Session 5: Modeling & Data Assimilation Introduction

Science Advisory Committee Meeting

26 – 28 August, 2014

National Space Science and Technology Center, Huntsville, AL

Relevance to SPoRT

- SPoRT focuses on improvements to short-term, regional weather forecasts using unique satellite products and capabilities
  - Convection and precipitation, sea/land breezes, temperature forecasts
  - SPoRT tools used to address forecast challenges: SPoRT SST Composite, hyperspectral sounder retrieved profiles, LIS, SPoRT MODIS NDVI/GVF composite

- Complements JCSDA's global mission by focusing on the regional and local scale data assimilation and modeling applications

- Few other groups actively working to transition satellite assets into local- and regional-scale operational models (community more focused on global with recent focus on regional)

- SPoRT's work feeds back to local operational end-users through active collaborations

Capabilities and Legacy

- Land-surface modeling expertise through collaborations with NASA Land Information System (LIS) group
  - Funding through NASA Unified-Weather Research and Forecasting (NU-WRF) project to develop capabilities for and perform validation experiments with regional LIS
  - LIS is used operationally at AFWA and NRL; being discussed with NCEP/EMC
  - Provides a pathway/tool for assimilating data from current (GPM, VIIRS) and future (SMAP) NASA missions

- New capabilities to assimilate passive microwave soil moisture observations into LIS using Ensemble Kalman Filter
  - Currently assimilating data from European SMOS satellite to prepare for assimilation of SMAP

Capabilities and Legacy

- Expertise in regional modeling using WRF Model

- Directly support local modeling at WFO level

  – SPoRT SST, LIS and GVF datasets have been integrated as <u>official</u> options for initialization in WRF-based Environmental Modeling System (EMS)

  – Used by 20+ WFOs and private groups

  – Demonstrated impact of SPoRT datasets on local NWP forecasts through Southern Region Modeling Collaboration

- Expertise in modification and validation of WRF microphysics
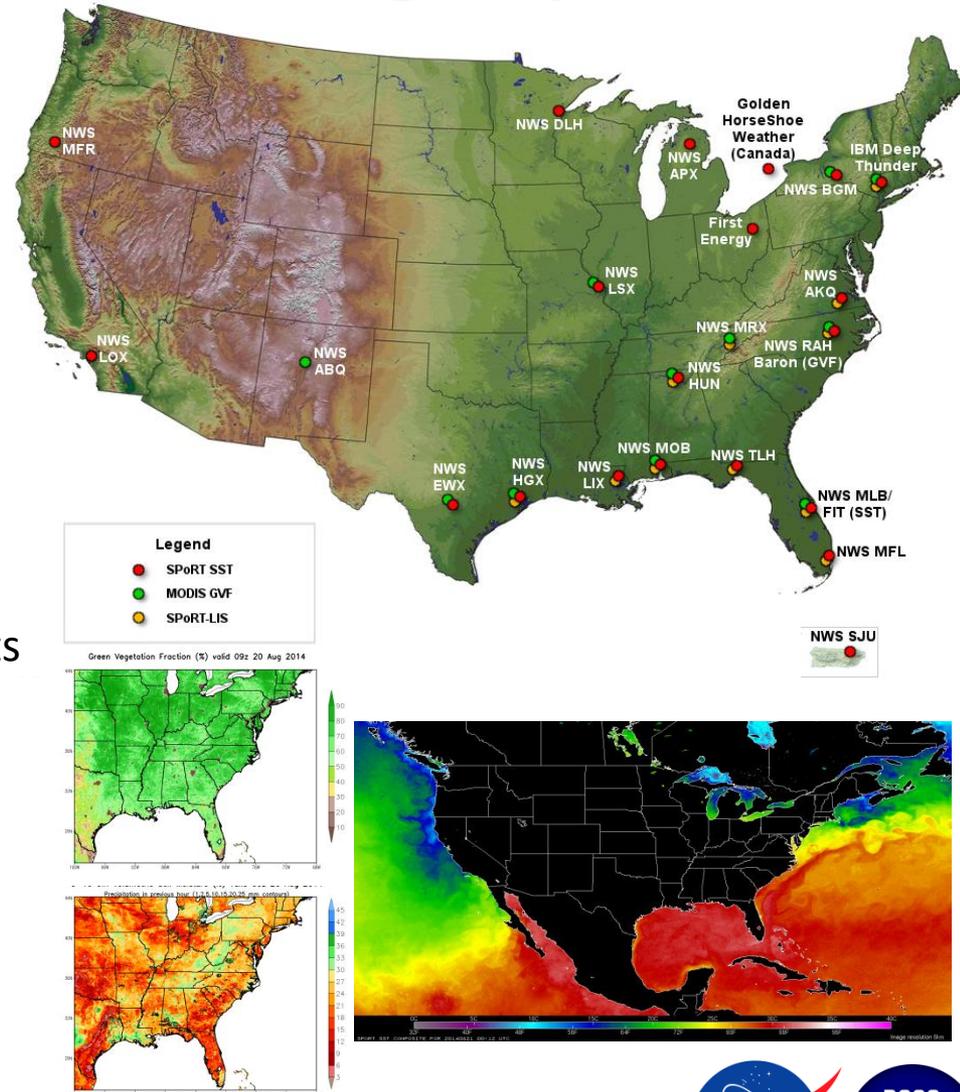
Capabilities and Legacy

- Data assimilation of hyperspectral IR retrieved profiles to demonstrate impact of AIRS in regional weather forecasts
  - Originally used ARPS Data Assimilation System (ADAS) then WRF-Var
  - Now using operational Gridpoint Statistical Interpolation (GSI)
  - Have begun to develop techniques for assimilating CrIS retrieved profiles

- Data assimilation of hyperspectral IR radiances
  - Collaboration with JCSDA to assimilate AIRS radiances into NAM
  - Funded project through JCSDA to investigate assimilation of AIRS radiances and profiles
  - Extension of previous work to collaborate with GMAO to aid in investigation of assimilation of partly cloudy radiances

Introduction of Speakers

- Real-time SPoRT-LIS and GVFs (Case)

- Soil Moisture Data Assimilation (Blankenship)

- Hyperspectral IR Data Assimilation (Berndt)