An update on the use of ATMS data at ECMWF

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ECMWF

Operational use of ATMS

- **ATMS has been assimilated operationally at ECMWF since 26 September 2012.**
  - **3x3 averaging for channels 3-22**
  - **Assimilate channels 6-15, 18-22; 6-8 and 18-22 over sea only**
  - **Assimilation in clear-sky**
- **Neutral to slightly positive forecast impact when used in addition to the full observing system.**
- **Striping remains the only small issue identified.**
- **See also Bormann et al 2014, JGR NPP Special Issue**

ATMS: Forecast impact

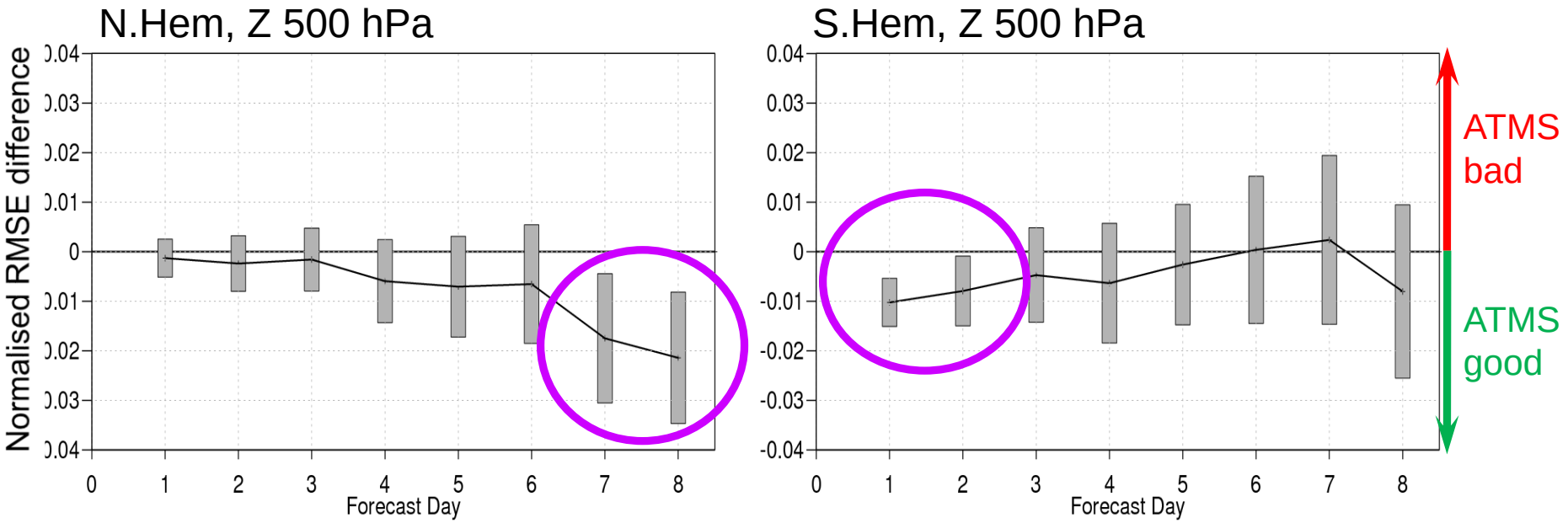
Assimilation experiments over two seasons:

15 Dec 2011 – 6 Feb 2012

28 June 2012 – 31 August 2012

Use temperature and humidity channels (6-15; 18-22); surface-sensitive channels over sea only.

Combined scores over two seasons (102 cases):



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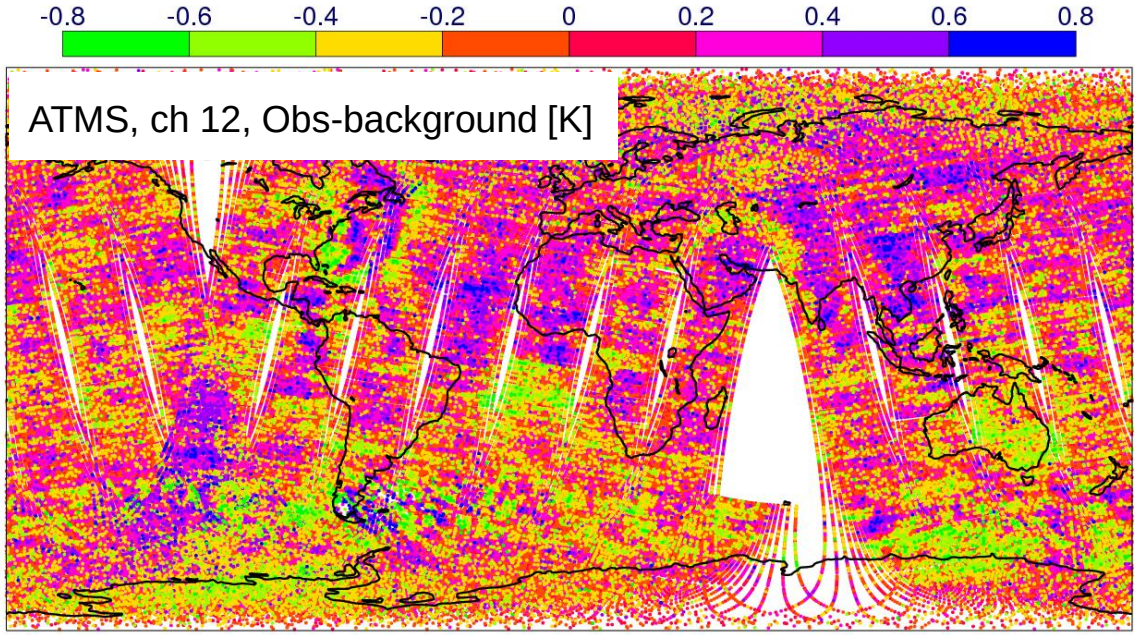
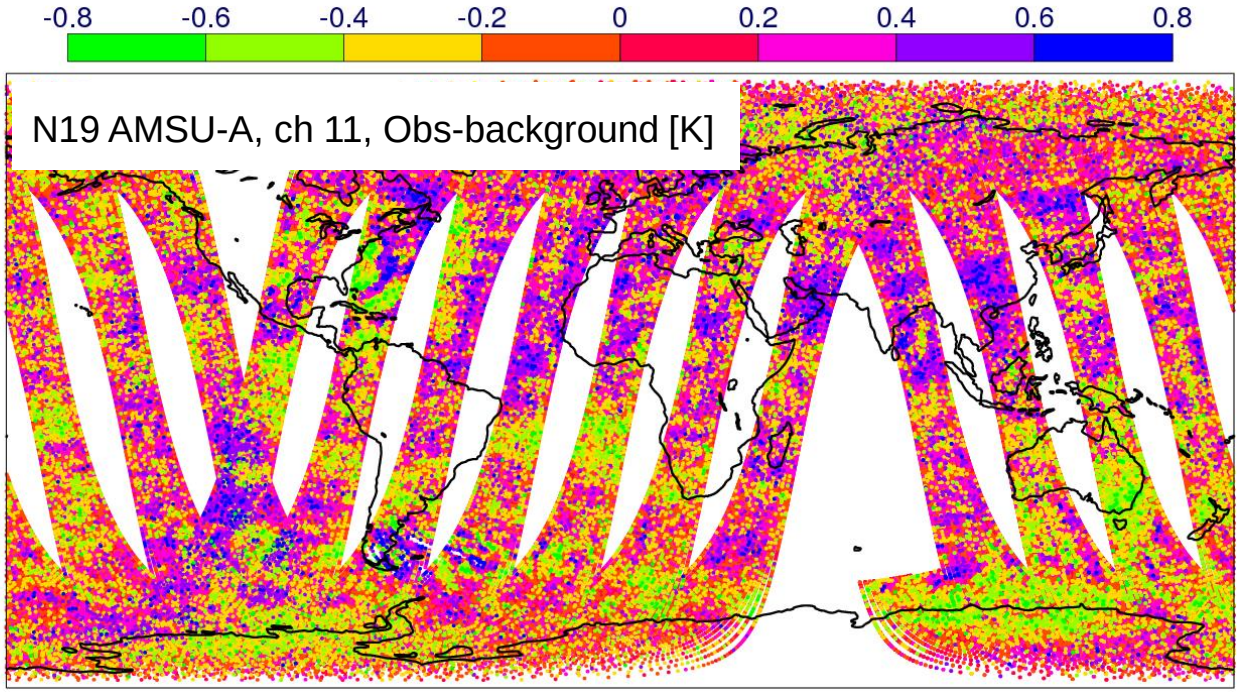
ATMS: Striping

Weak cross-track striping effect, especially for stratospheric temperature-sounding channels.





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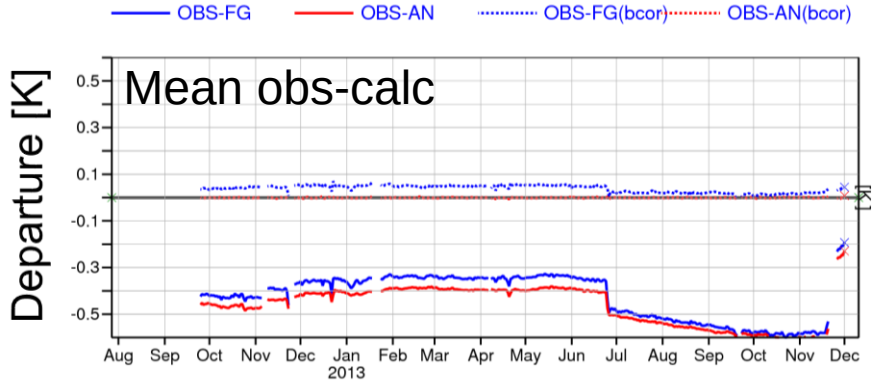
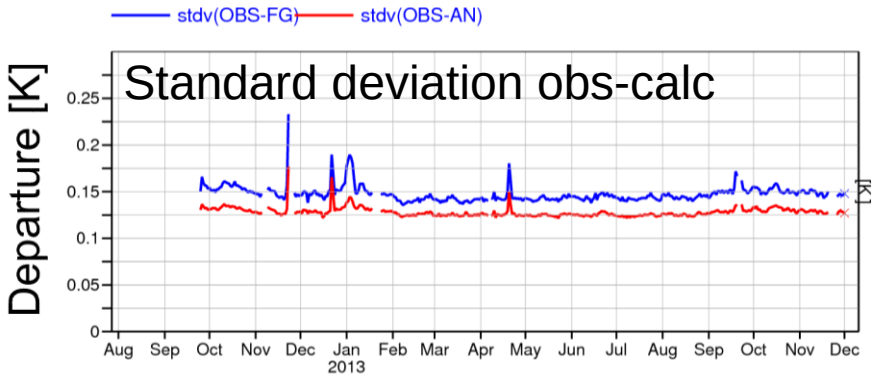
Outline

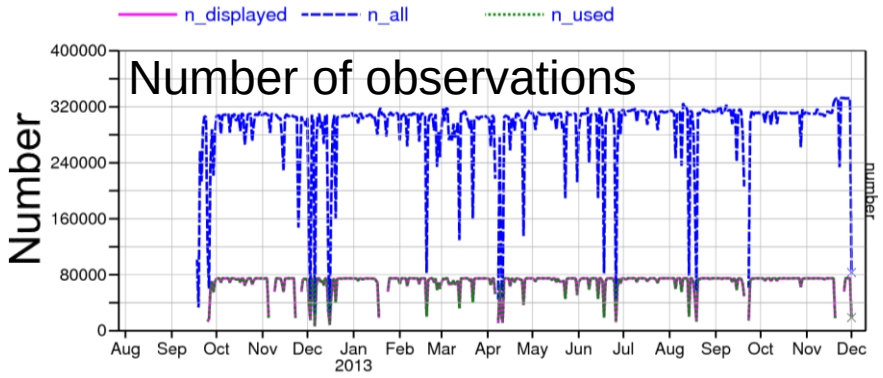
1) **Looking back over 15 months of assimilation of ATMS**
   - **Stability**
   - **Lunar intrusions**
   - **Introduction of antenna pattern correction**
2) **ATMS vs AMSU-A/MHS impact in an observation-depleted system**

15 months of assimilating ATMS

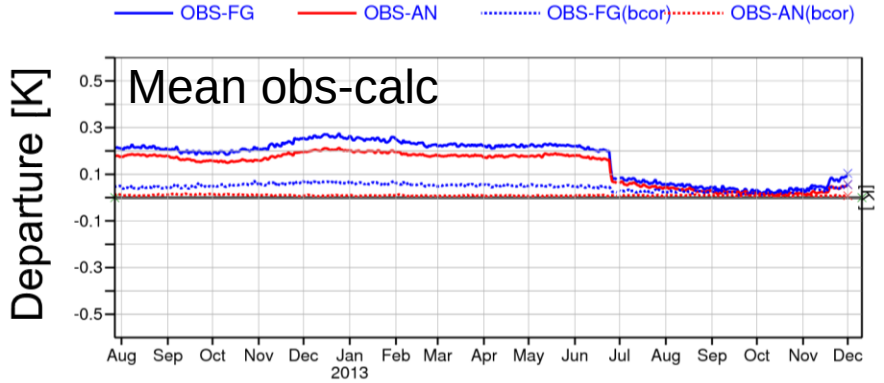
ATMS, channel 9

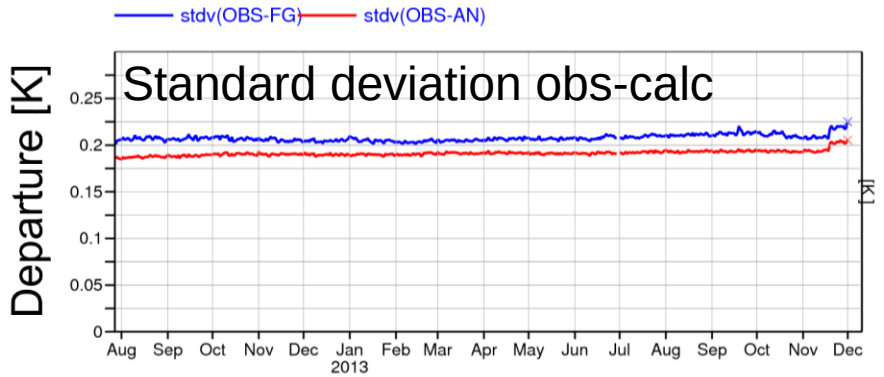


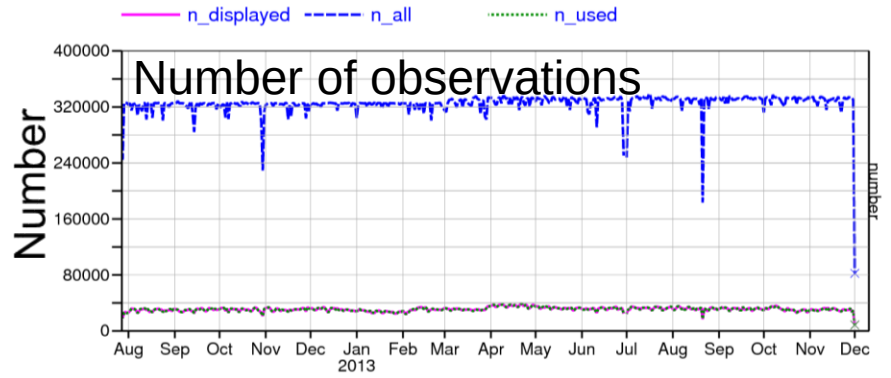




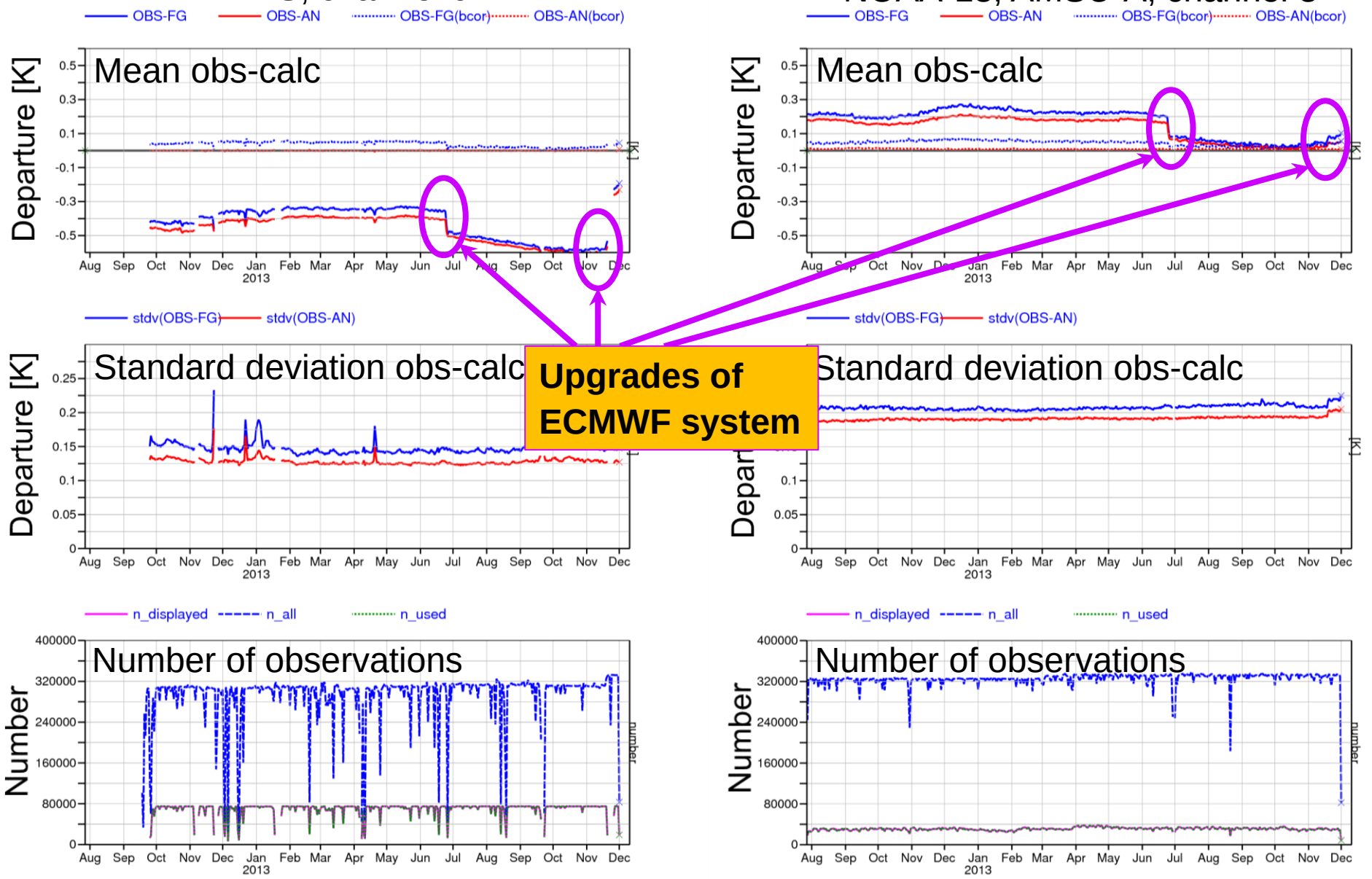
NOAA-18, AMSU-A, channel 8







15 months of assimilating ATMS



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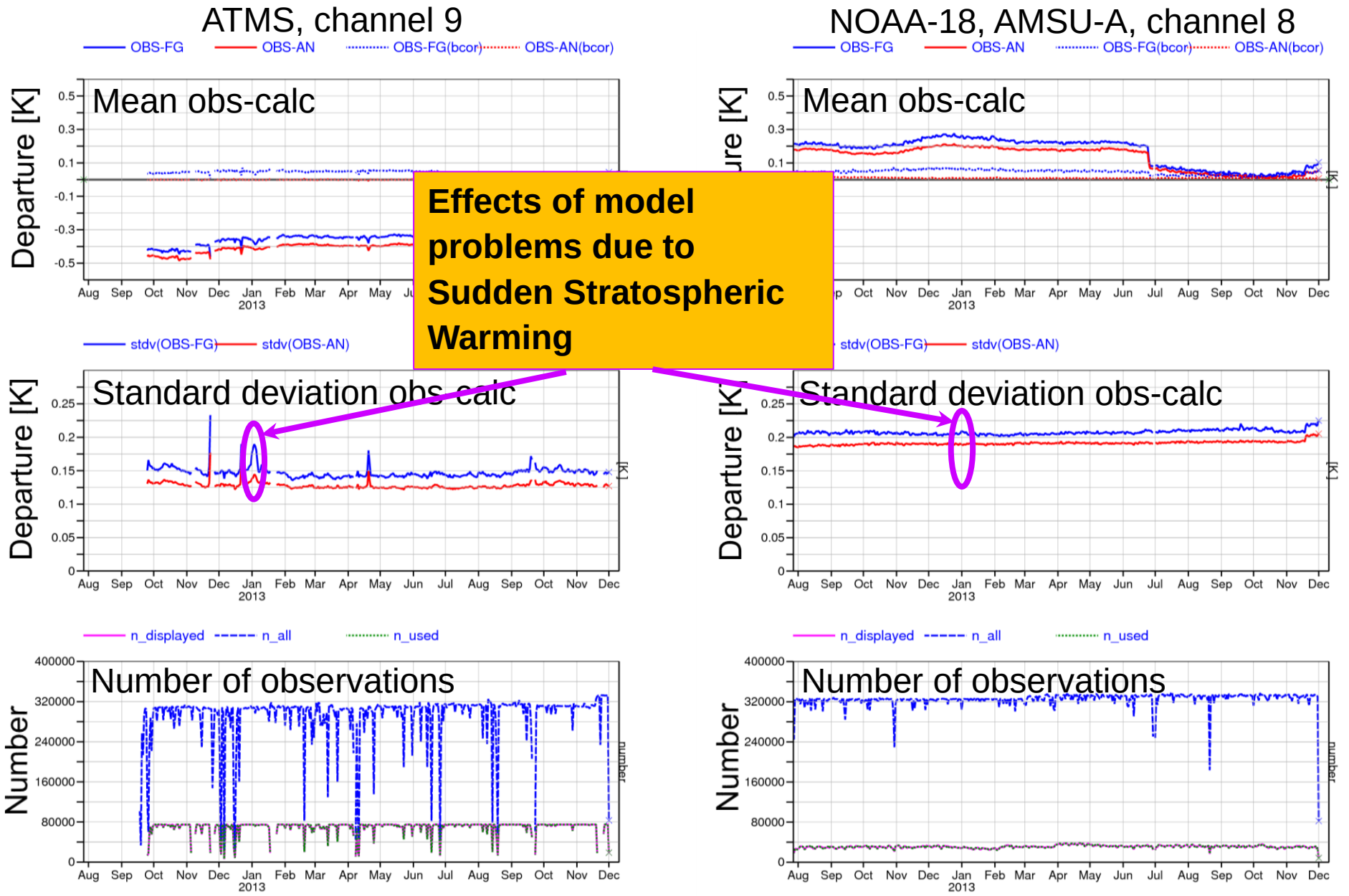

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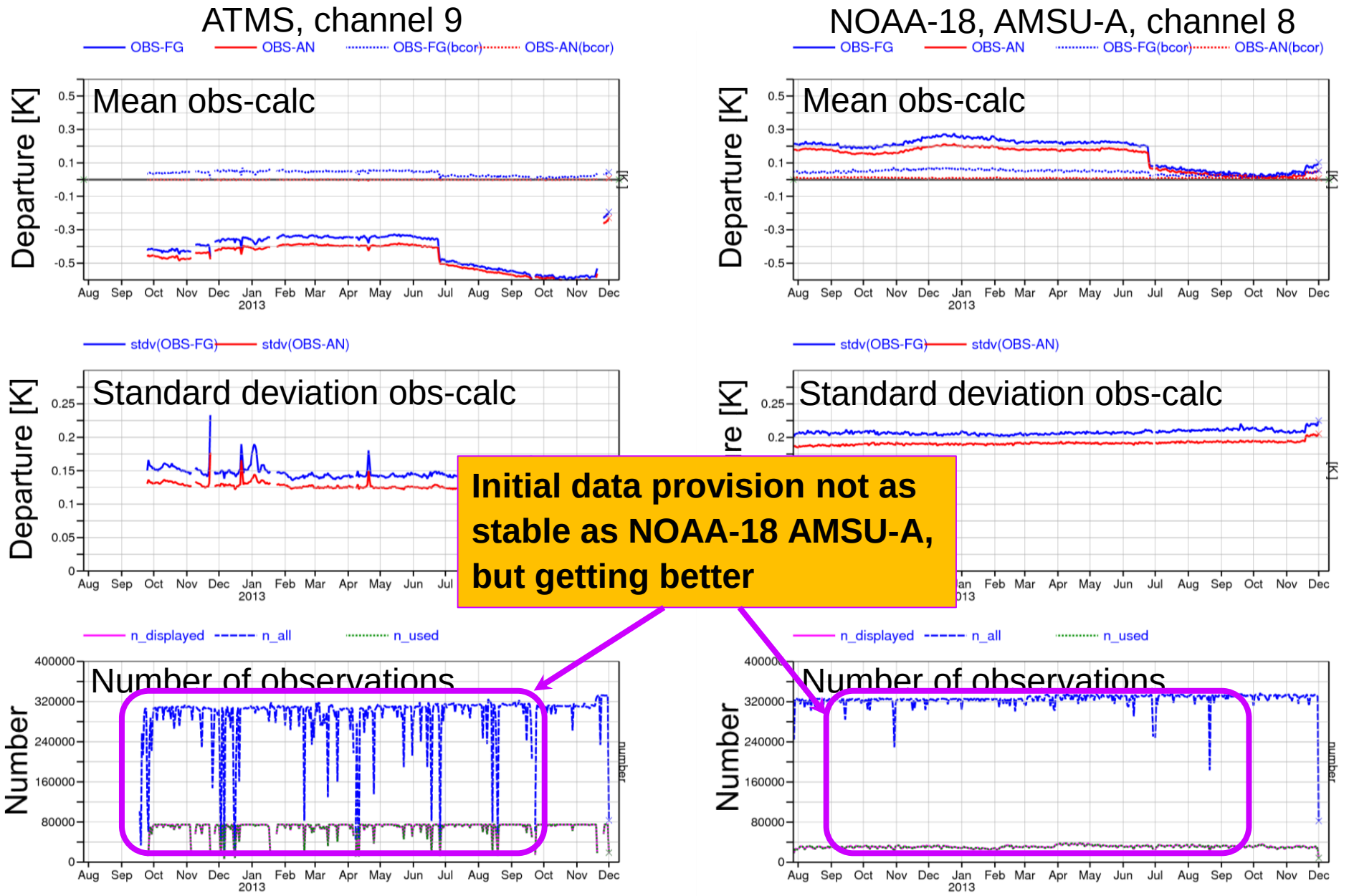
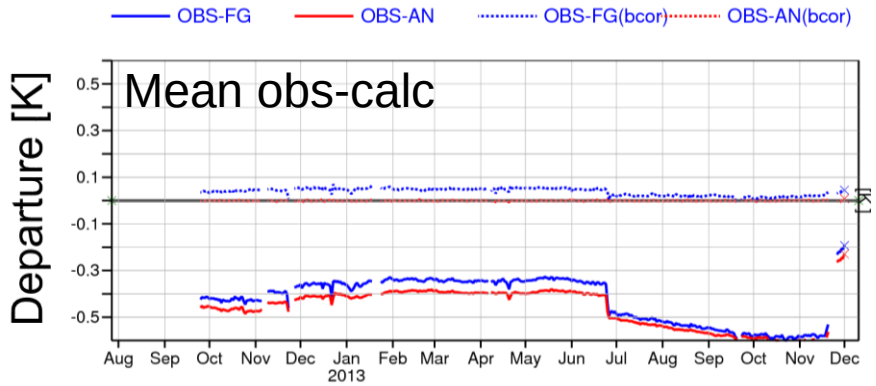
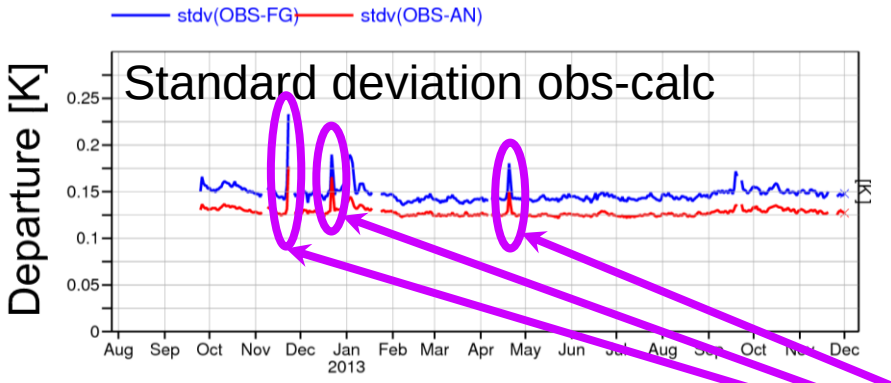
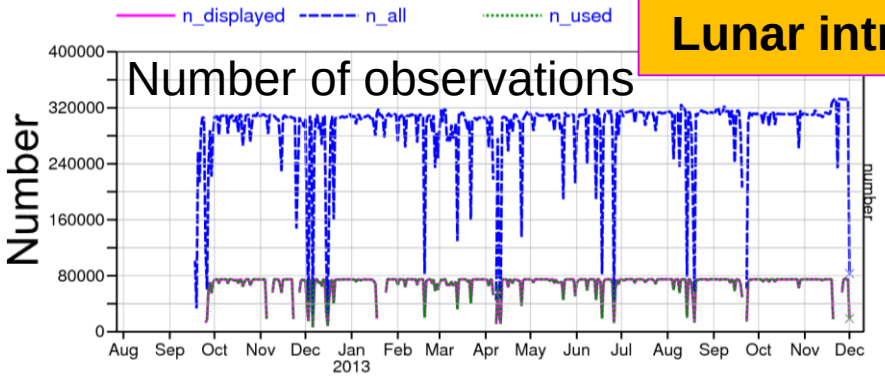


15 months of assimilating ATMS

ATMS, channel 9

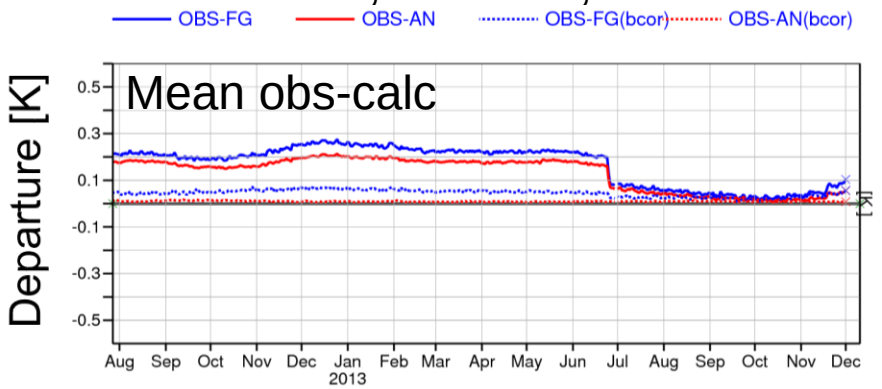


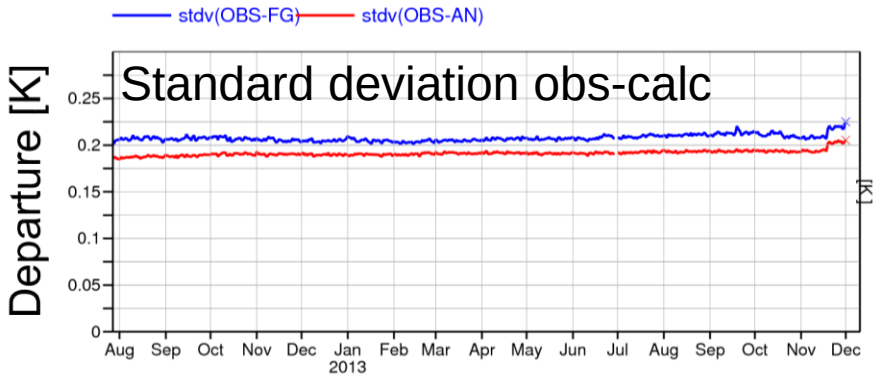


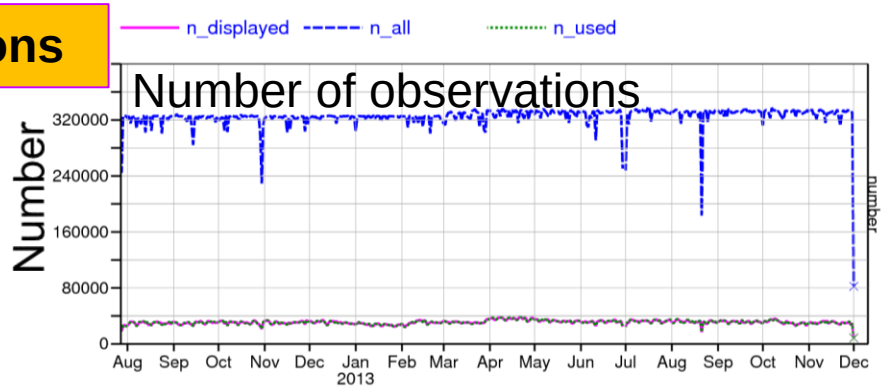


Lunar intrusions

NOAA-18, AMSU-A, channel 8

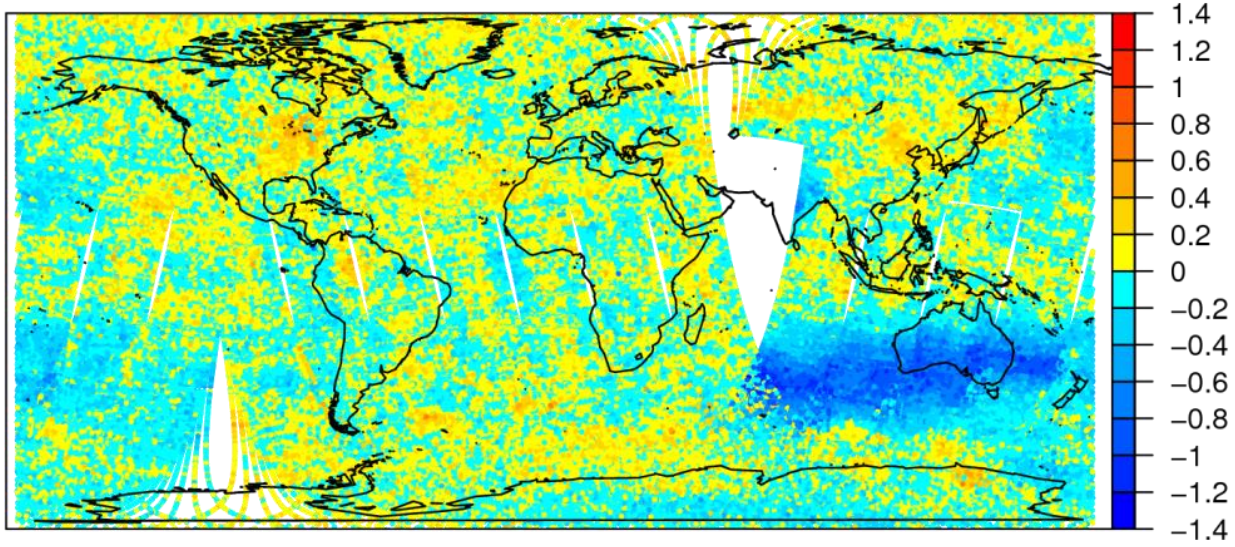




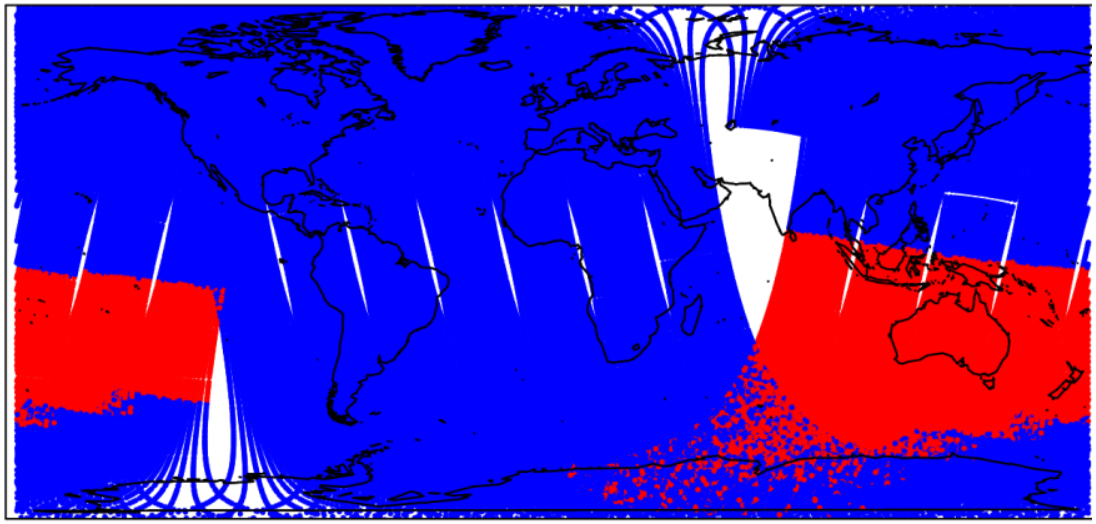


Lunar intrusions

Obs – FG [K],
ATMS channel 9,
19 April 2013, 9-21 UTC



Lunar intrusion flag,
ATMS channel 9,
19 April 2013, 9-21 UTC



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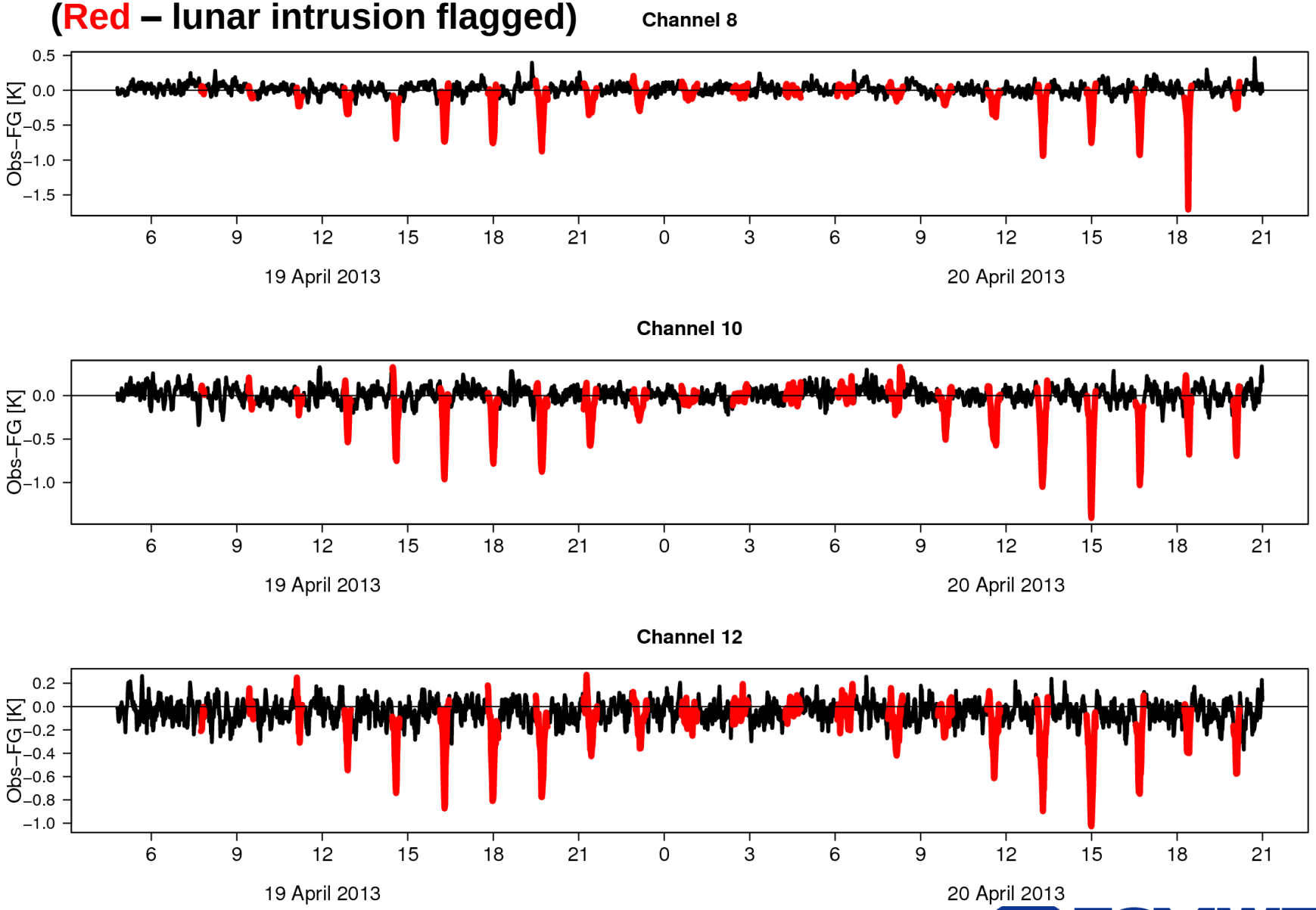
Mean(Obs-FG) during lunar intrusion

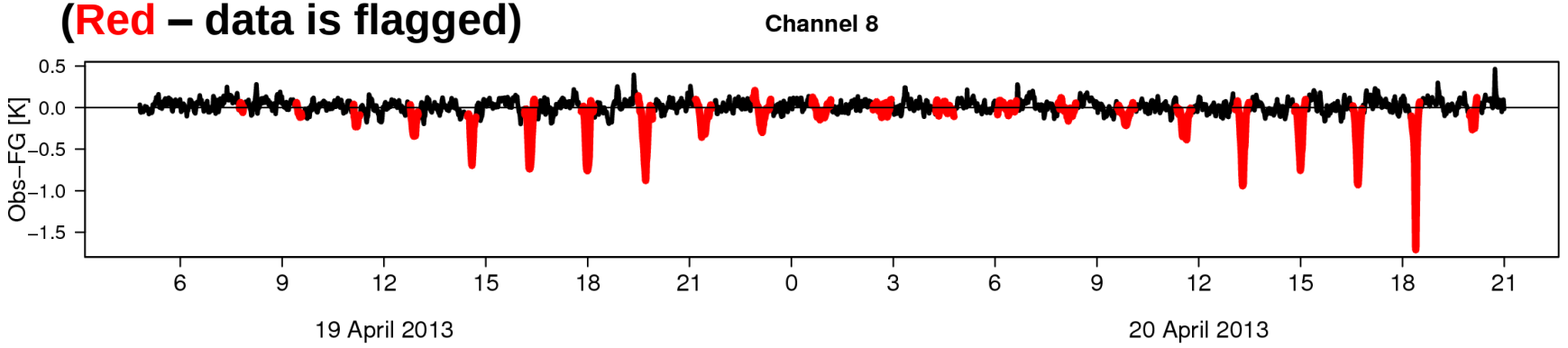
(Red – lunar intrusion flagged)

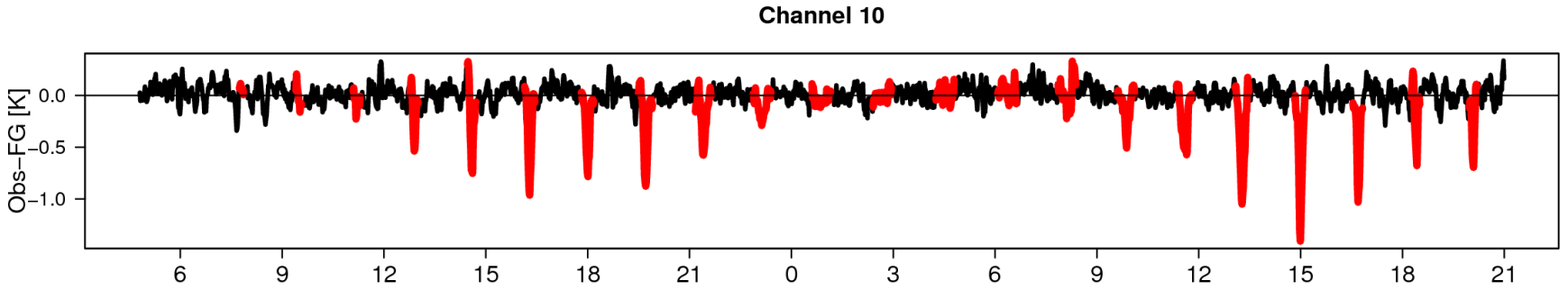


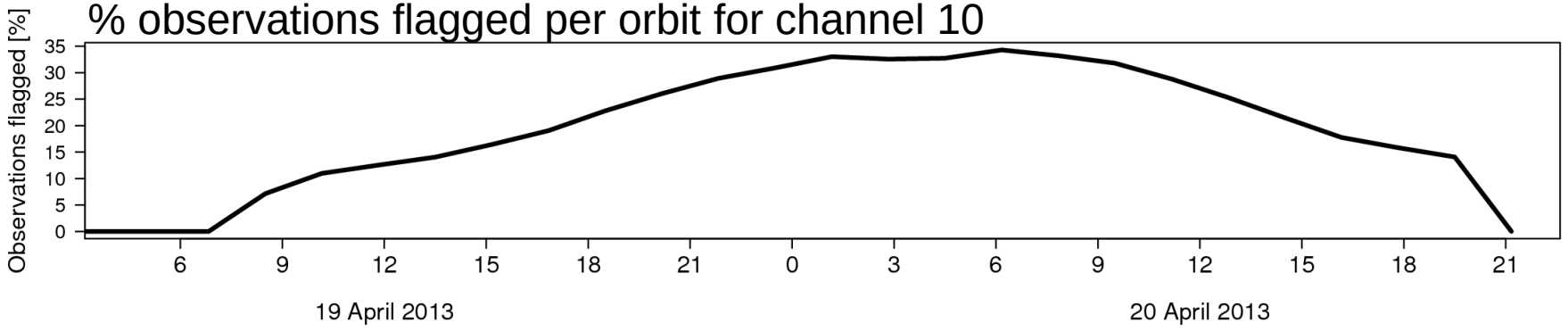
ECMWF

Mean(Obs-FG) during lunar intrusion

(Red – data is flagged)







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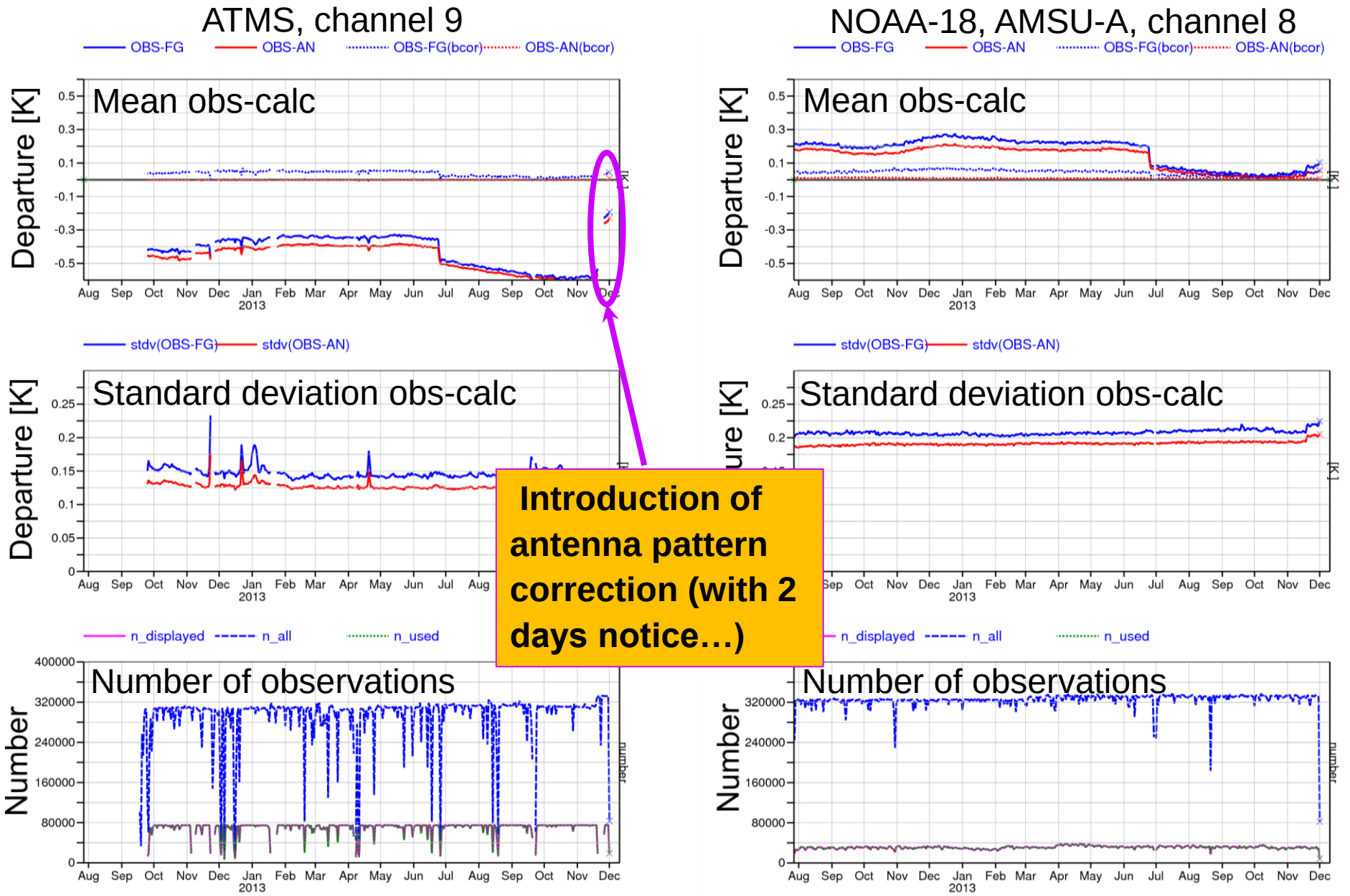
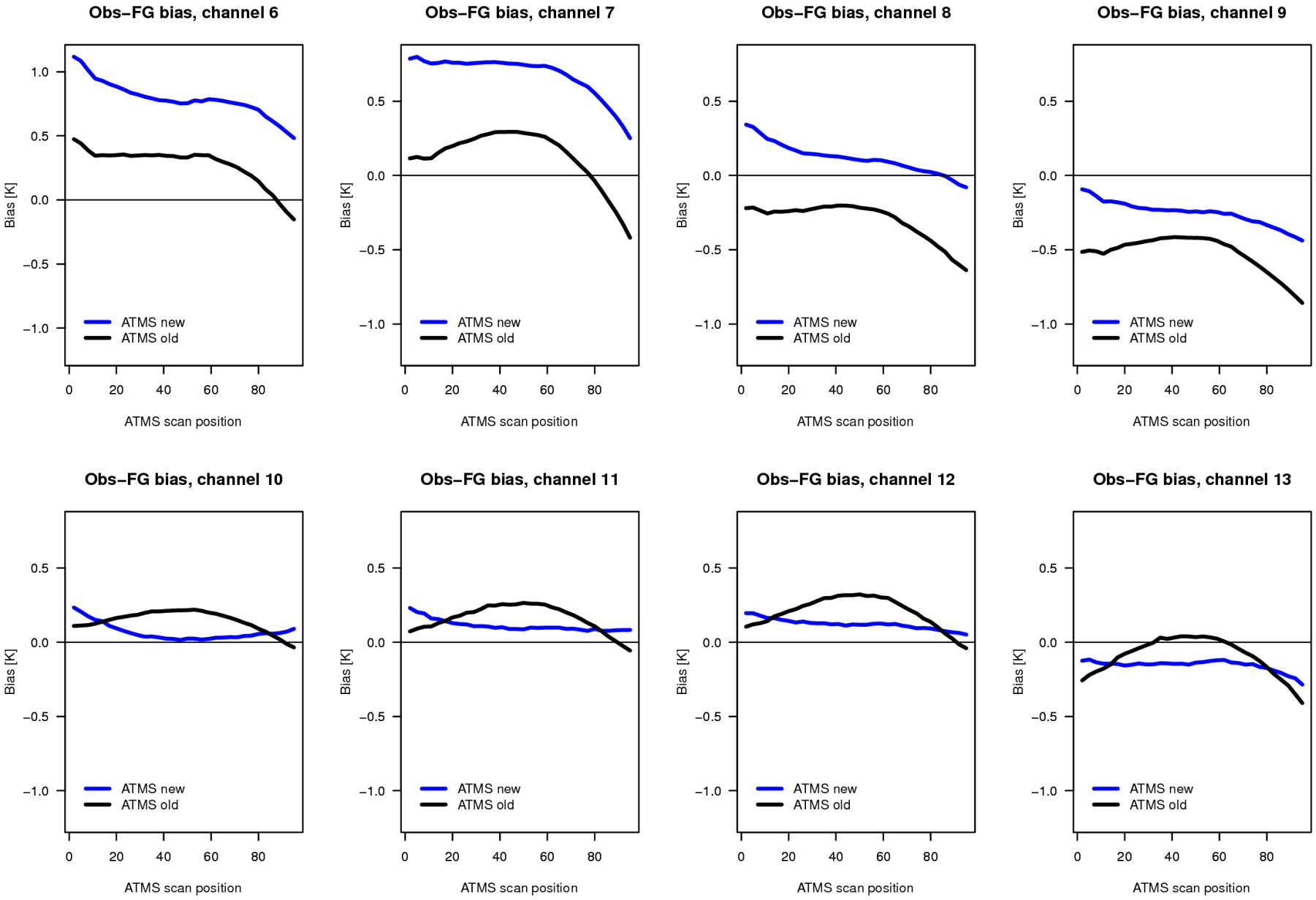
15 months of assimilating ATMS



Introduction of antenna pattern correction



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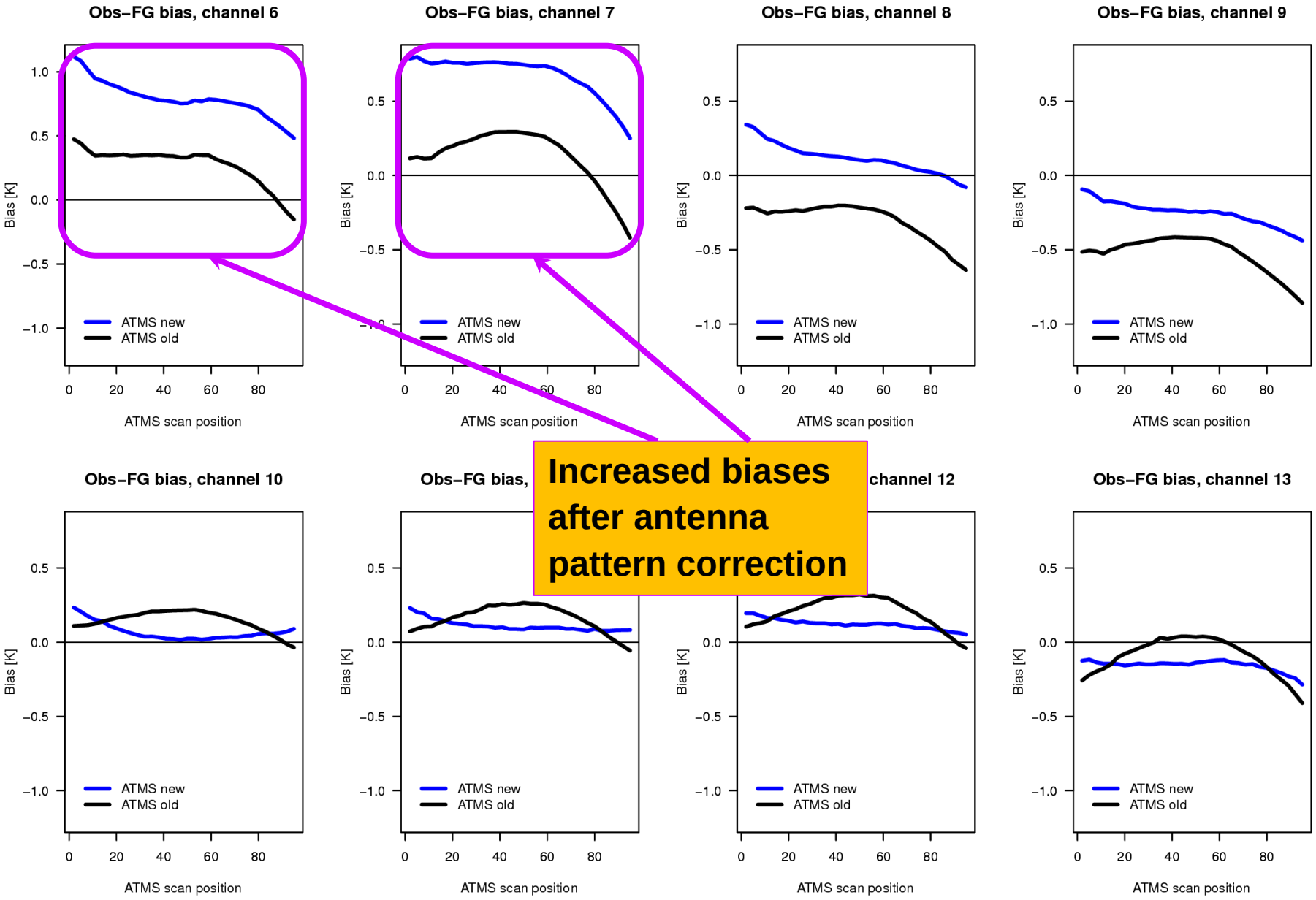

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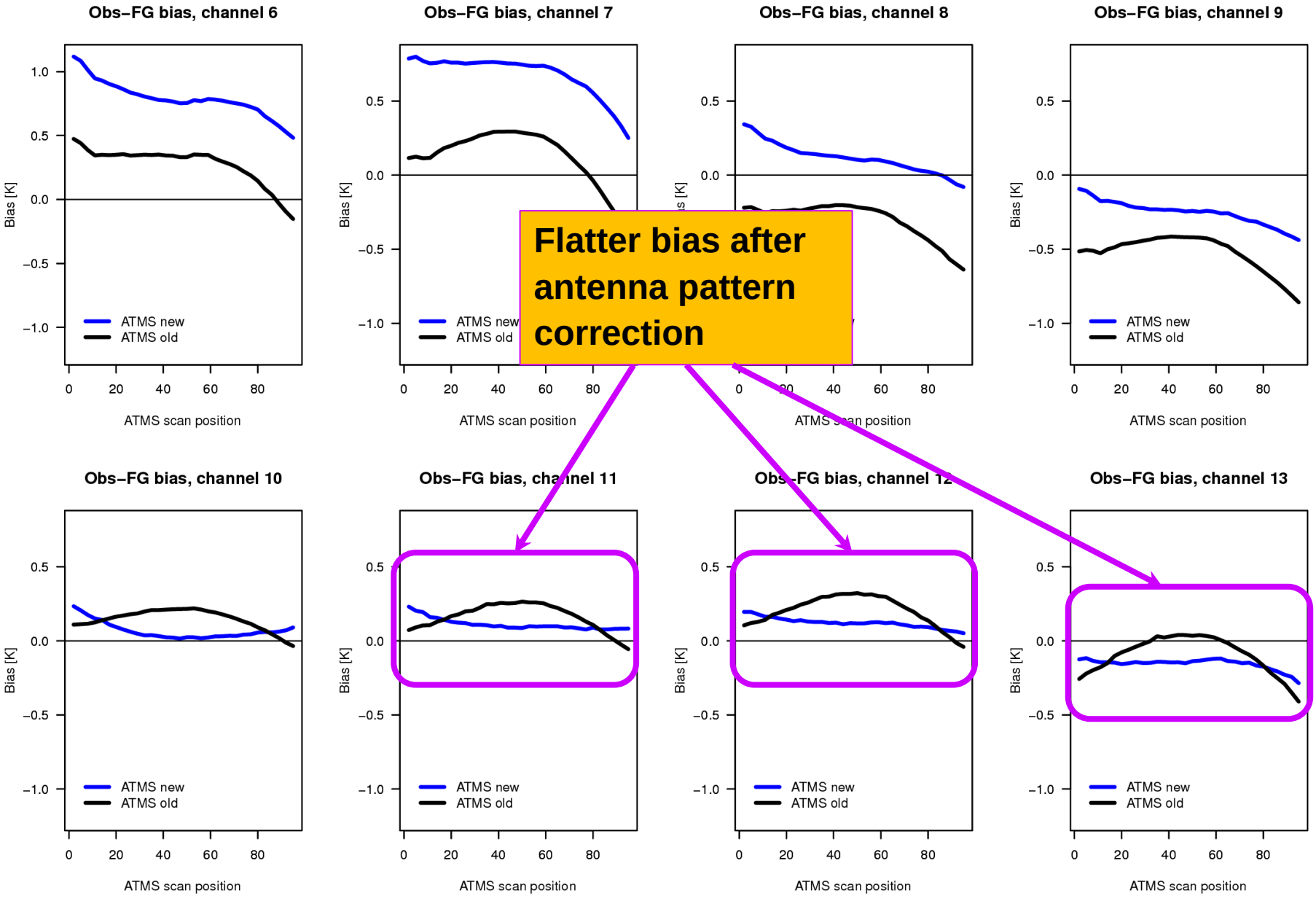

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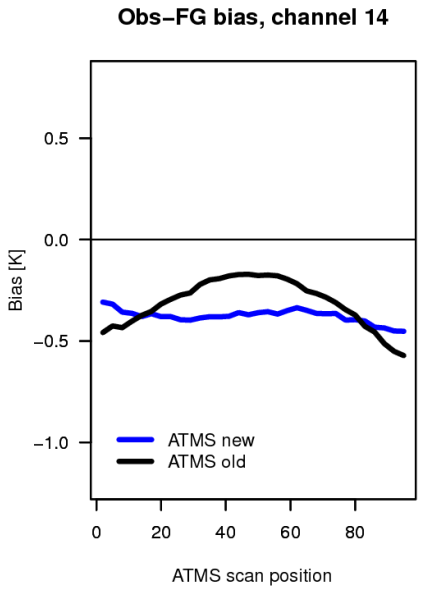
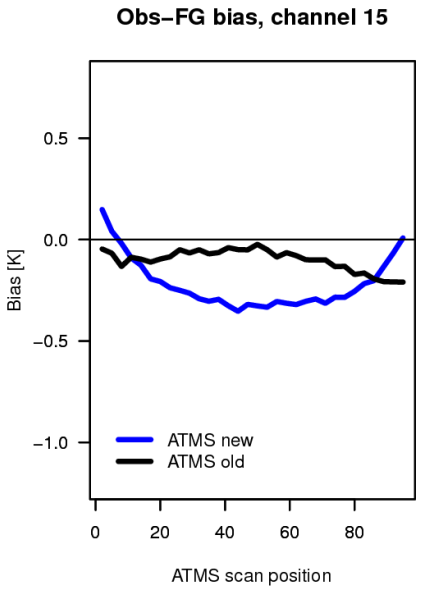
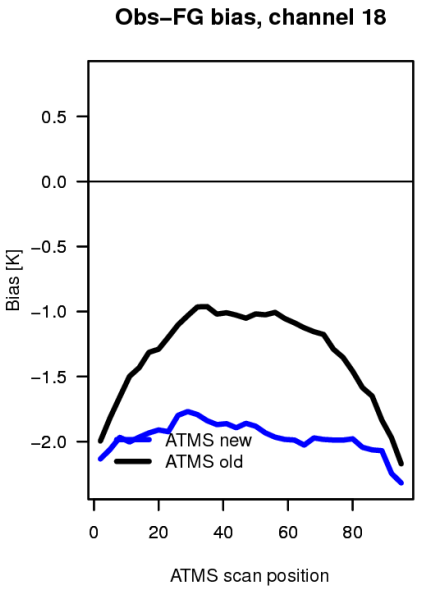
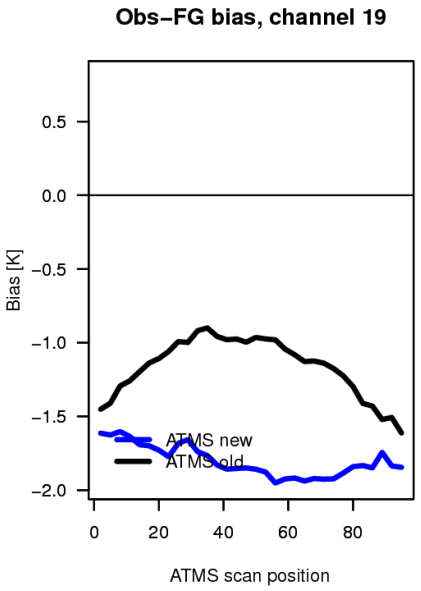
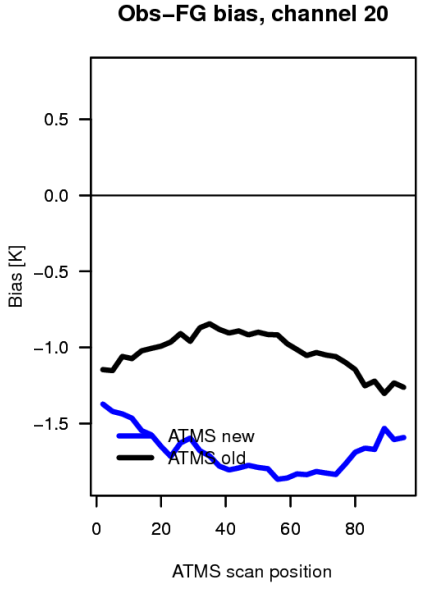
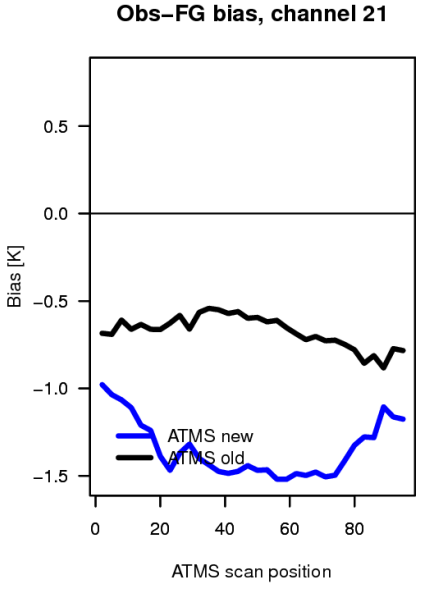


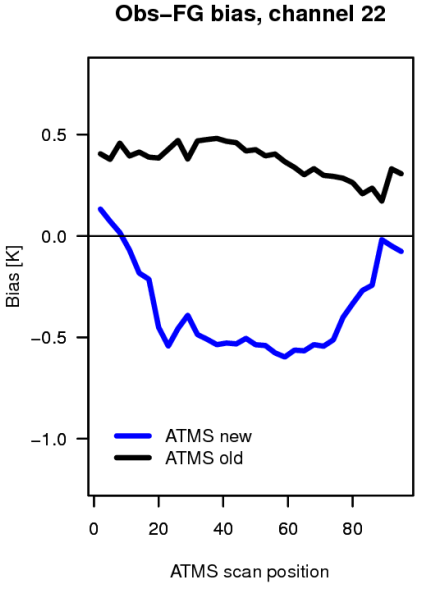












Outline

1) Looking back over 15 months of assimilation of ATMS
   - Stability
   - Lunar intrusions
   - Introduction of antenna pattern correction
2) **ATMS vs AMSU-A/MHS impact in an observation-depleted system**

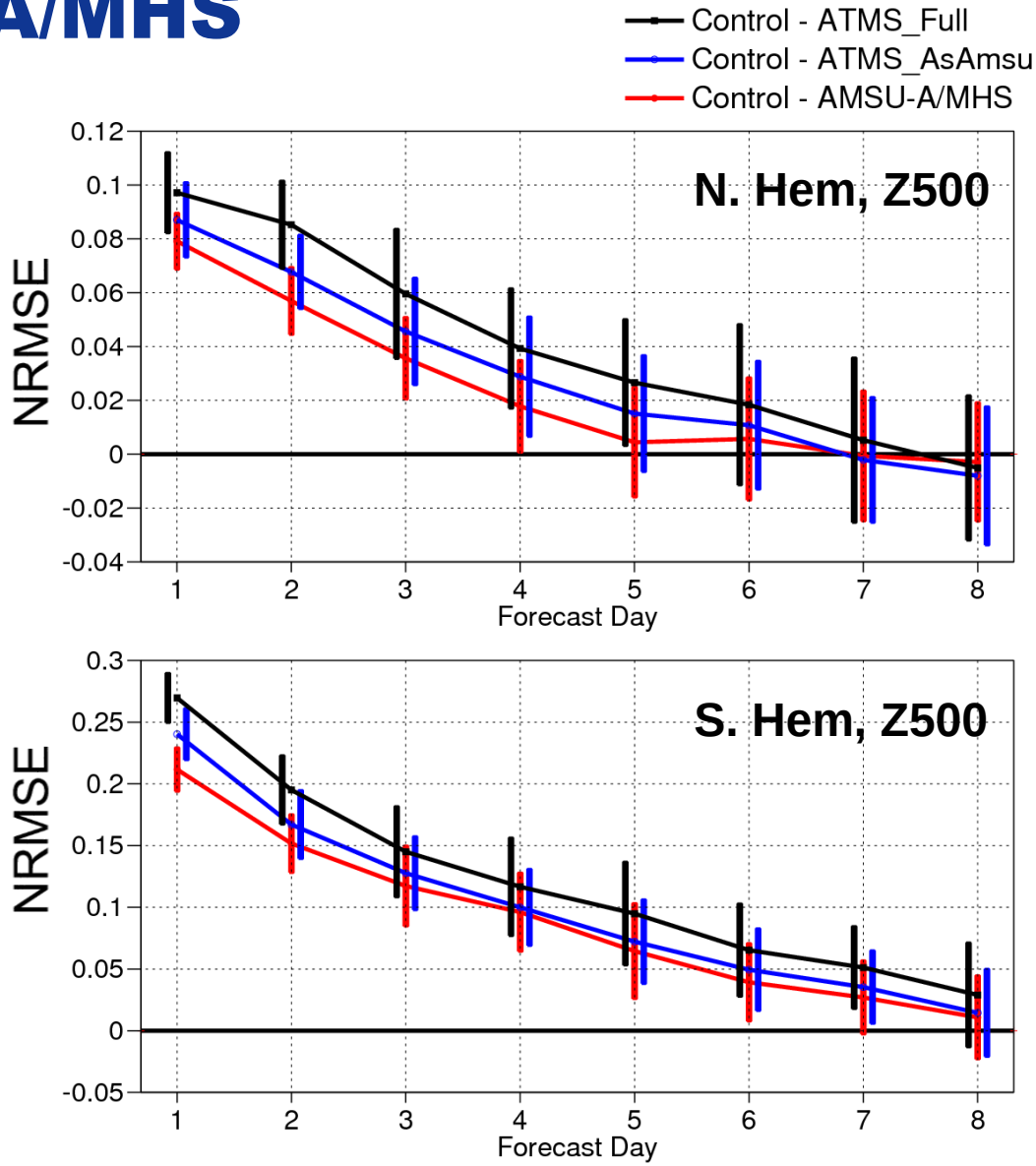
ATMS vs AMSU-A/MHS

- **Experiments with depleted observing system, 1 July-31 Aug 2012:**
  - **Control: No polar satellite data**
  - **ATMS_Full: Control + ATMS**
  - **ATMS_AsAmsu: As ATMS_Full, but blacklist outer-most 4 scan-positions and two additional humidity channels**
  - **AMSU-A/MHS: Control + NOAA-18 AMSU-A and MHS**

- **Note:**
  - ***All* scan-positions used for ATMS; outermost 3 on either side are blacklisted for AMSU-A, 9 for MHS (scan-biases).**
  - **ATMS experiments use 5 humidity channels; only 3 available from MHS.**
  - **MHS humidity channels unaveraged, ATMS 3x3.**

ATMS vs AMSU-A/MHS

- **Comparable impact from ATMS and AMSU-A/MHS**
- **Benefits from using the outer-most fields of view**



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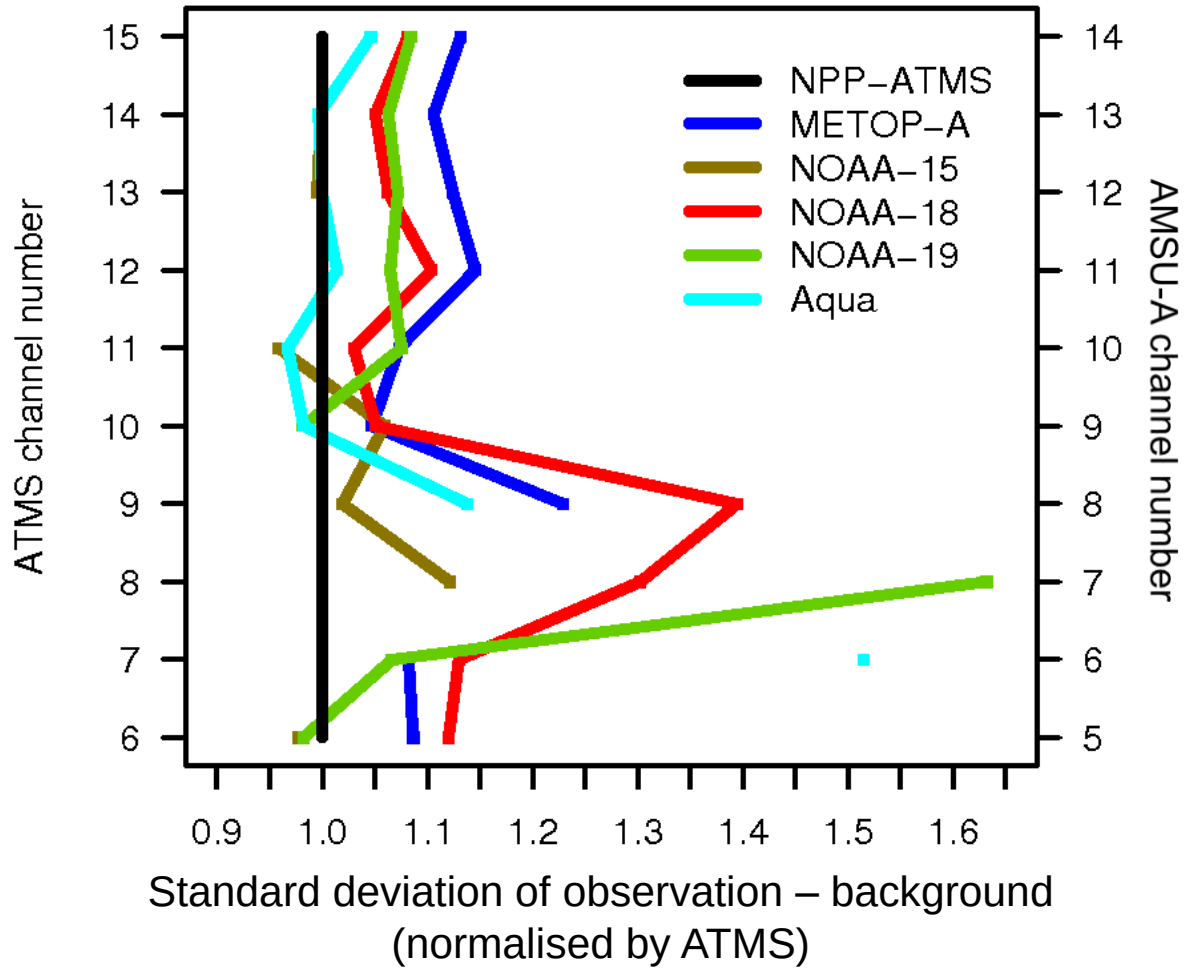
Summary

- **ATMS performance has been stable over the last 15 months:**
  - **Noise performance and forecast impact comparable to AMSU-A/MHS (or a little better).**
  - **Striping remains the only issue.**
  - **Lunar intrusions are flagged successfully.**
- **Outlook:**
  - **Assimilation of surface-sensitive channels over land and sea-ice**
  - **Tuning of observation errors**

Backup slides

ATMS: Comparison to AMSU-As (for ATMS 3x3)

→ After averaging, ATMS noise performance at least as good as AMSU-A.



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