Infusing the Chinese FY3B PMW Retrievals into CMORPH

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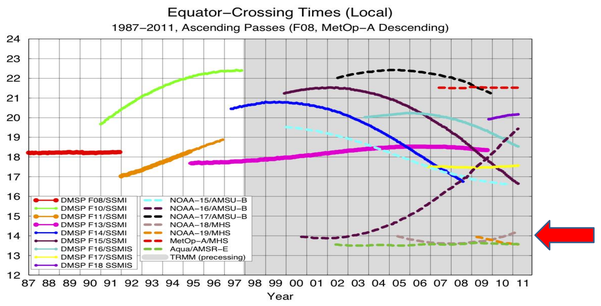
I. Objective

- Explore the possibility and optimal strategy to infuse the Level 2 precipitation products of the Chinese FY3B PMW precipitation retrievals into the CMORPH satellite precipitation estimates

II. Basic Information about FY3B and Its PMW Precipitation Retrievals

- ECT time ~01:40AM/PM
- Level 2 PMW precipitation retrievals produced routinely from ~beginning of July 2011



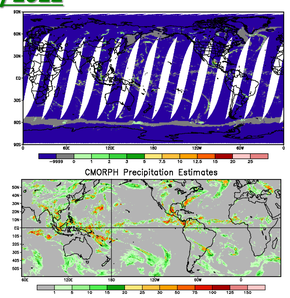
Thickest lines denote GPCP calibrator.

Image by Eric Nelkin (SSAI), 28 April 2011, NASA/Goddard Space Flight Center, Greenbelt, MD.

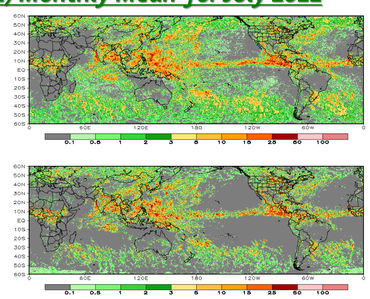
III. PMW Precipitation Retrievals

1) Example for June 30, 2011

- Comparison with CMORPH for the same day
- Qualitative agreement in global precipitation patterns

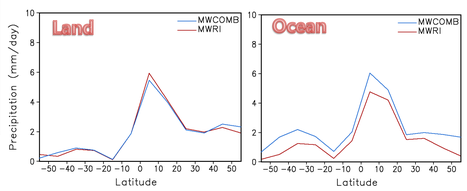


2) Monthly Mean for July 2011



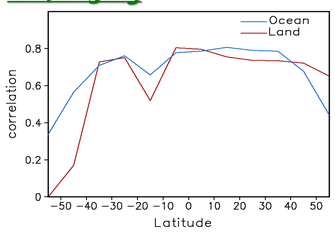
- Overall good agreement with MWCOMB
- Under-estimates over ocean

3) July 2011 Latitudinal Profiles



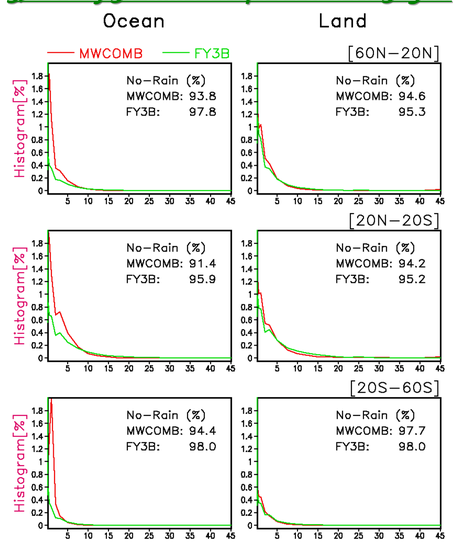
- Very close agreement of the FY3B retrievals with MWCOMB over land
- General under-estimates over ocean

4) Correlation with MWCOMB in 30-min/0.25deg



- High correlation with concurrent MWCOMB, except over hi-latitudes in Southern Hemisphere

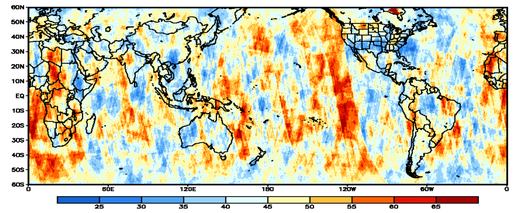
5) PDF of 30-min Precip. Over a 0.25° grid



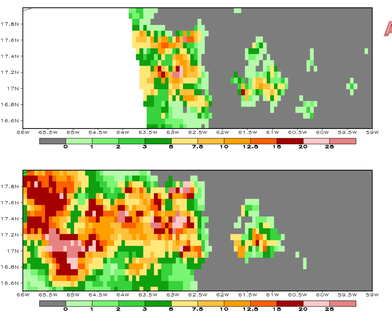
- FY3B presents lower PDF for weak precipitation, especially over ocean
- Reasonable agreements in PDF over land

6) Time / Space Coverage of FY3B

- Percentage of time a grid box of 0.25°lat/lon and 30-min is covered by FY3B but not by any other PMW satellites during July 2011



7) Example of FY3B/AMSR-E Coverage

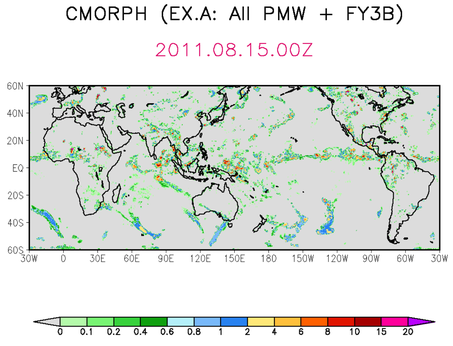


IV. FY3B Infusing Tests

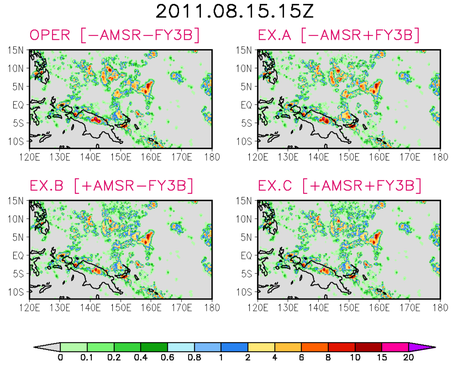
1) Strategy

- Generate 4 sets of CMORPH with different combinations of inputs including and excluding FY3B and compare the results
- Four Sets of Inputs
  - *OPER*
    - *PMW from all platforms excluding FY3B and AMSR*
  - *EX. A*
    - *PMW from all platforms including FY3B but excluding AMSR*
  - *EX.B*
    - *PMW from all platforms including AMSR but excluding FY3B*
  - *EX.C*
    - *PMW from all platforms including FY3B and AMSR*

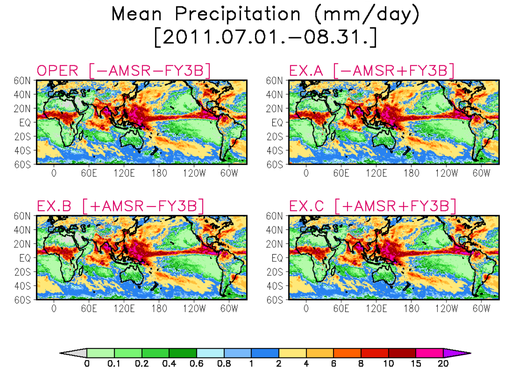
2) Example



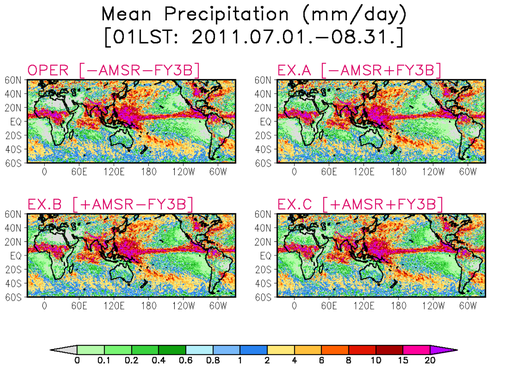
3) Comparison among the 4 Ver CMORPH



4) Mean Precip. For Jul-Aug 2011



5) Mean Precip. for Jul-Aug 2011,01-02LST only

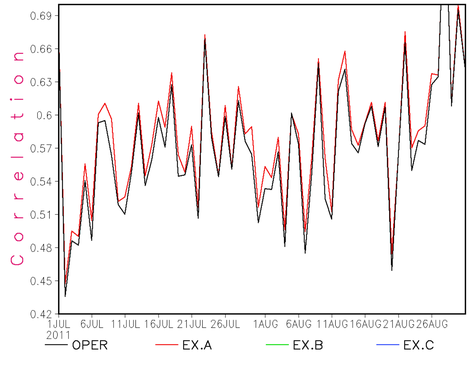


6) Correlation with Daily Gauge over Land

Correlation	60°S-20°S	20°S-20°N	20°N-60°N	60°S-60°N
OPER	0.633	0.554	0.580	0.567
EX.A	0.642	0.567	0.591	0.579
EX.B	0.640	0.569	0.593	0.580
EX.C	0.644	0.573	0.597	0.585

- Based on comparisons between daily CMORPH and gauge analysis over 0.25olat/lon grid boxes over land with one or more reporting station over a 62-day period from July 1 to August 31, 2011.
- Daily mean for CMORPH satellite estimates is defined for the same 24-hourly accumulation periods with those for the gauge data.

7) Time Series of Daily Correlation with gauge

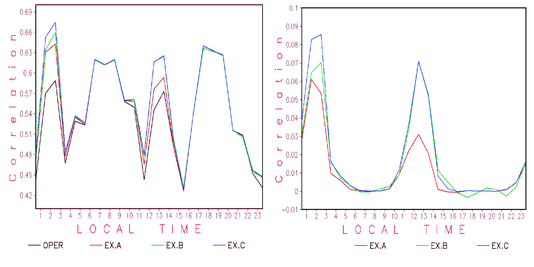


8) Correlation with Stage IV Radar over CONUS

Correlation	Daily	Hourly
OPER	0.646	0.528
EX.A	0.656	0.538
EX.B	0.658	0.543
EX.C	0.662	0.545

- Based on comparisons between daily / hourly CMORPH and Stage IV radar observations on a 0.25°lat/lon grid over CONUS over a 62-day period from July 1 to August 31, 2011.

9) Correlation with Radar for Different LST



- Correlation improved substantially in hours when FY3B flies over

V. Summary

- Infusing FY3B improves the quantitative accuracy of CMORPH around 02/14 local time when the satellite flies over
- More examinations needed for FY3B especially for its retrievals over ocean
- We will continue the experiments to include evaluations using data over China and other key regions