Testing and Evaluation of Regional EnKf Radiance Data Assimilation: Impact of MHS Assimilation

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Background/Objectives

- Recent Studies (Liu et al. 2012, Schwartz et al. 2012) have shown positive impacts when assimilating microwave radiances with a limited area EnKF
- These studies focused on the impact of assimilating AMSU-A radiances
- This study expands on previous work to evaluate the impact of assimilating MHS radiances in addition to AMUS-A to determine if there is an added benefit from assimilating MHS

Experiment Design & Assimilation Methodology

- Limited-Area EnKF using Data Assimilation Research Testbed (DART) with WRF-ARW v3.2.1
- Time Period: 20080811-20080901
- 36 km horizontal resolution
- 45 vertical levels
- 20 hPa model top
- 96 ensemble members
- 6-hr cycling using ensemble LBCs from perturbed GFS means
- Deterministic 72-hr ARW forecasts initialized from 00/12 ensemble mean analyses
- Aggregated statistics using Model Evaluation Tools (MET) v3.0.1

Assimilation Methodology

- Assimilated observations for experiments:
  - AMSA: conventional obs from radiosondes, aircraft, sat-derived winds, land/ocean sfc stations, GPS dropsondes (NOAA G-IV aircraft), COSMIC GPSRO, AMSU-A radiances
  - MHS: same as AMSA + MHS radiances
  - Radiance data were thinned on a 72-km grid
  - +/-1.5 hr observation assimilation window
  - Bias correction coefficients from 3-mo offline statistics (spin-up)
  - AMSU-A channels 5-7 & MHS channels 3-4 NOAA-18/METOP-2 assimilated

- Radiances were assimilated into DART using the CRTM built into WRFDA as the radiation forward operator for computing radiance prior ensembles
- Only radiation prior ensembles came from WRFDA, all other LBCs
- Vertical localizations for each radiance observation were taken as the level the radiance was measured at
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- AMSA mean track error deviates from AMSA quickly after 42 hrs (most contribution from along track)
- Individual Storms: Fay and Gustav
- All Storms: Fay, Gustav, Hanna, Ike, Josephine

Assimilation and Forecast Results

- Assimilation and Forecast Results
- Verification Against ERA-interim Reanalysis

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