

Ocean Model Impact Tiger Team (OMITT)

Supplemental presentation: Sensitivity of coupled intensity forecasts to ocean model initialization fields generated by an ocean OSSE system

Chair and co-chair

H.-S. Kim, G. Halliwell

Team

P. Black, N. Bond, S. Chen, J. Cione, M. Cronin, **J. Dong**, I. Ginis, B. Jaimes, S. Jayne, B. Liu, L. Miller, E. Sanabia, N. Shay, V. Tallapragada, B. Thomas, E. Uhlhorn, and L. Zhu

Institutions

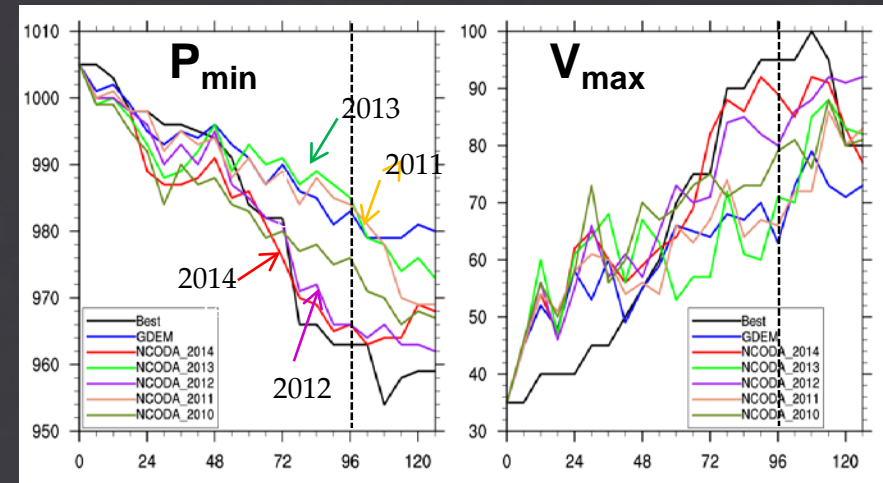
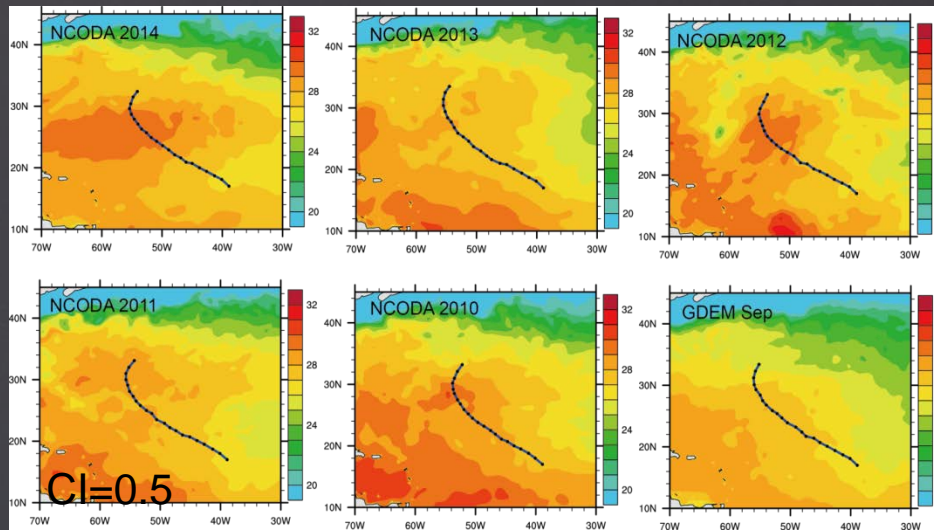
EMC, NESDIS, DTC, HRD/AOML, PhoD/AOML, PMEL, USNA, NRL, URI, UM, JISAO/UW, and WHOI

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HFIP Annual Meeting

OSSE-based Sensitivity Analysis - Motivation

Edouard forecasts (2014, from previous talk, shown for reference)

Sensitivity study for Initial SST and Warm Pool's location, size, and strength



The above analysis was conducted using fixed SST. What is the sensitivity to realistic coupled forecasts?

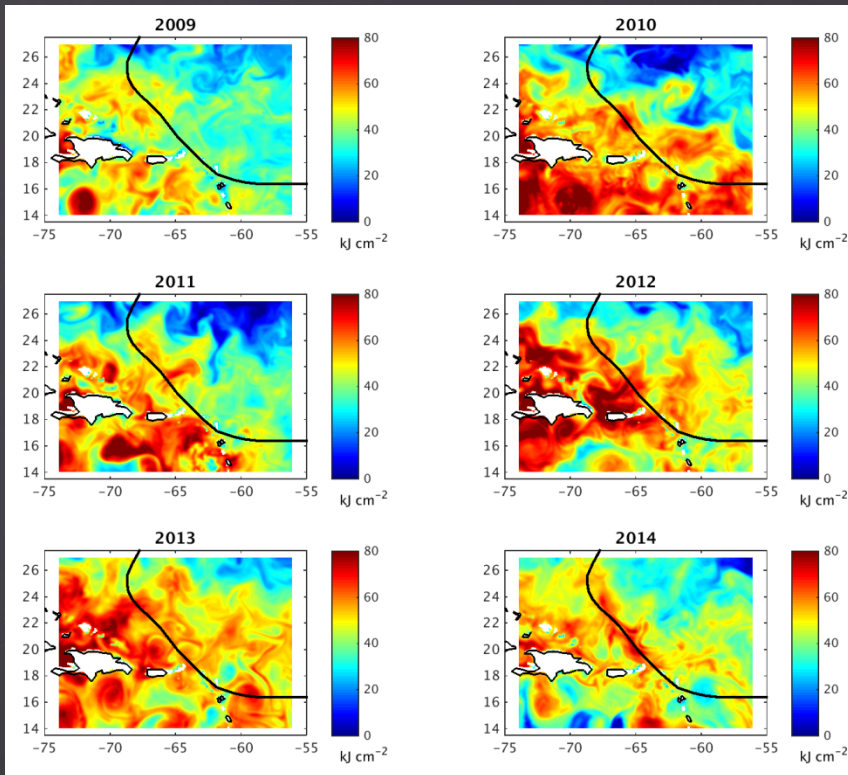
The control experiment run for the ocean OSSE system provides an ensemble of realistic 3-D ocean model initializations for Hurricane Gonzalo (2014) over years 2009–2014.

Used to determine sensitivity of fully-coupled forecasts to ocean model initialization.

Sensitivity Analysis for Gonzalo

Gonzalo forecasts (2014)

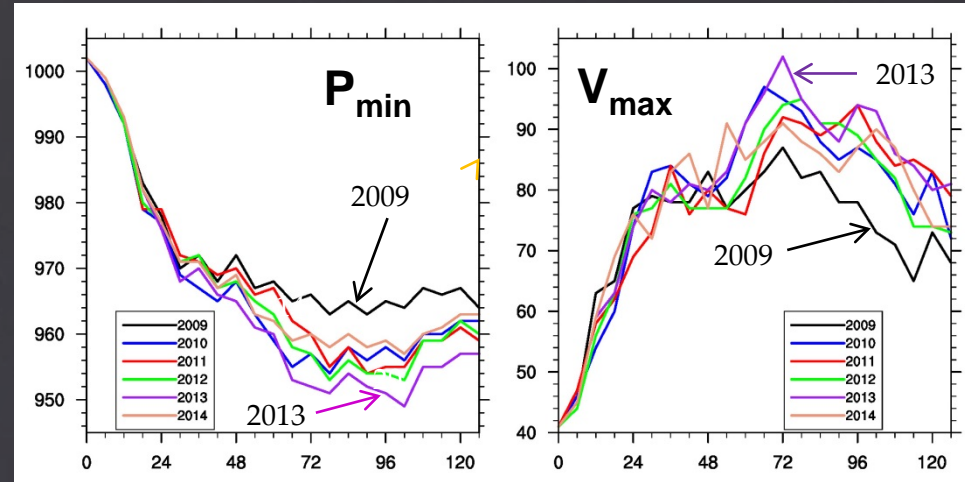
Sensitivity of realistic coupled forecasts to 3-D ocean model initialization



Ocean Heat Content, 2009-2014, 13 Oct.

2009 is coldest year (OHC=35-50 kJ cm^{-2})

Warmest years have OHC=50-75 kJ cm^{-2})



In 2009 (the coldest year), storm intensification is arrested after forecast hour 36.

Intensity spread due entirely to 3-D ocean model initialization.

Sensitivity to ocean likely stronger to the west.

Accurate ocean model initialization is of direct importance to intensity forecasts.

Future Plans

Planned applications of ocean OSSEs to hurricanes for improving ocean model initialization

- Evaluate the impact of different components of the operational ocean observing system (e.g. altimetry, drifters, Argo, XBT)
- Evaluate the impact of hurricane season enhancements to the operational ocean observing system (e.g. Alamo floats, gliders, add thermistor chains to drifters)
- Evaluate the impact of rapid-response pre-storm ocean surveys (e.g. airborne profiles, drifters with thermistor chains)
- Evaluation procedures
 - Error and bias reduction in ocean analyses used to initialize the ocean model
 - Impact on coupled intensity forecasts initialized with these analyses
- OSSEs to evaluate the impact of actual ocean observations before, during, and after tropical cyclones are also planned