Preliminary Results of a U.S. Deep South Warm Season Deep Convective Initiation Modeling Experiment using NASA SPoRT Initialization Datasets for Operational National Weather Service Local Model Runs

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**Objectives**

Focus on two U.S. Deep South forecast challenges: the initiation of deep convection (CI) during the warm season; and heavy precipitation during the cool season.

Objectively quantify the impacts of NASA-SPoRT (Short-term Prediction-Research and Transition Center) datasets (6Z: SPoRT SSTs, SVP) on the summertime deep convective initiation problem.

Highlight how a NWS Operational Meteorologist-Researcher collaboration is invaluable towards addressing forecast problems; and how this approach could set a precedent for future local and/or mesoscale modeling.

**Methodology**

Using identical Advanced Research WRF (ARW) model settings on two separate WRF-EMS domains, the NWS Mobile and Houston offices are concurrently evaluating the impacts of the following NASA-SPoRT datasets on recurring local forecast problems. SPoRT SSTs – 2 km sea-surface temperature analysis, updated twice daily. SVP – 3 km soil temperature analysis, updated four times daily. 3 km green vegetative fraction, updated daily.

SPoRT provides the Central run (6Z) for comparison purposes during this study.

**Model Settings**

- **Domains**: 9 km x 3 km
- **Levels**: 40
- **Time Step**: 3 s
- **Run Time**: 6 UTC daily out to 24 h
- **Initial Conditions**: GFS Vertical Wind Shear (0.205 km)
- **Convective Parameterization**: Kain-Fritsch outer 9 km grid only
- **Microphysics**: WSM Single-Moment 6 Class
- **Boundary Layer Scheme**: Mellor-Yamada-Janic
- **Long-Shortwave Radiation Schemes**: RRTM, Dudhia

**Non-Linear Variations occurring with Different Computational Platforms**

Testing revealed that the different computational platforms between SPoRT and WRF-EMS resulted in Houston yielding slightly different forecast run results. The different background or forecast sensitivity, an area for study for many the attributes caused only by the initialization datasets.

To remove this issue, SPoRT performed re-runs of our operational WRF-EMS for good candidate (no synoptic forcing) warm season days. These cases can then be compared to the Central run, which were run on the same platform by SPoRT.

**Cool Season Heavy Rainfall Case Southeast Texas November 8-9 2011**

**Statistics from Model Evaluation Tools**

All Warm Season Convective Cases (41 days) – no Synoptic Forcing

1 Hour Accumulated Precipitation Verification – by forecast hour - WFO Mobile domain

- **Heidke Skill Score (HSS)**
- **Frequency Bias (FBIAS)**

**Convective Initiation Case - Mobile - July 3rd 2012**

This case provides a good opportunity to examine some of the variables that we are evaluating when assessing the value of the SPoRT datasets with respect to convective initiation.

**Convective Initiation Cases - Houston - June 28th and July 3rd 2012**

In both of these Houston area convective cases, the SPoRT and Control runs underestimated precipitation coverage, with the Control runs having better verification scores for 3 and 6 hour precipitation than the SPoRT WRF.

WRF comparing hour-by-hour rainfall is not a trend or an anomaly. It appears that convective cells are not sustained for a long enough time period in either WRF run, and this needs to be investigated further.

We are currently looking at how to best objectively verify convective initiation using the Model Evaluation Tools package. Some preliminary statistics are shown above, to the right.