Development of a Global Ensemble-based Data Assimilation System for NRT Aerosol Forecasting at NOAA

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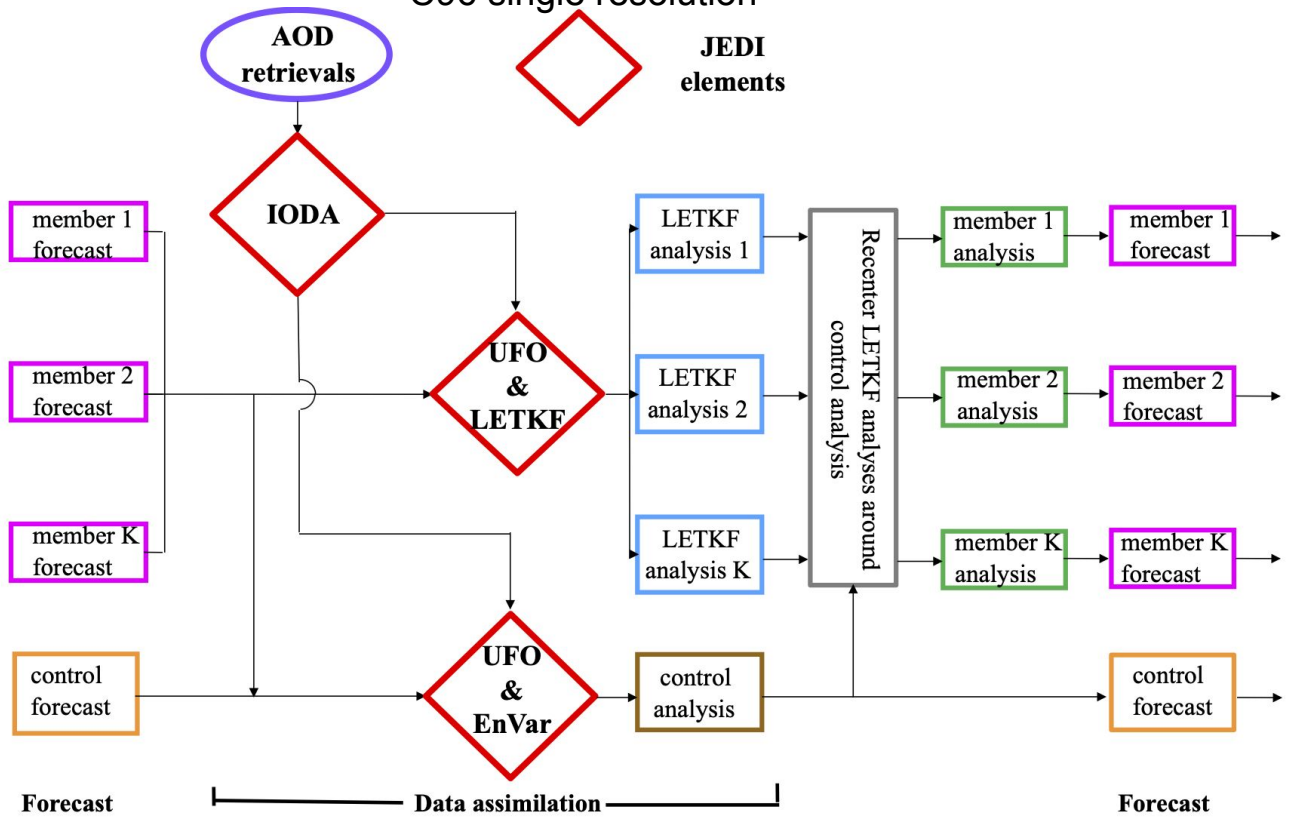
3D Hybrid Ensemble Variational System
- 20 members GEFS-Aerosols model
- Background error covariance entirely ensemble-based
- C96 single resolution

- **AOD**: VIIRS aerosol optical depth (AOD) at 550 nm;
- **JEDI**: Joint Effort for Data assimilation Integration -- a collaborative effort led by JCSDA;
- **IODA**: Interface for Observation Data Access;
- **UFO**: Unified Forward Operator;
- **LETKF**: Local Ensemble Transform Kalman Filter;
- **EnVar**: Ensemble-Variational solver.



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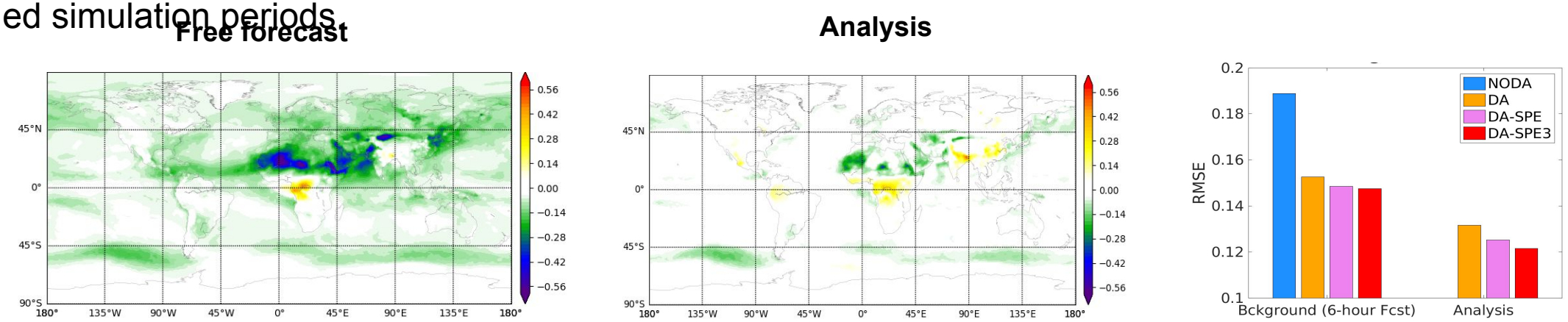
Achieved: Developed METPlus-based evaluation against NASA's MERRA-2 and ECMWF's CAMSiRA and obtained statistics for extended simulation periods.

June 2016 bias against NASA-MERRA 2 reanalysis



- Developed bias correction and stochastic perturbations to emission sources (SPPT-based).
- Tested various assimilation configurations (LETKF, GETKF, FGAT, recentering, lagged forecasts, etc.).
- NRT System assimilating VIIRS AOD running at ESRL/GSL for tuning and extensive testing.

On-going: Developing verification against other AOD retrievals.

- Improving spread statistics through other stochastic approaches (codded CA but needs refinement).
- Work on thinning strategies and observation errors.
- Switching to CROW workflow.
- Transitioning to operations by the end of performance period in June 2022.

More details at most recent virtual presentations: Huang et. al., ISDA, May 2021, JCSDA Technical Review, June