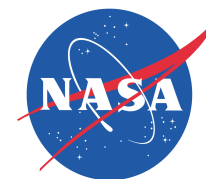


Observation Impact of Satellite Winds in NASA GEOS-5 Forecast System

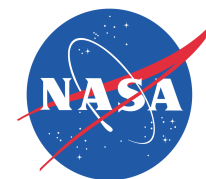
Dagmar Merkova and Ronald Gelaro
GMAO NASA

Nancy Baker, Pat Pauley, Rolf Langland and Liang Xu
NRL



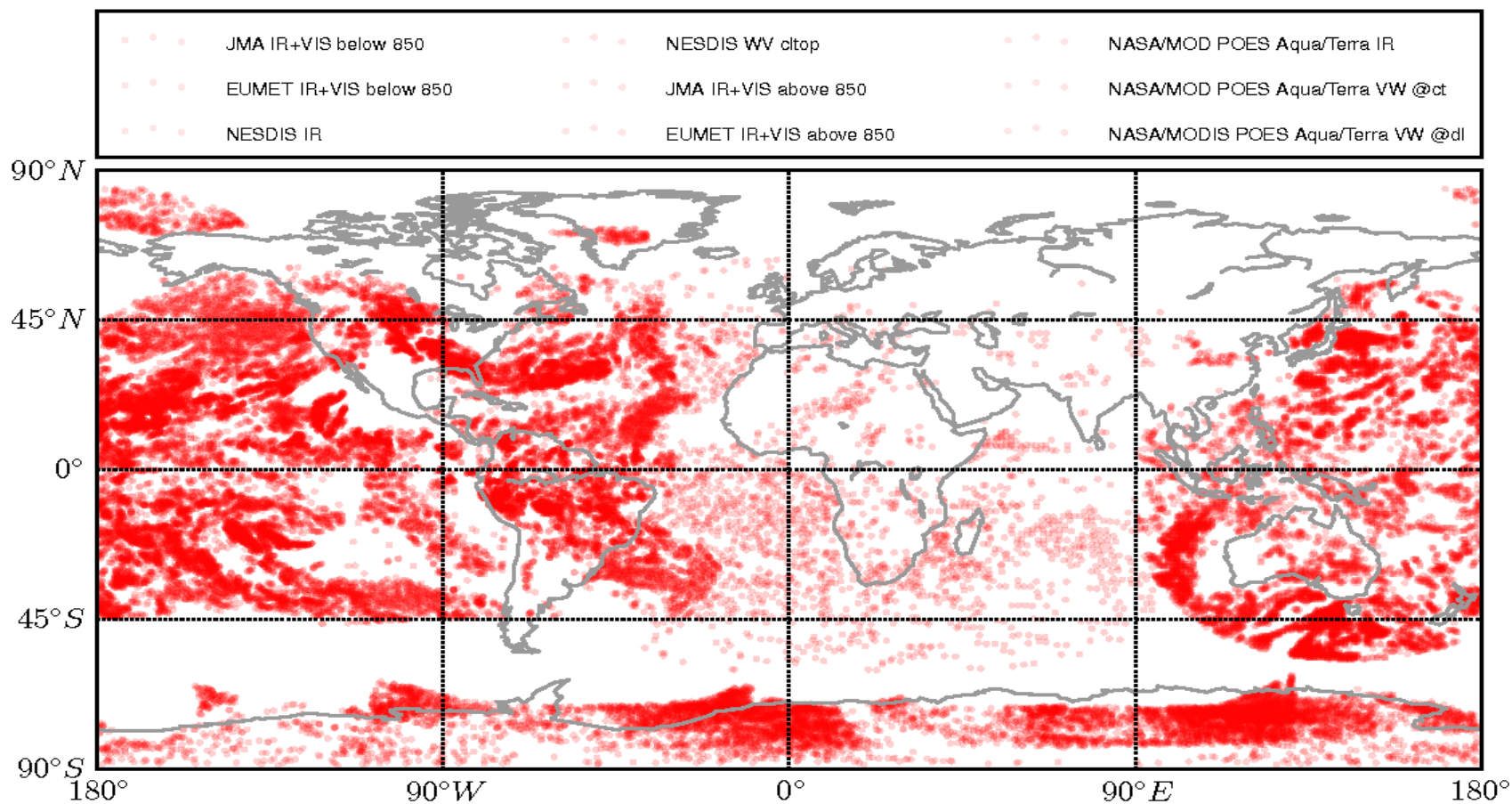
Motivation

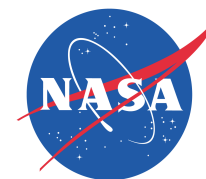
- System with adjoint capabilities to study observational impact in GEOS-5
- Very positive observational impact of the satellite winds in NRL system
- Desire to improve current GEOS-5 system



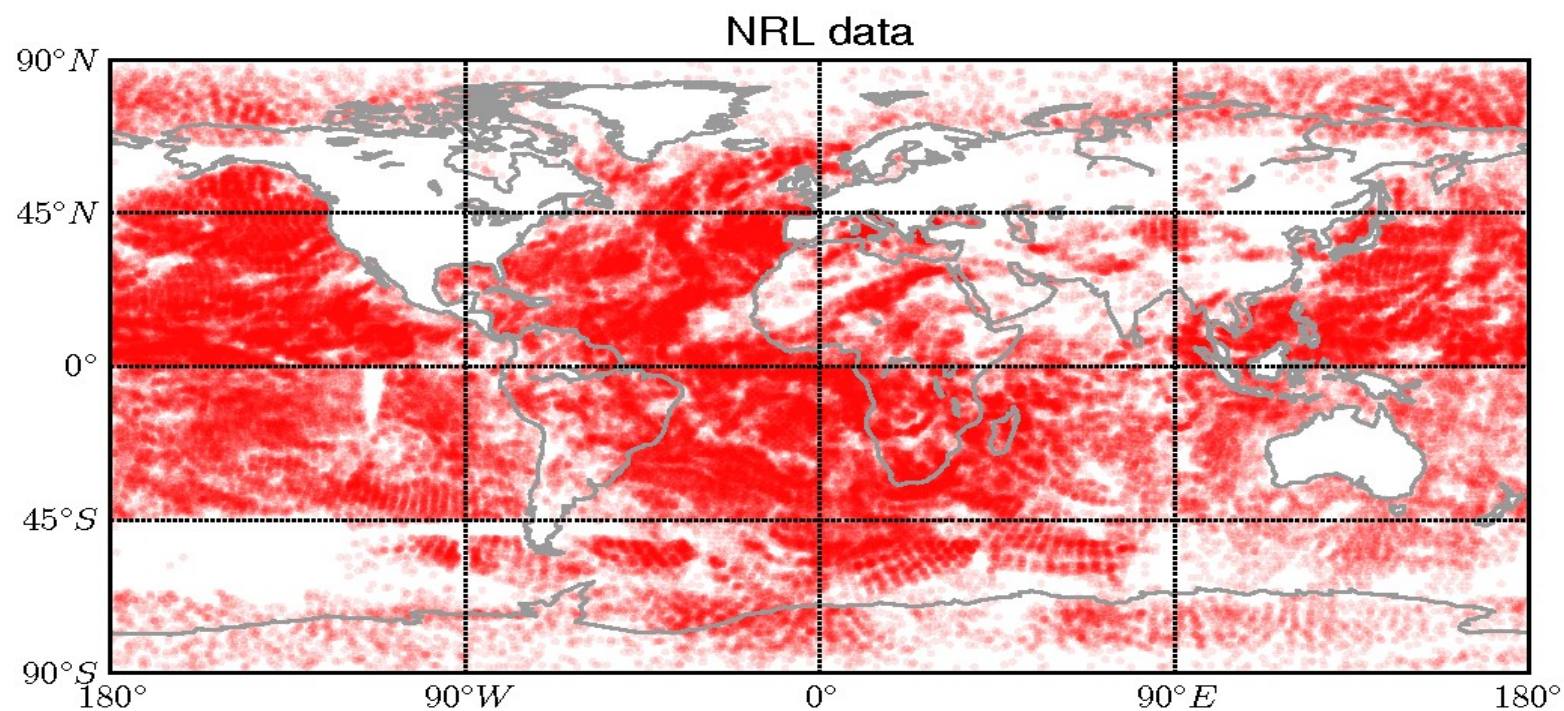
Control Run AMV

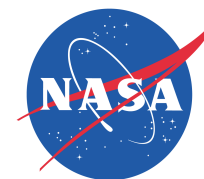
GMAO data





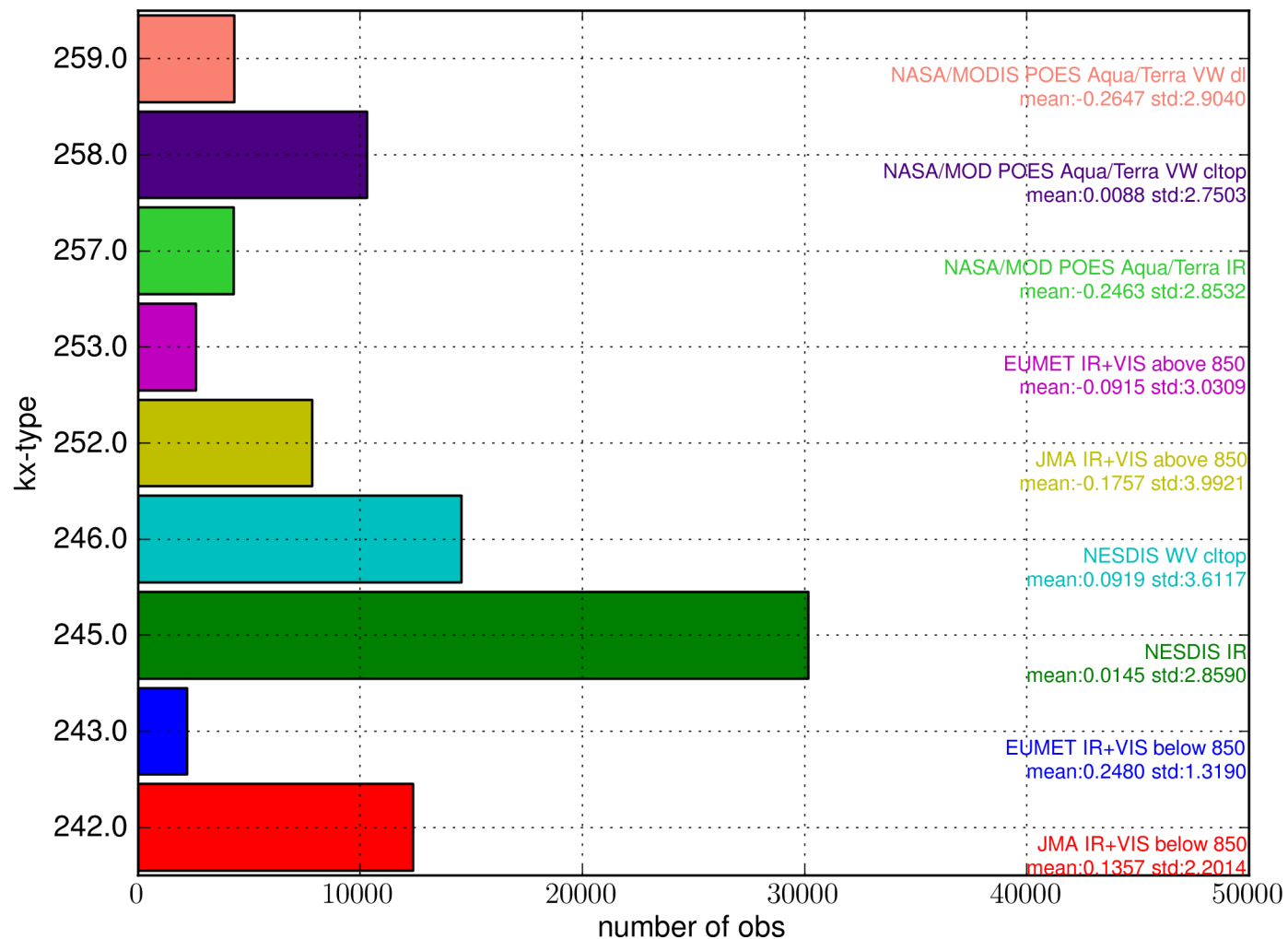
NRL AMV

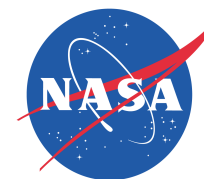




Control run

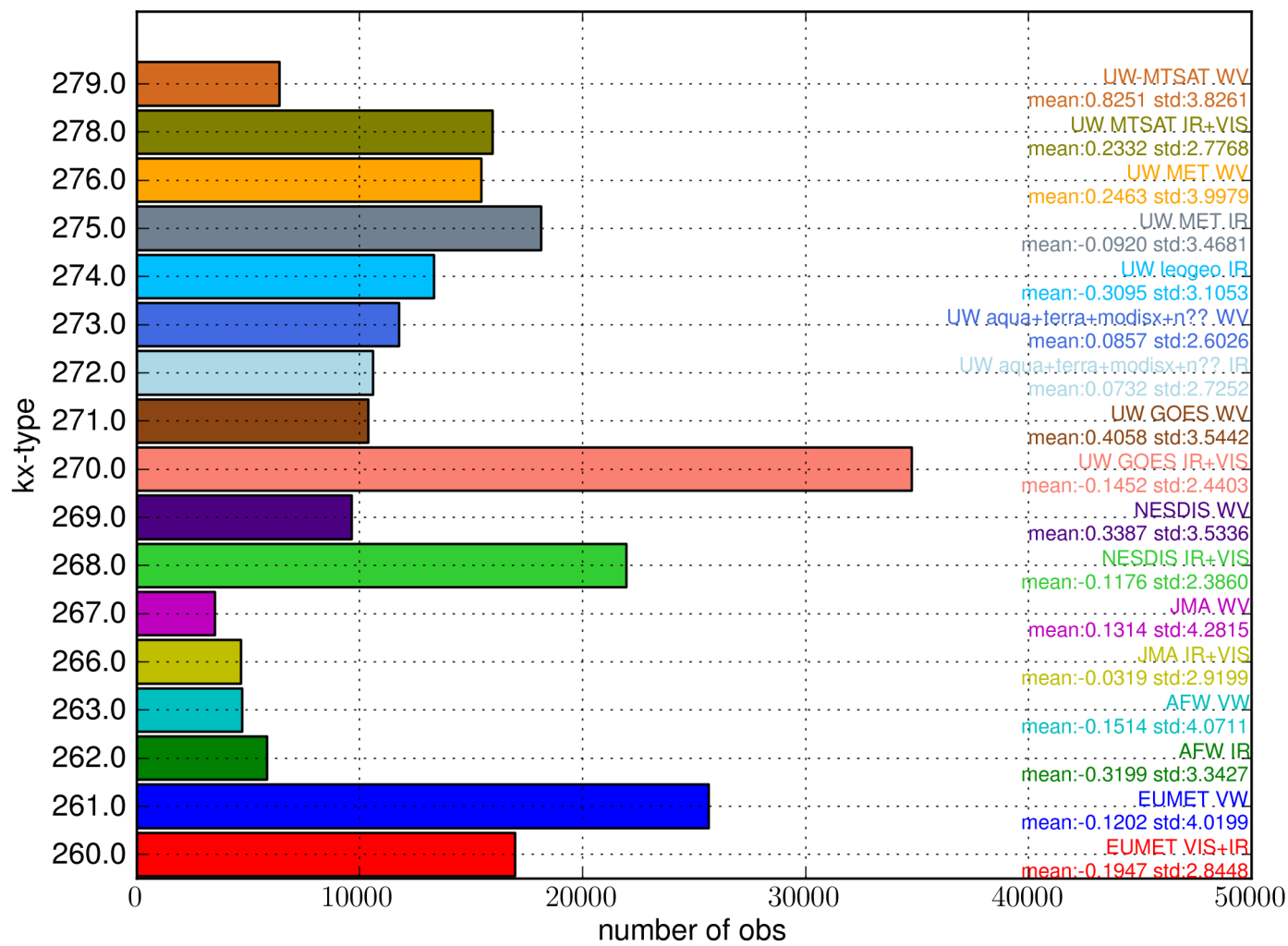
OMF overall mean: 0.0031 std: 3.0032

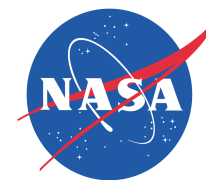




NRL AMV

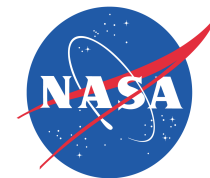
OMF overall mean: -0.0001 std: 3.2080





What is different?

- Data count
- Multiple sources of data in the NRL set
 - NESDIS, EUMETSAT, JMA, AFW
 - University of Wisconsin
- Superobing of the NRL AMV
(except EUMETSAT)



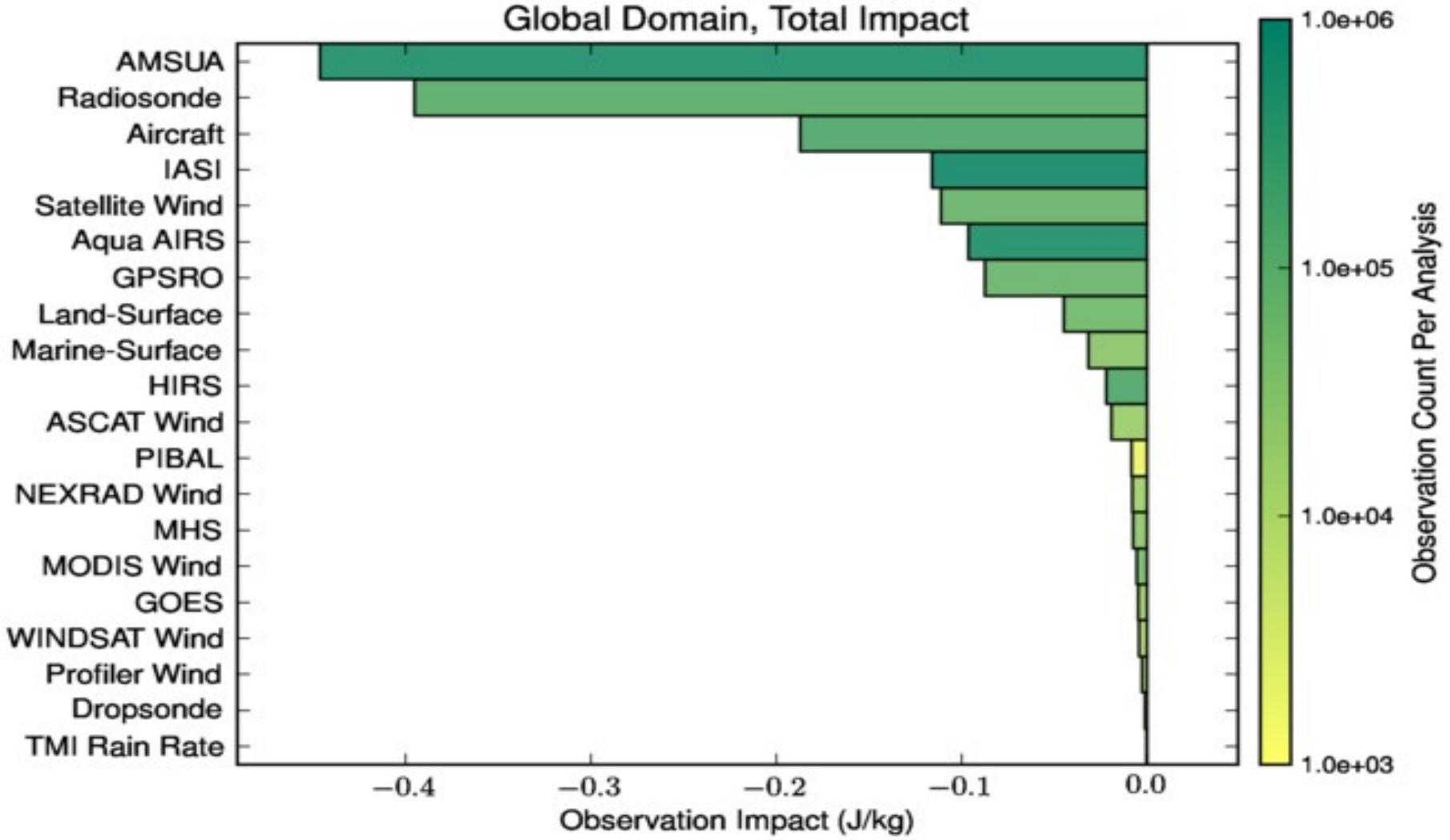
Observation Impact

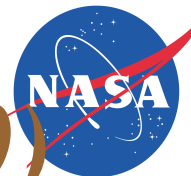
- Is computed using the adjoint of the GEOS-5 atmospheric DAS, including the GEOS-5 forecast model and GSI analysis.
- It is 24-h forecast error that combines errors in wind, temperature and surface pressure with respect to the verifying analysis from the surface to 150 hPa in terms of dry total energy (J/kg). Negative, resp. positive, values indicate improvement, resp. degradation, of the given obs. set in the 24-h forecast.



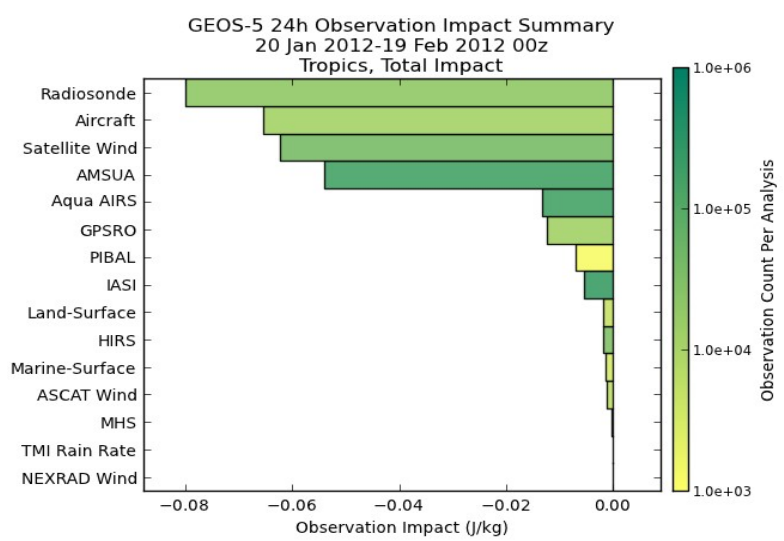
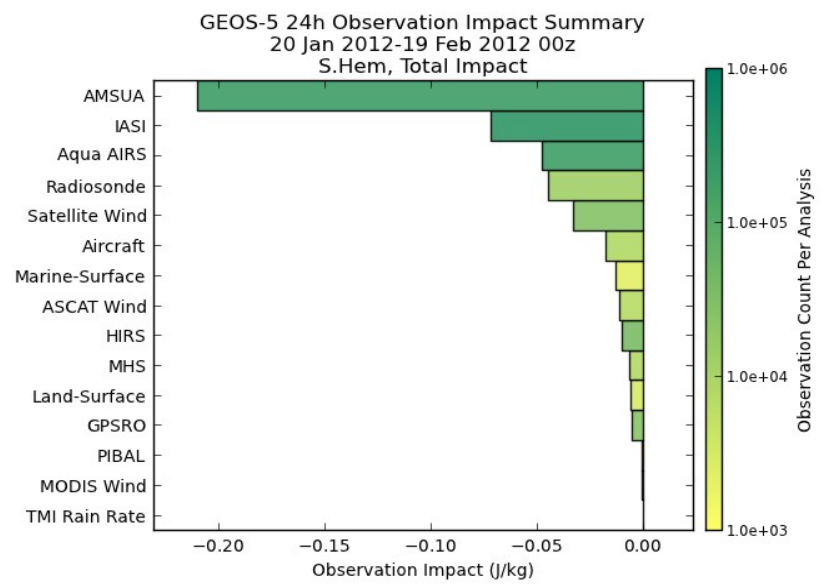
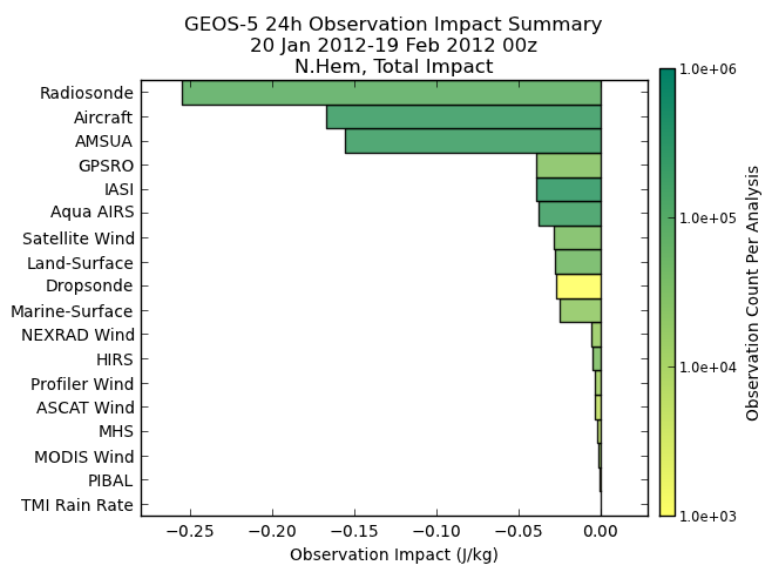
GMAO satellite winds (Dec 2010)

GEOS-5 24h Observation Impact Summary
1 Dec 2010-31 Dec 2010 12z
Global Domain, Total Impact





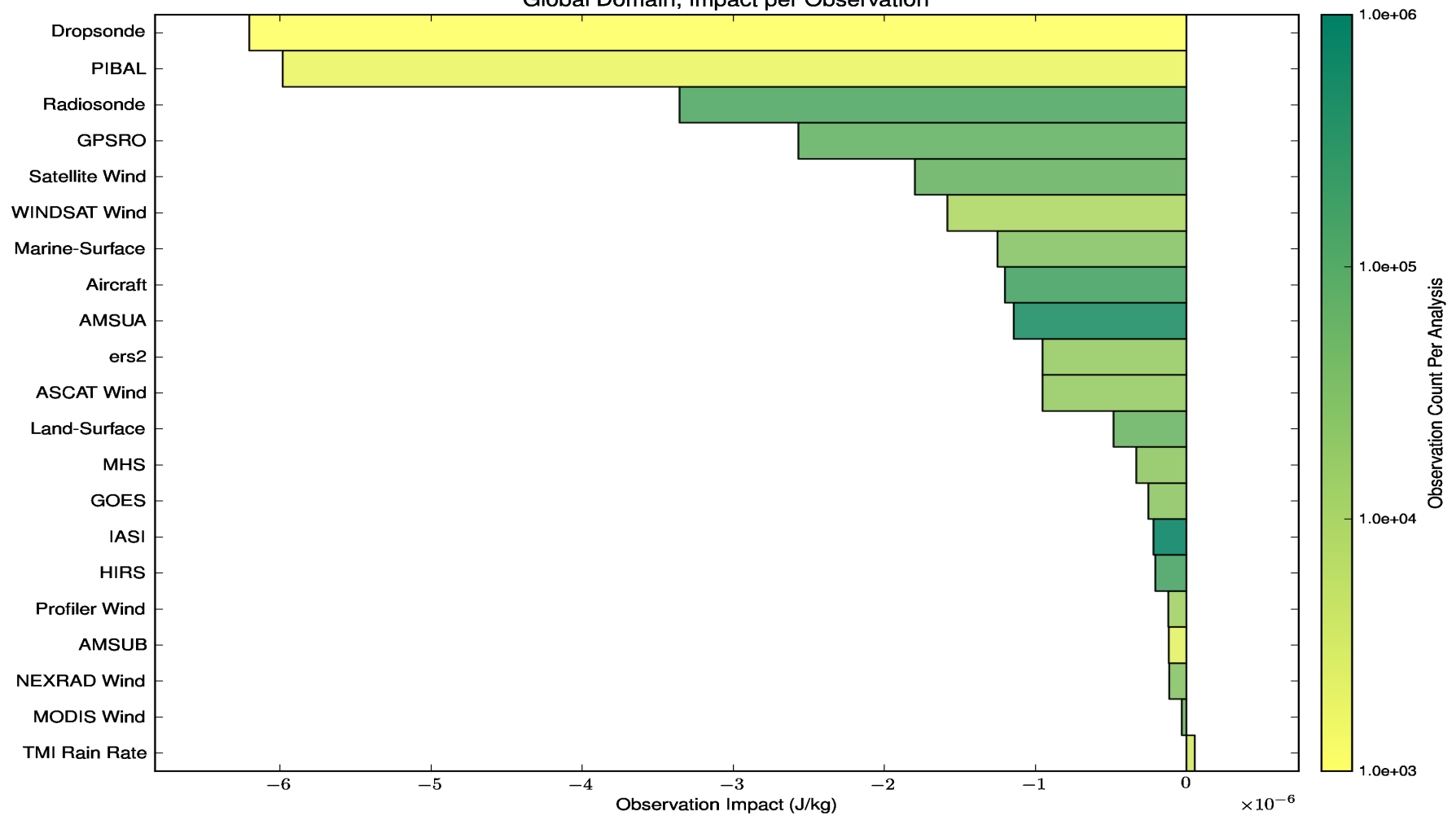
GMAO satellite winds (Dec 2010)

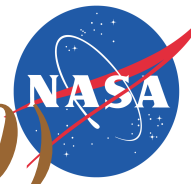




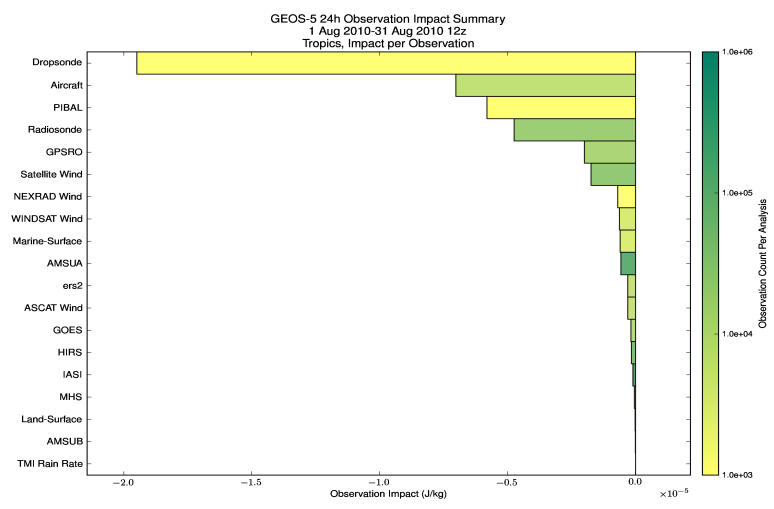
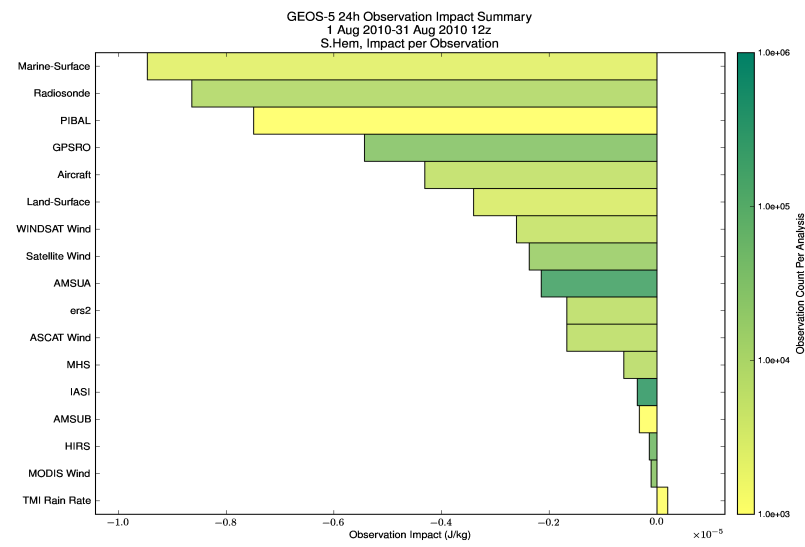
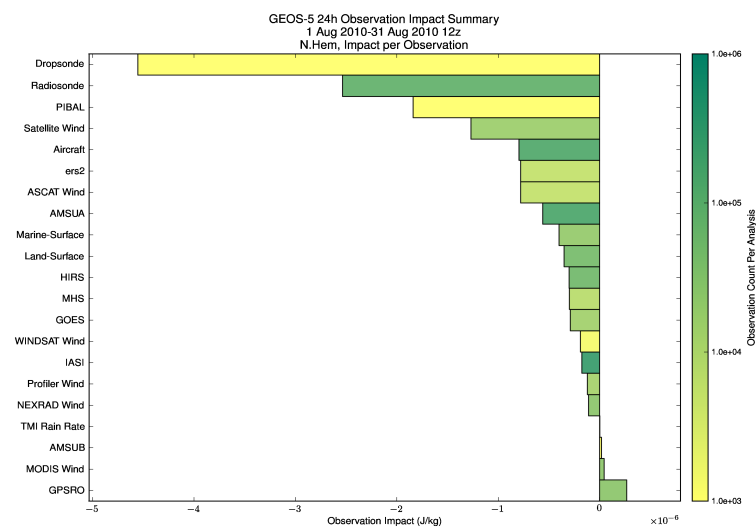
GMAO satellite winds (Aug 2010)

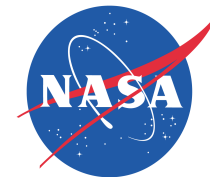
GEOS-5 24h Observation Impact Summary
1 Aug 2010-31 Aug 2010 12z
Global Domain, Impact per Observation





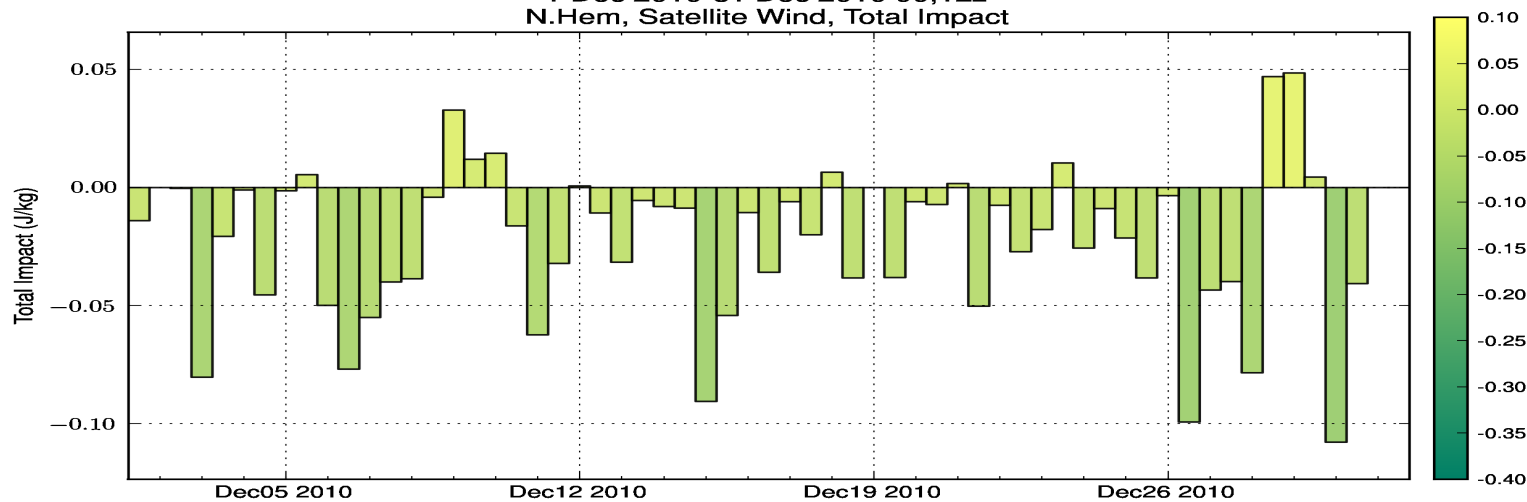
GMAO satellite winds (Aug 2010)



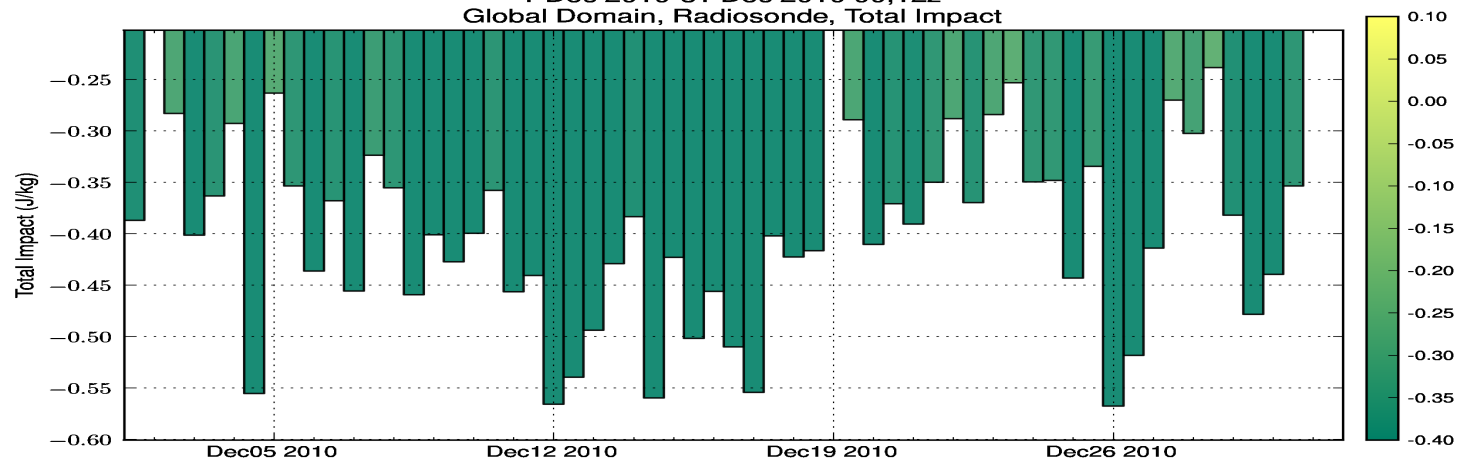


Time series

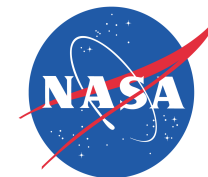
GEOS-5 24h Observation Impact Time Series
1 Dec 2010-31 Dec 2010 00,12z
N.Hem, Satellite Wind, Total Impact



GEOS-5 24h Observation Impact Time Series
1 Dec 2010-31 Dec 2010 00,12z
Global Domain, Radiosonde, Total Impact

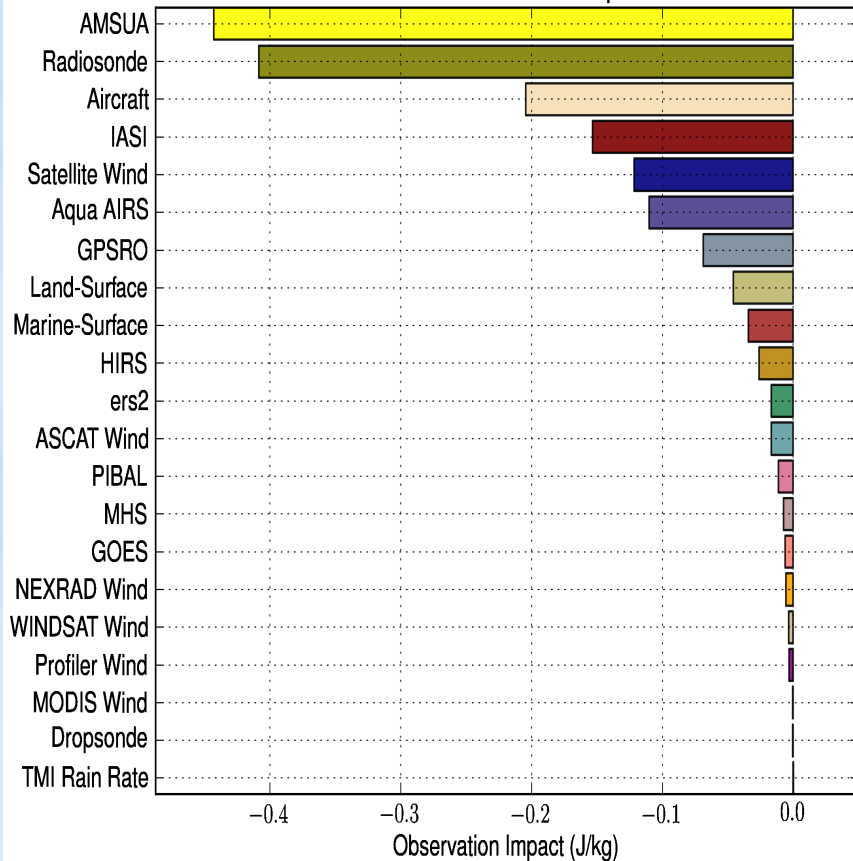


Preliminary Results



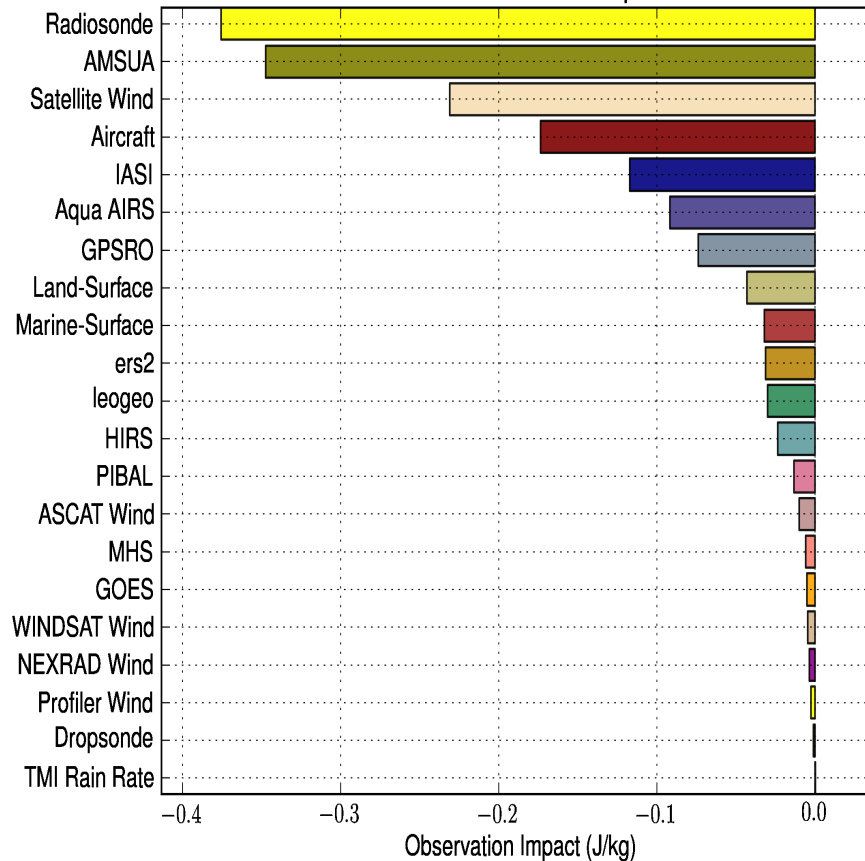
Control Run

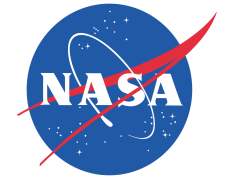
GEOS-5 Summary
1 Dec 2010-31 Dec 2010
Global Domain Total Impact



NRL winds

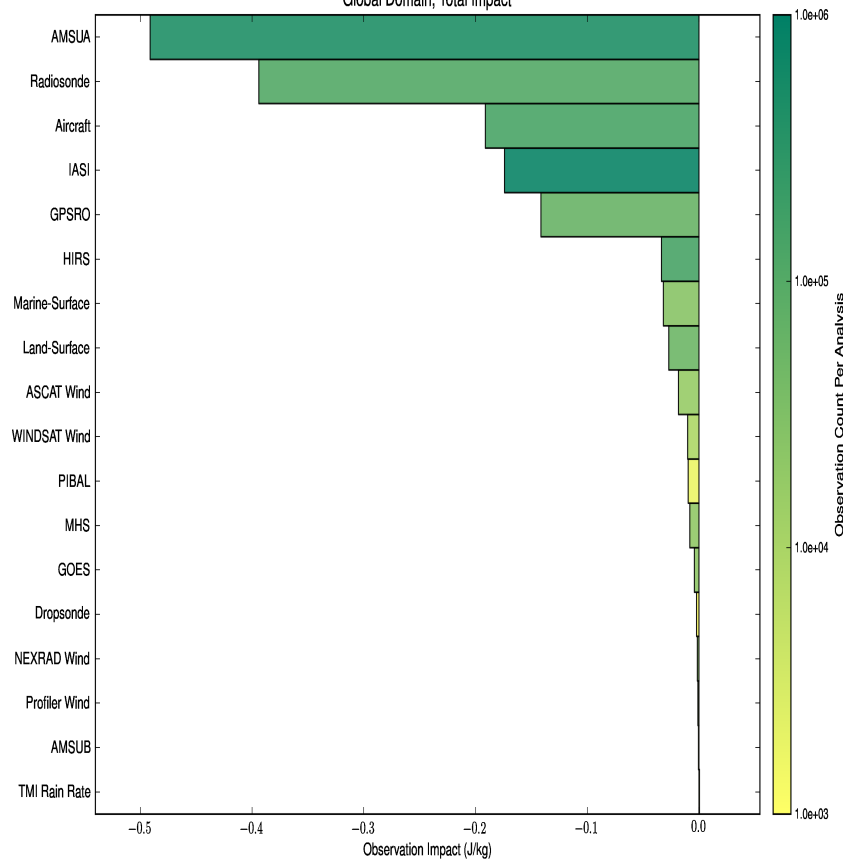
GEOS-5 Summary
1 Dec 2010-31 Dec 2010
Global Domain Total Impact



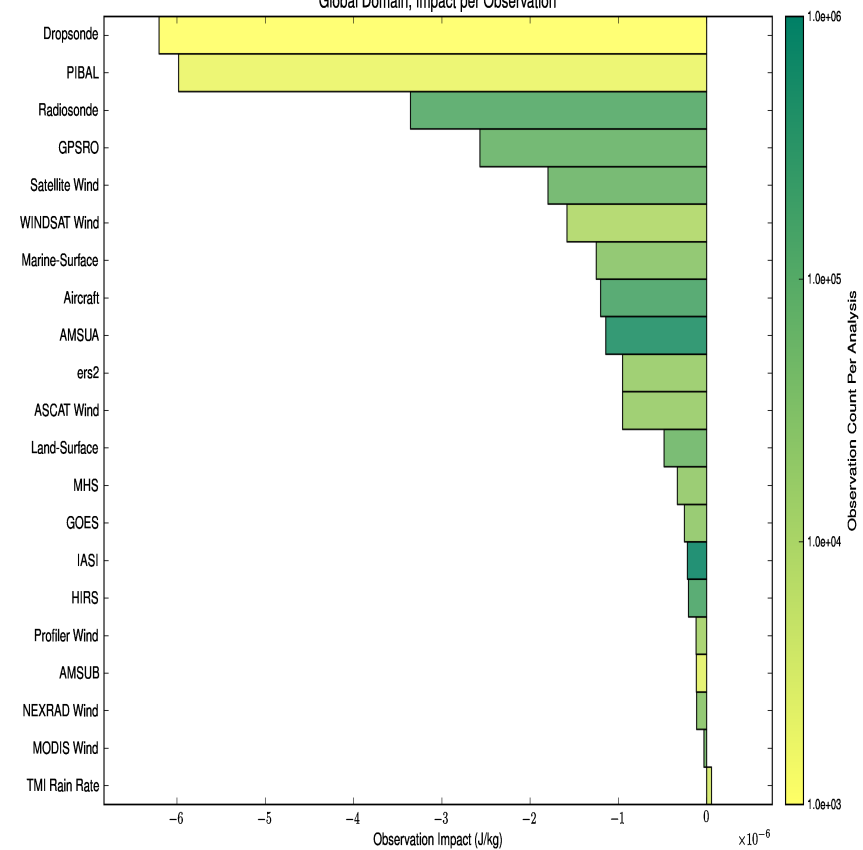


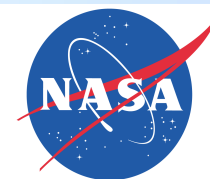
OSE experiment (no AMV)

GEOS-5 24h Observation Impact Summary
1 Aug 2010-31 Aug 2010 12z
Global Domain, Total Impact



GEOS-5 24h Observation Impact Summary
1 Aug 2010-31 Aug 2010 12z
Global Domain, Impact per Observation





Work in progress

- Process all data and compare results with NRL to identify possible improvements for AMV (to use superobs or not)
- Finish OSE experiments (exclusion of AMV, and SCAT data in higher resolution)

