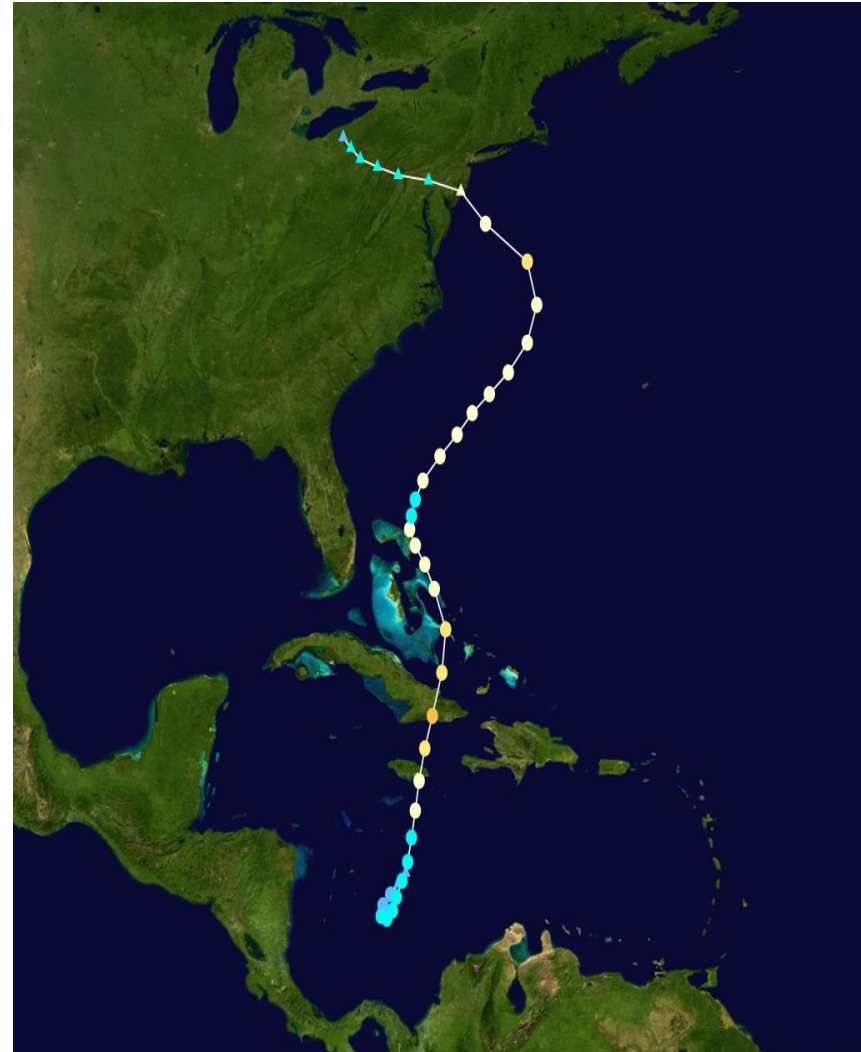
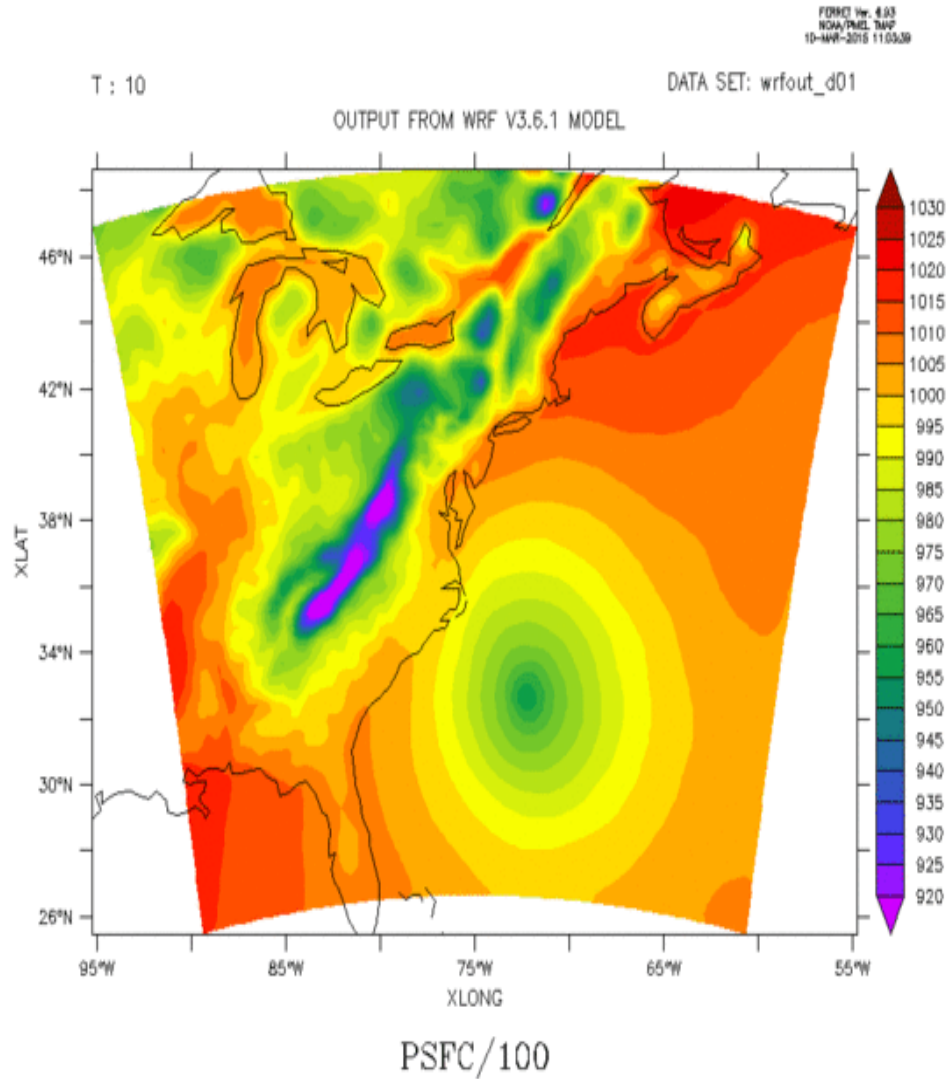
dx = 30 KM

dy = 30 KM

TIME INTERVAL BETWEEN COUPLING

- $TI_ATM2WAV = 1800\text{ s}$! atm to wave coupling interval
- $TI_ATM2OCN = 1800\text{ s}$! atm to ocean coupling interval
- $TI_WAV2ATM = 1800\text{ s}$! wave to atm coupling interval
- $TI_WAV2OCN = 1800\text{ s}$! wave to ocean coupling interval
- $TI_OCN2WAV = 1800\text{ s}$! ocean to wave coupling interval
- $TI_OCN2ATM = 1800\text{ s}$! ocean to atm coupling interval

SIMULATION OF SANDY USING THE COUPLED MODEL



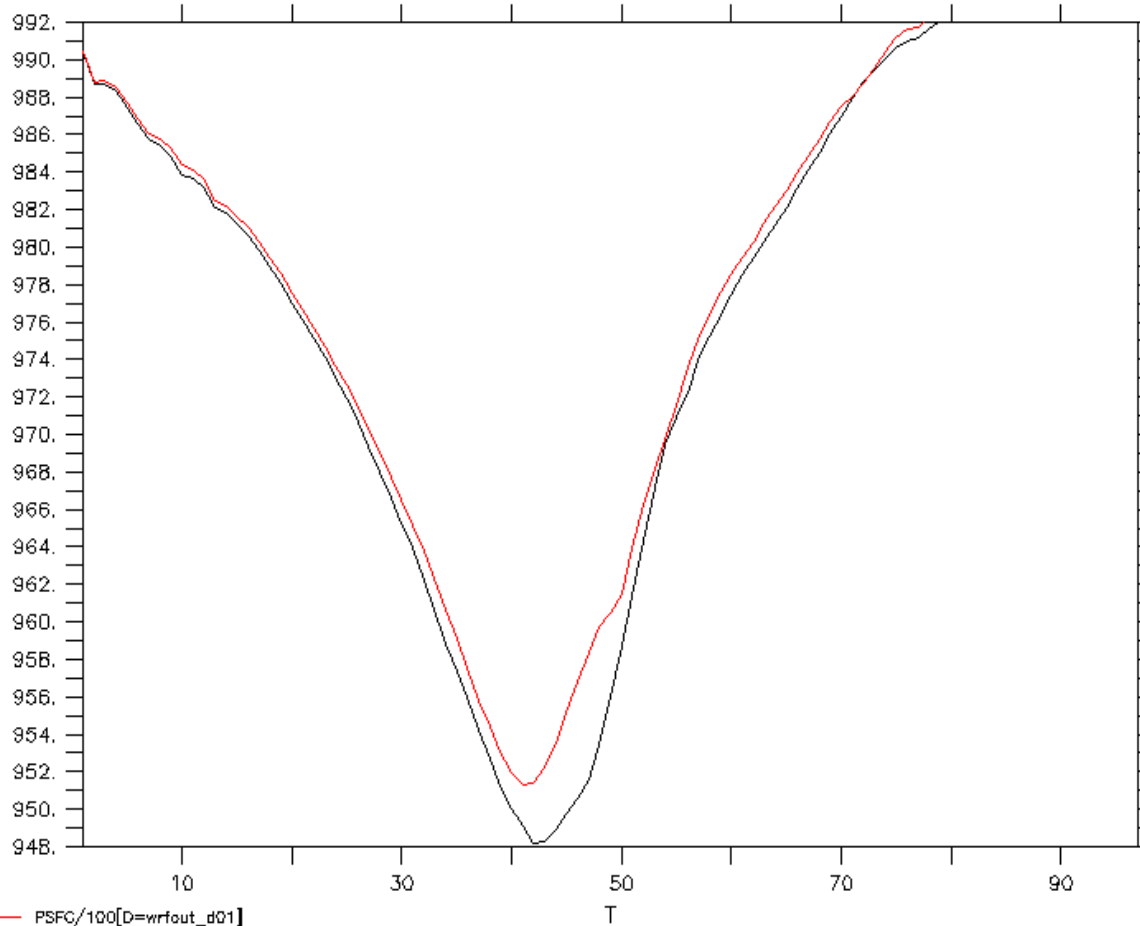
DIFFERENCE IN PRESSURE (hPa) BETWEEN COUPLED (RED) AND UNCOUPLED SIMULATIONS

NOAA/PMEL TMAP
11-MAR-2015 14:45:08

X : 64
Y : 33

DATA SET: wrf_d01_wrfonly

OUTPUT FROM WRF V3.6.1 MODEL

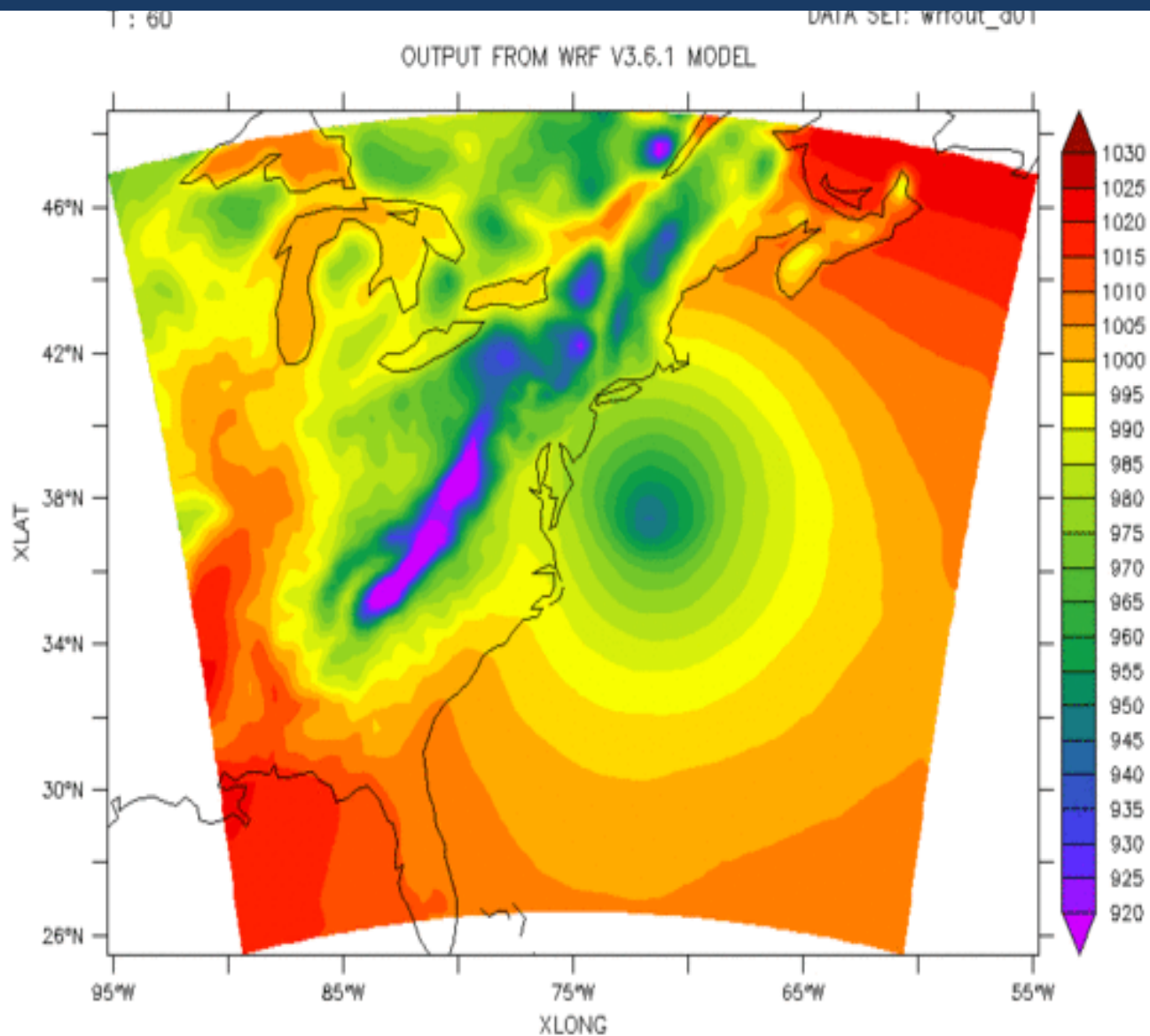


PSFC/100

Coupled simulation is close to the observed pressure (950 mb) at the closest grid point

PSFC/100[D=wrfout_d01]

COUPLED WRF-ROMS-SWAN SIMULATION



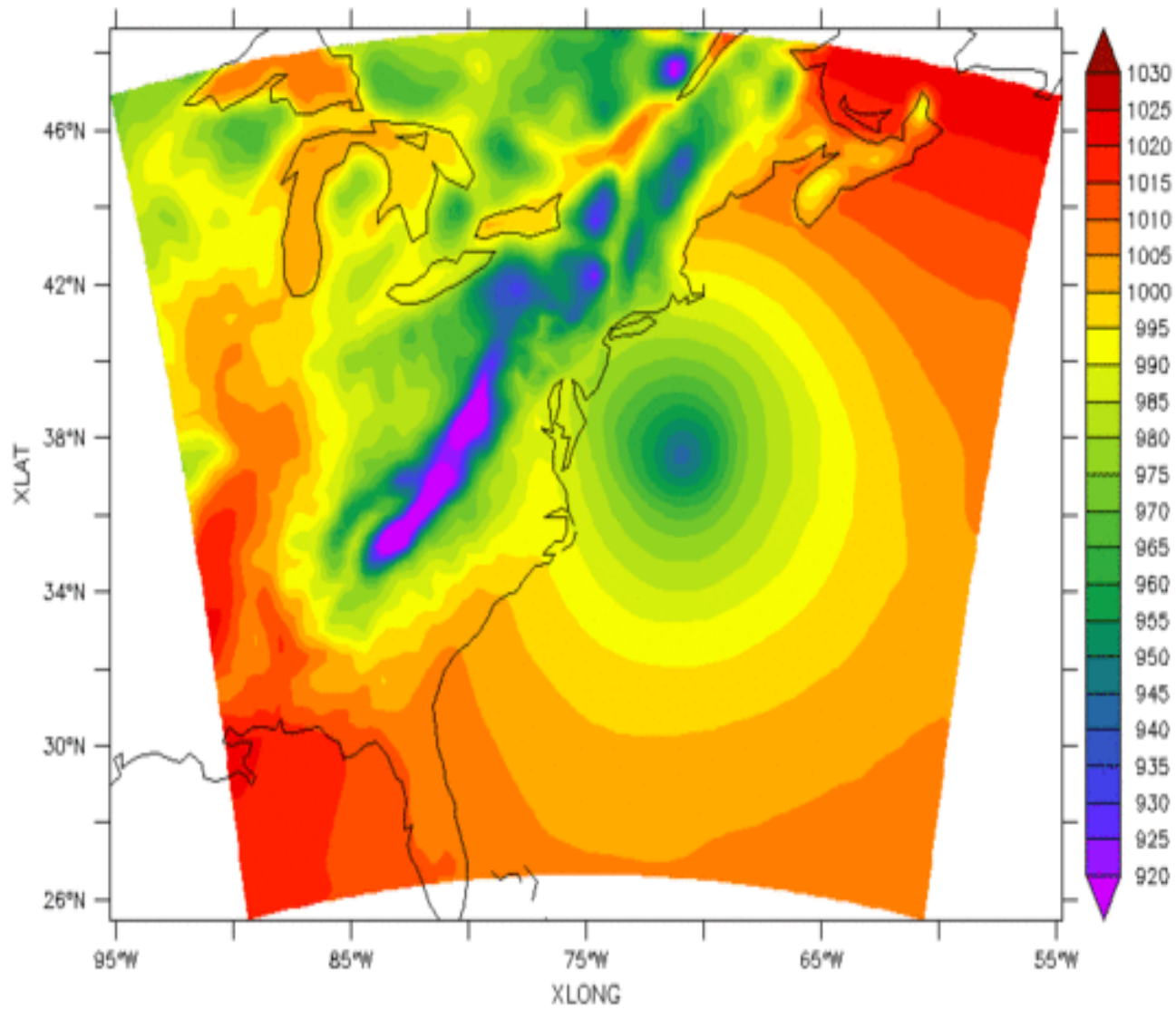
PSEC / 100

WRF SIMULATION

T : 60

DATA SET: wrf_d01_wrfonly

OUTPUT FROM WRF V3.6.1 MODEL



CONCLUSIONS

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