

Assessment of Chinese Satellite FY3A/B MWHS

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Abstract

The FY3 series began in May 2008 with the launch of the FY-3A satellite. The microwave humidity sounders (MWHS) provide vertical information of water vapor, which is important for numerical weather prediction (NWP). The Noise Equivalent Delta Temperature (NEDT) of the MWHS is higher than that of the Microwave Humidity Sounder instrument (e.g. on MetOp-B) but lower than that on the older AMSU-B instruments (on NOAA-15,16 and 17). Assimilation of MWHS observations into the ECMWF Integrated Forecast System (IFS) improved the fit of short range forecasts to other observations, notably MHS and also slightly improved the longer range forecast scores verified against analysis. Also Assimilating both the MWHS/FY3A and the MWHS/FY3B gave a larger impact than either instrument alone. However some negative impacts were also found. These forecast errors appeared to originate in the Tropics and spread southwards. This may imply tighter quality control (QC) is needed in the tropics. These results are encouraging that the FY3 series MWHS data is close to the quality required for use in NWP assimilation systems.

Two Months Experiments setup

Experiment ID: fz1u, 2013071000Z-091012Z,
with MWHS/FY3A, forecast time 00Z,12Z
(control run: fz1w, no MWHS, 38R2, 40km)

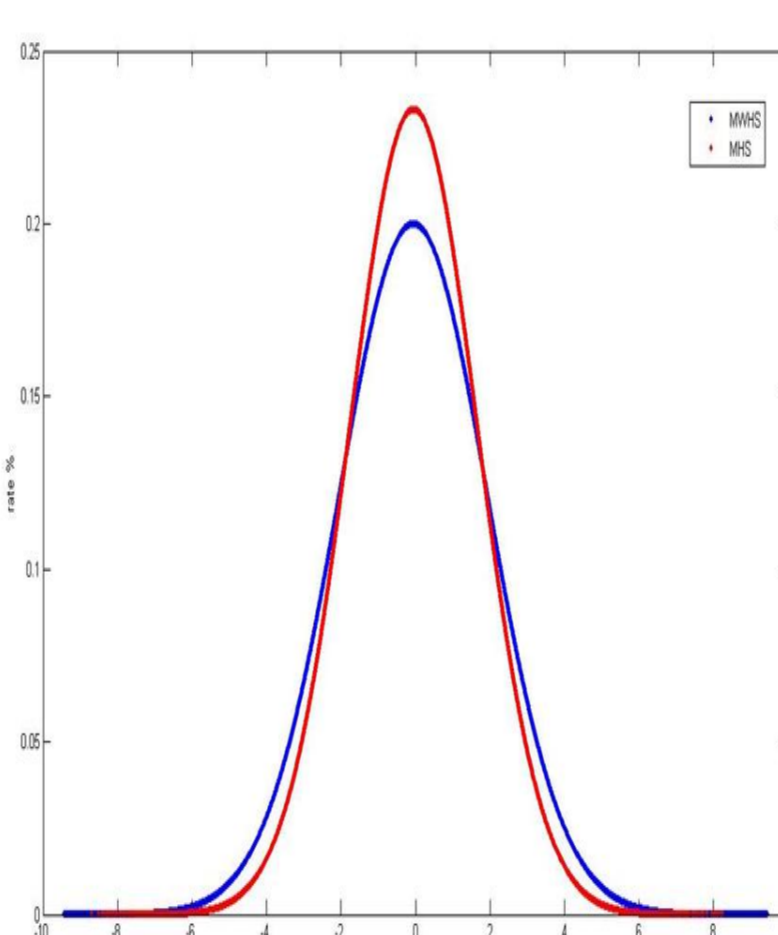
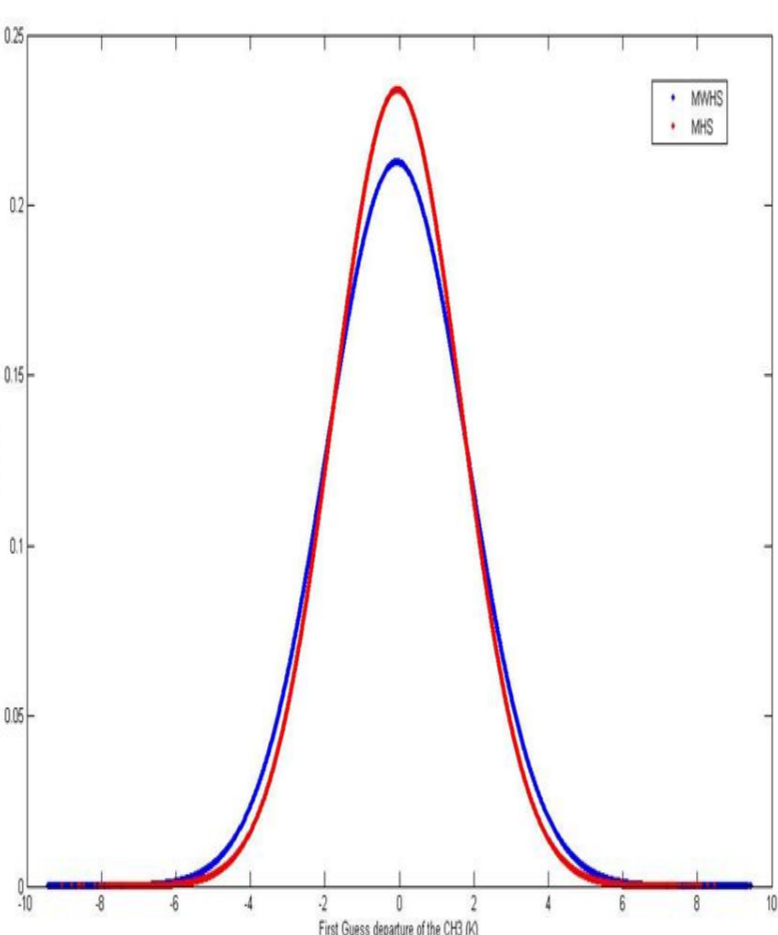
Experiment ID: fz1z, 2013070700Z-090712Z,
with MWHS/FY3B, forecast time 00Z,12Z
(control run: fz1y, no MWHS, 38R2, 40km)

Experiment ID: fzc0, 2013071000Z-091012Z,
with MWHS/FY3A+3B, forecast time 00Z,12Z
(control run: fz1w, no MWHS, 38R2, 40km)

Results

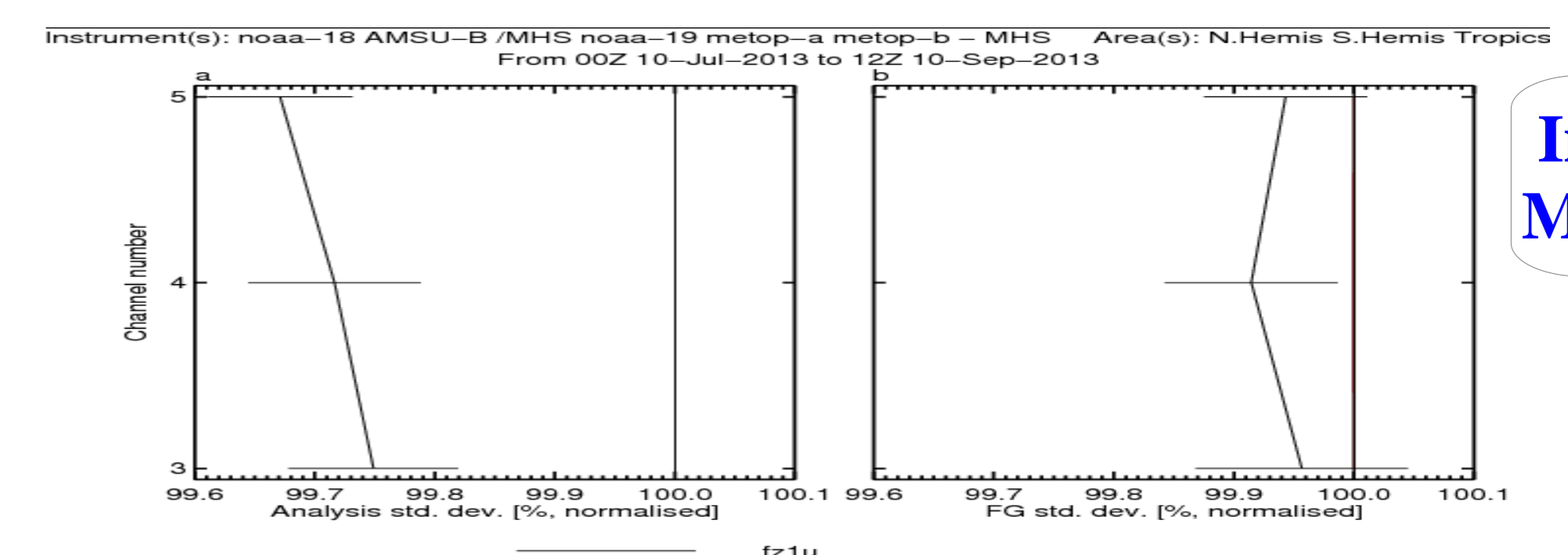
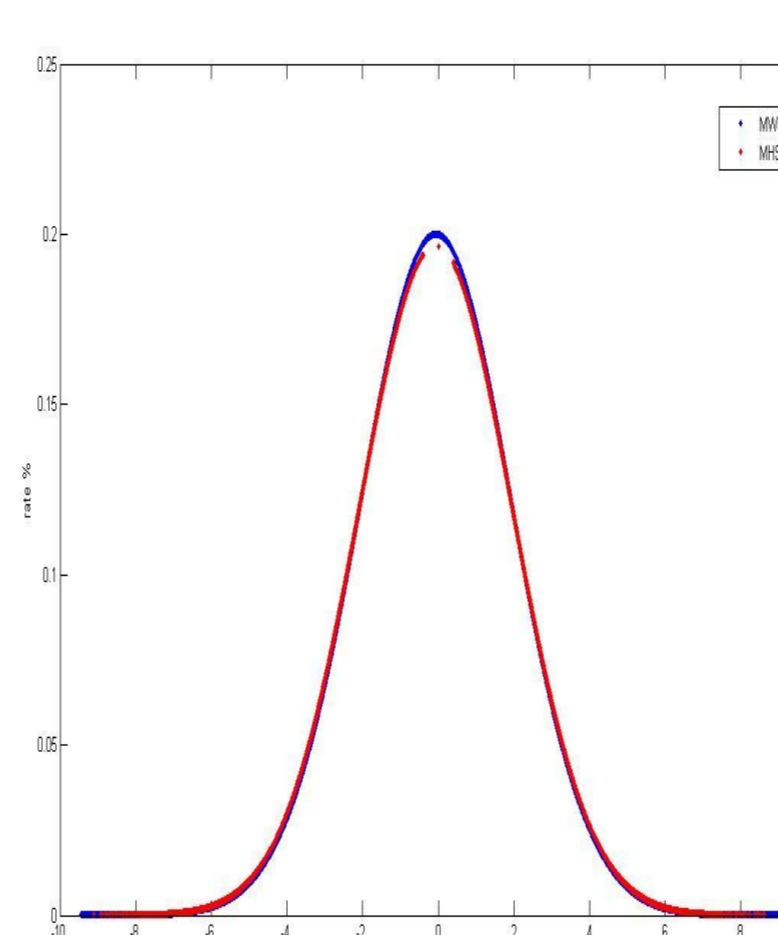
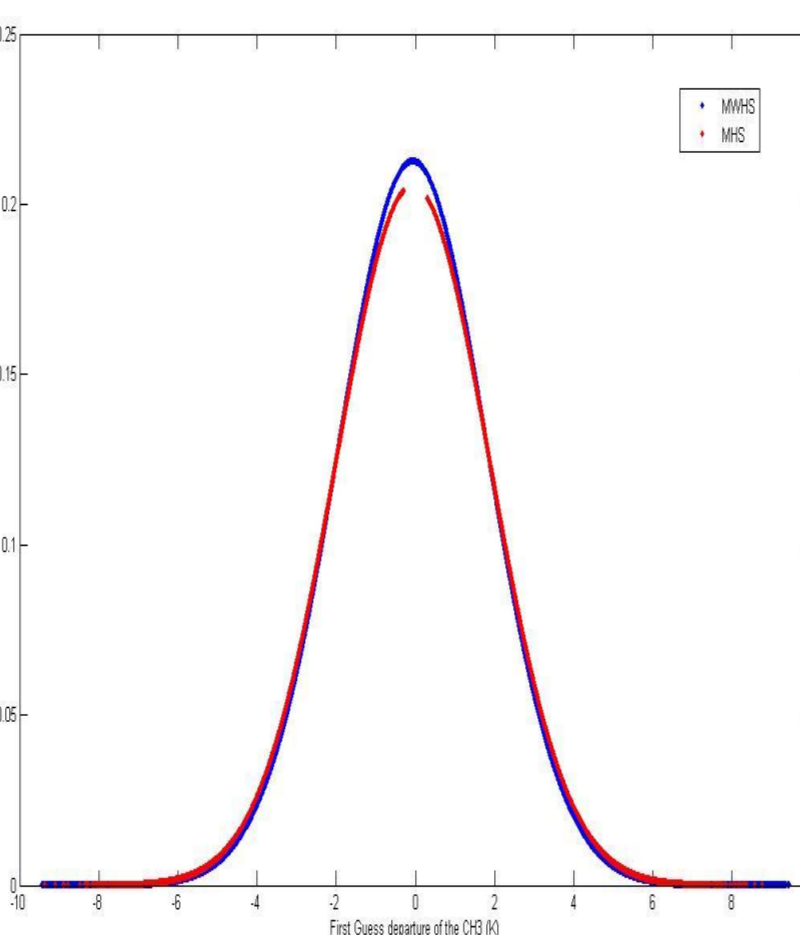
SHAW/VEXL J0 EQD

Ch3 of FY3B/MWHS

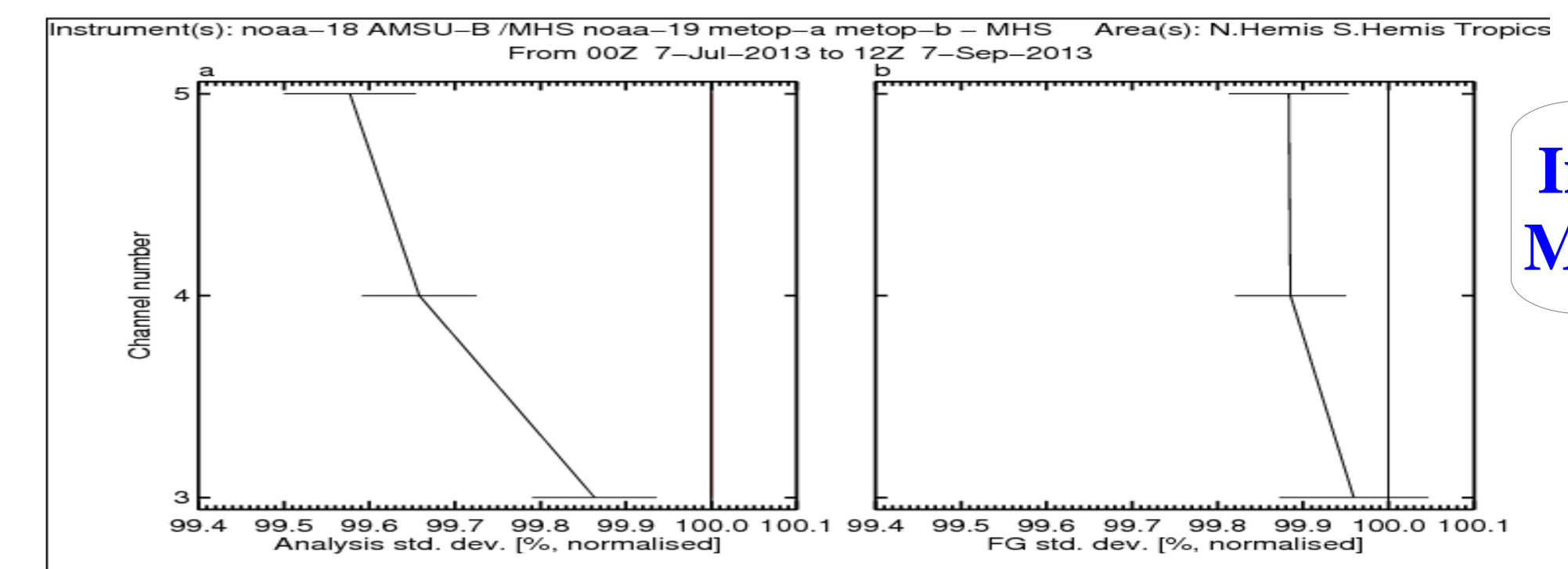


Ch3 of MHS+0.3/3A

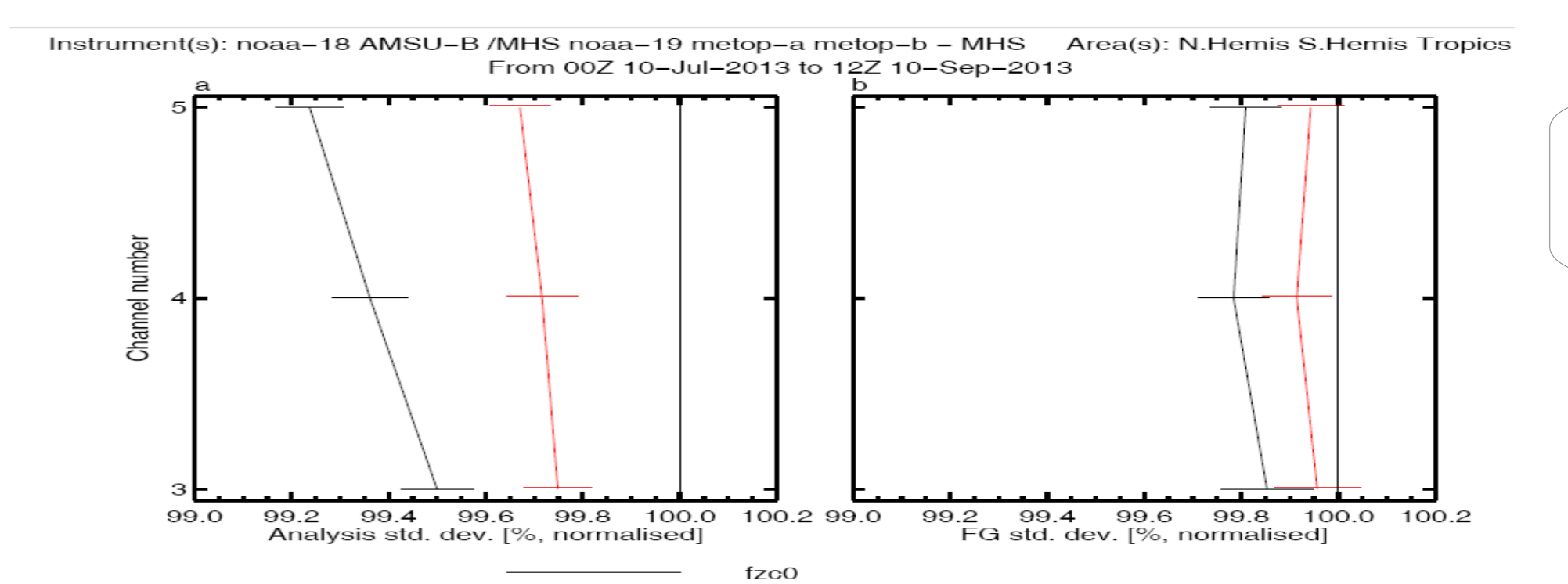
Ch3 of MHS+0.3/3B



Impact from MWHS/FY3A

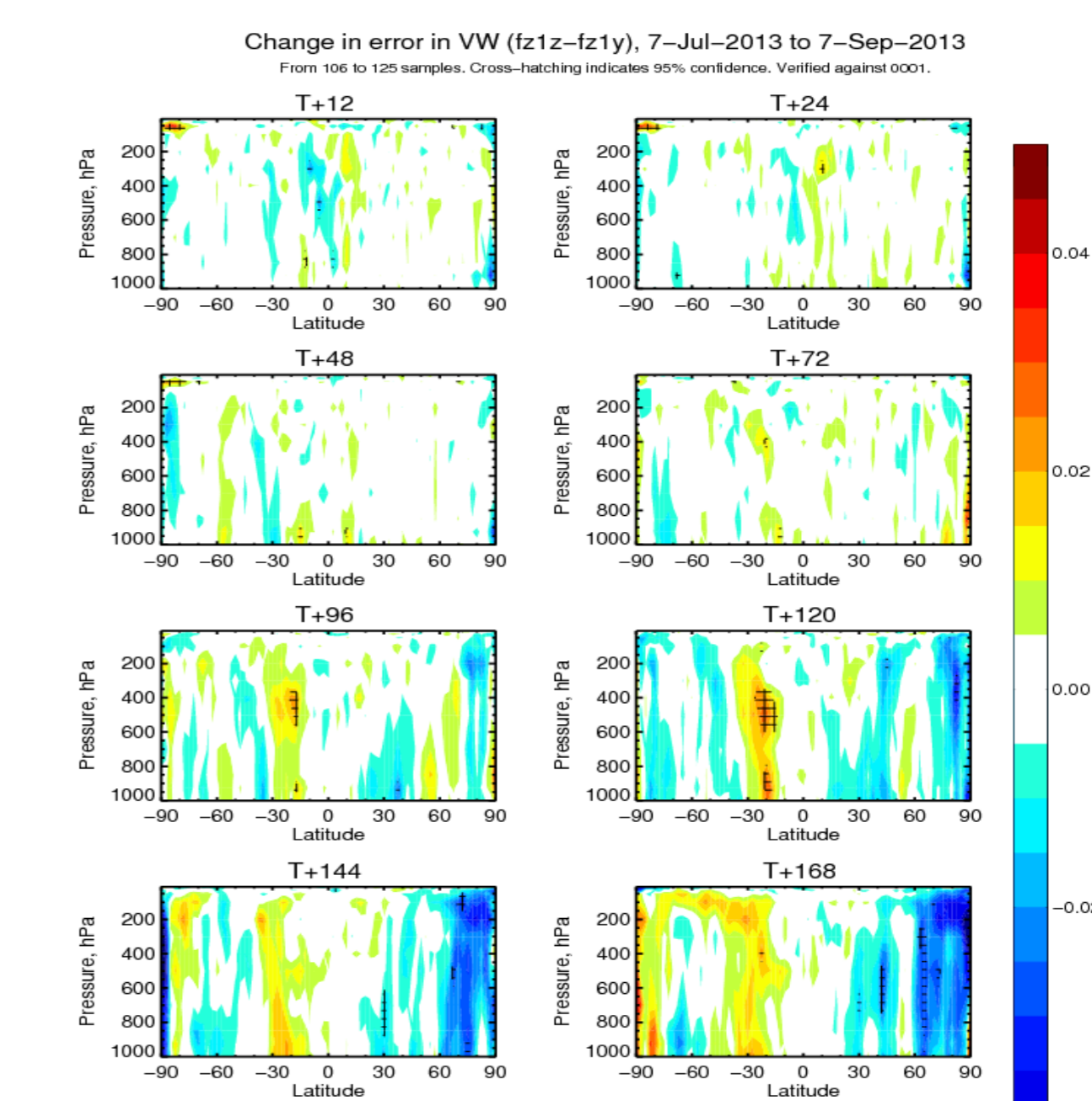


Impact from MWHS/FY3B

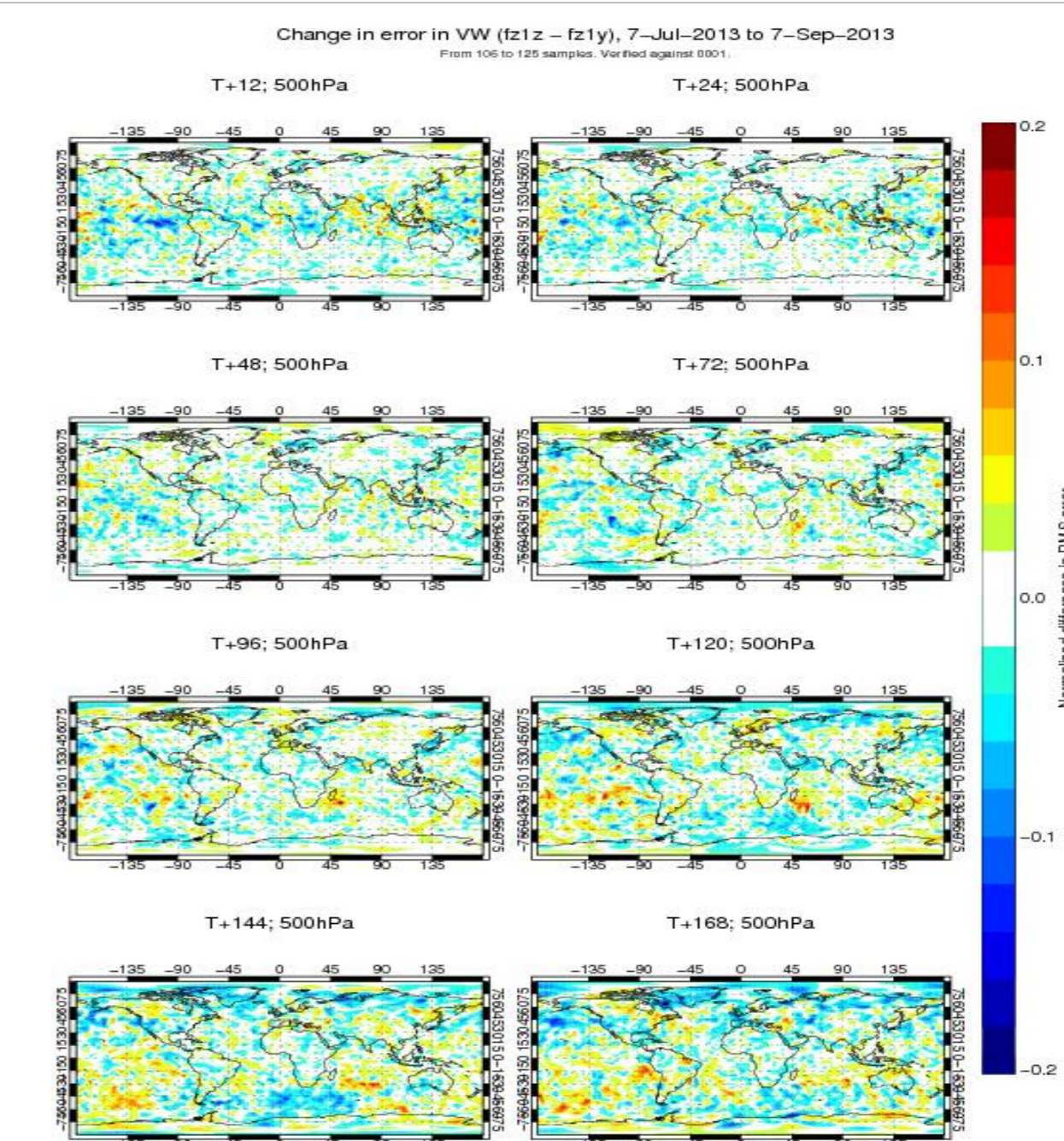


3A+B vs 3A

Vector Wind with MWHS/FY3B Against 0001



Vector Wind at 500hpa with MWHS/FY3B Against 0001



Conclusions:

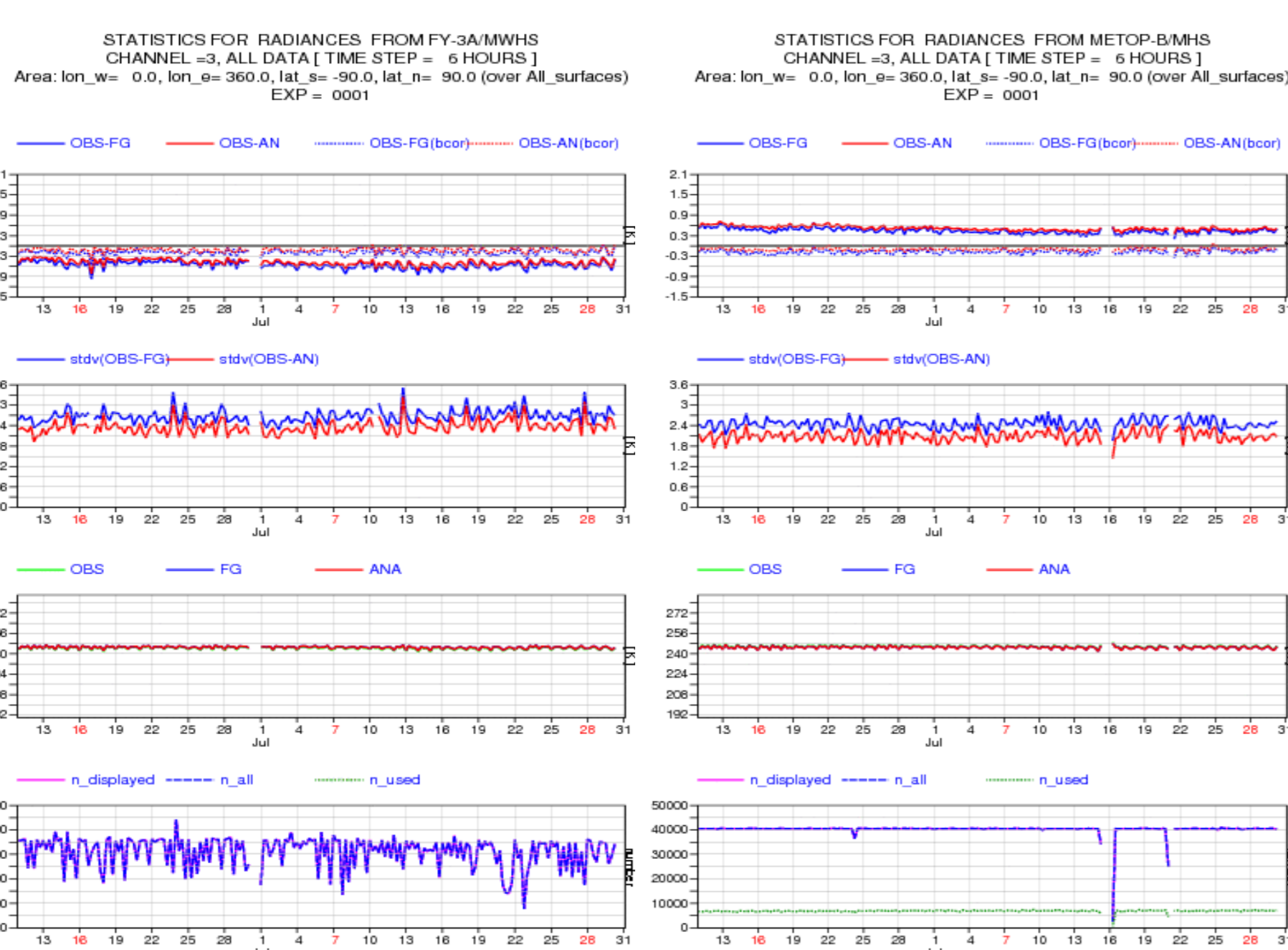
1. MWHS data is more noisy than MHS;

2. After MWHS data assimilated into the system, it shows positive impact on MHS and improved the forecast scores.

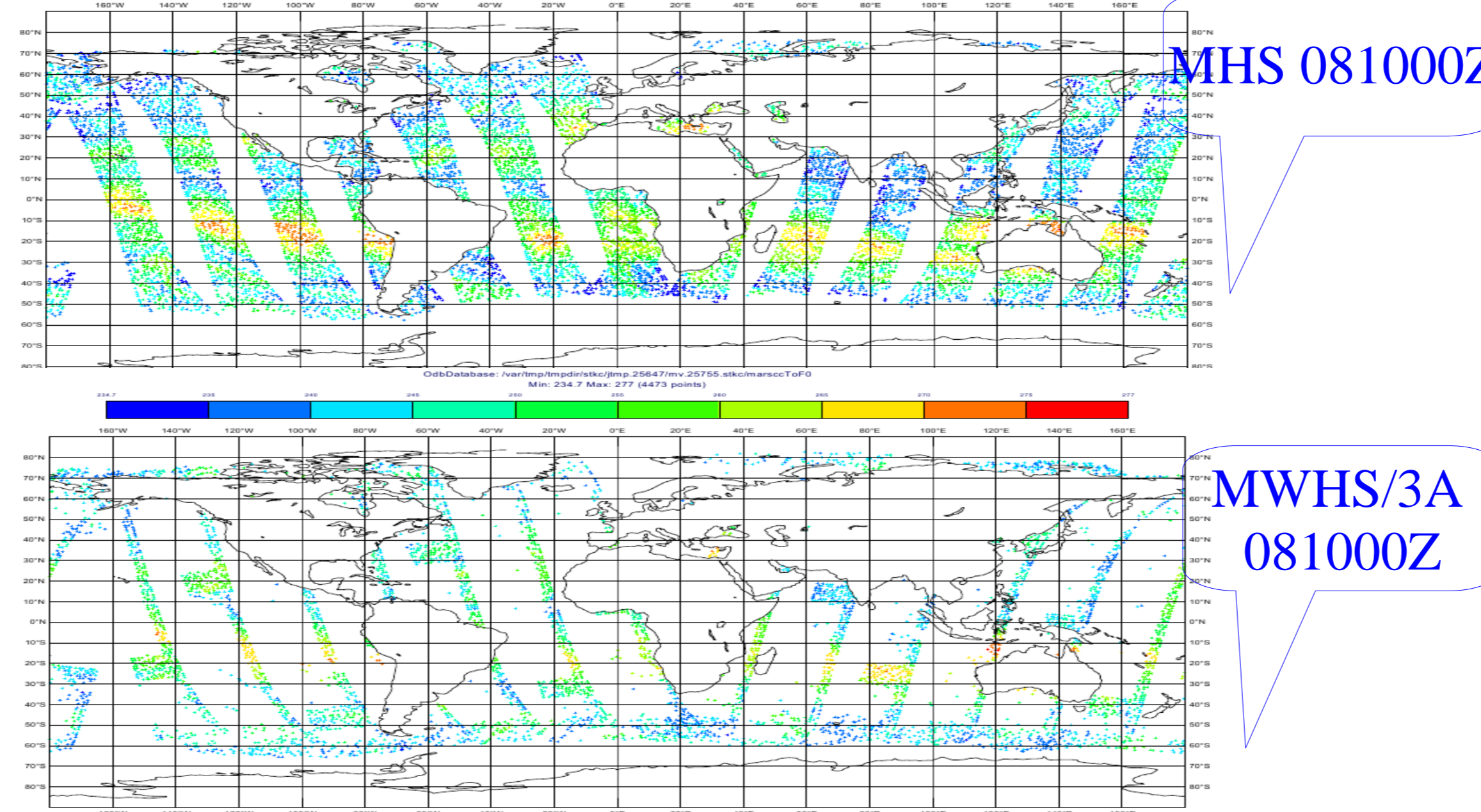
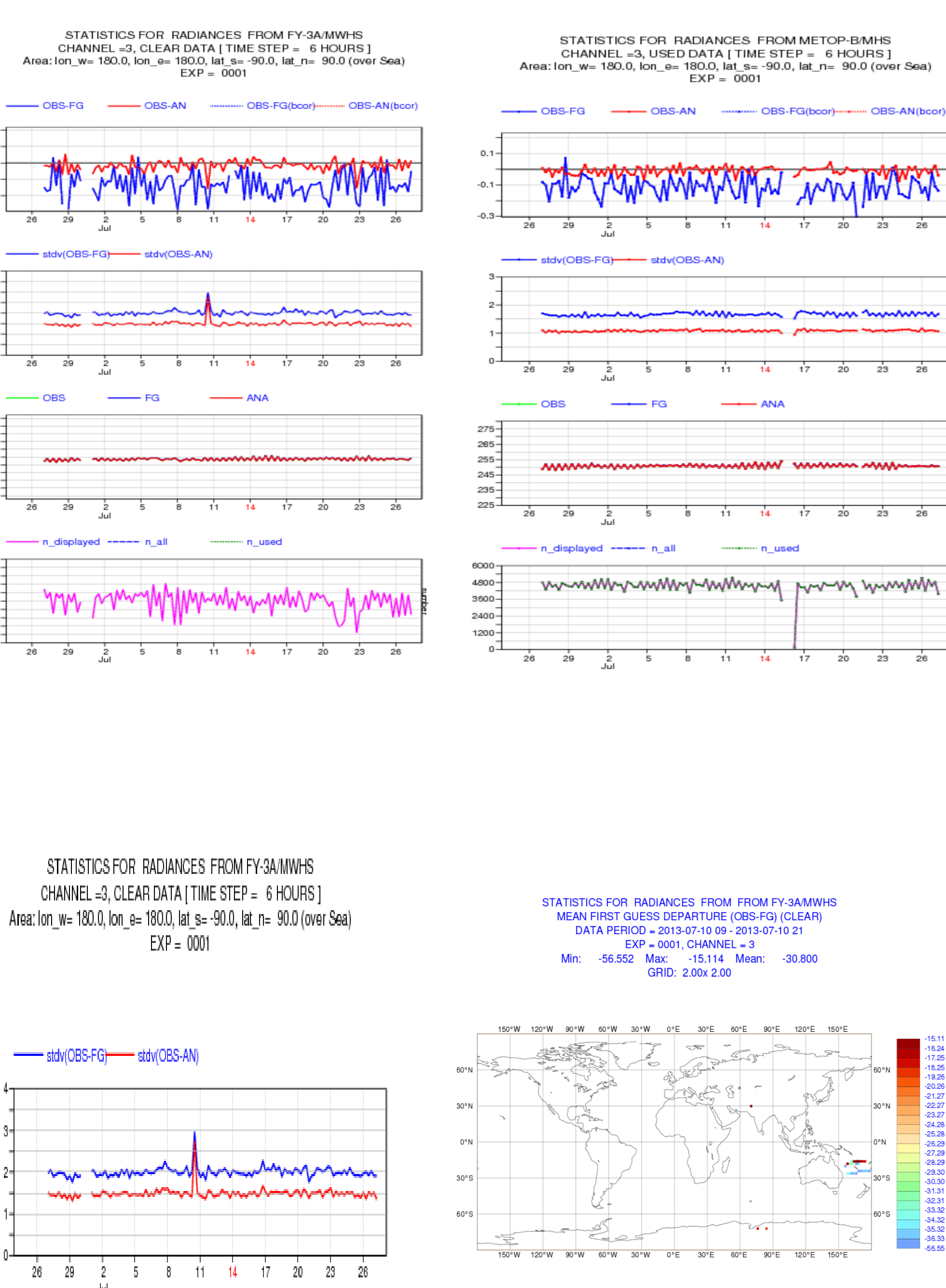
3. Assimilation with MWHS/3A+3B shows better results than only 3A or 3B assimilated.

4. Forecast errors start from the tropics, spread southward and grow stronger with time, so tight QC is suggested over tropics.

All data comparison between MWHS and MHS



Comparison between MWHS clear data and MHS used data over sea



MHS 081000Z

MWHS/3A 081000Z