

# Bias correction of window channels on microwave and Infrared sounders

Acknowledgements to  
NWP SAF VS project

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## ABSTRACT

This study is focused on the bias correction of window channels on microwave and infrared sounders (e.g. AMSUA and HIRS). These channels are primarily used to quality control other sounding channels by virtue of their enhanced sensitivity to cloud contamination. In general these channels may be susceptible to systematic errors like any other channel and as such must be bias corrected before they are used. It will be shown that their sensitivity to clouds poses particular problems for the evaluation and correction of systematic errors and some potential solutions are proposed.

### 1. Interaction between bias correction and quality control

- The are two primary sources of interaction (Auligne and McNally 2007)
  - outliers (e.g. cloudy data)
  - asymmetric quality control (AQC) (e.g. warm/cold)
- These sources can influence bias estimation in a static scheme
- These sources can lead to a feedback loop and a drift in an adaptive bias estimation(e.g. VARBC)

### 2. Mean F-G departures (bias corrected)

- Clear radiances over sea
- Clean observation bias? Or dragged by cloudy populations?

### 3. Theoretical study using the offline toy model

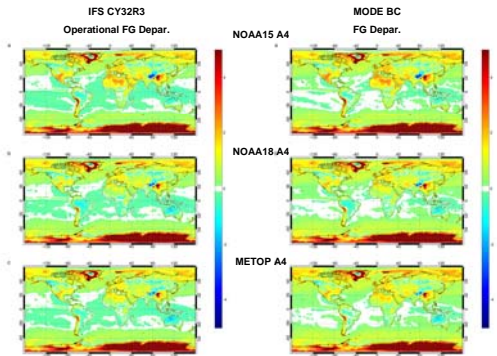
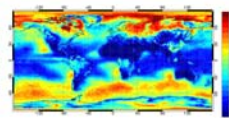
- Mode, Mean and Bias
- Window channel of AMSUA and HIRS: A4 and H8
- Robust mode estimation in VarBC: two ways

Tight QC: will give the mode by box-car QC if there is a dominant mode  
Robust pseudo-mode estimation( Weighting function)

- IFS experiment of tight QC
- Conclusions and discussions

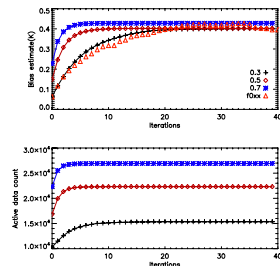
Mode is the clear radiance bias if background and RT model are bias free

LCC(Low Cloud Cover,p=800hpa)

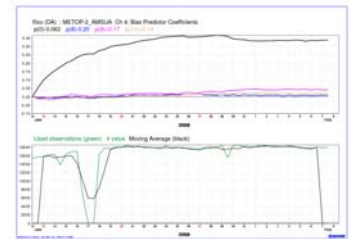


### 3. Theoretical study using the offline toy model

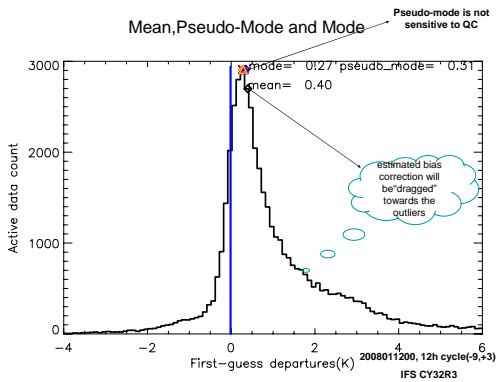
$$J(m) = \frac{1}{2n} \sum_1^n (d_i - m)^2 (w_i)^2$$



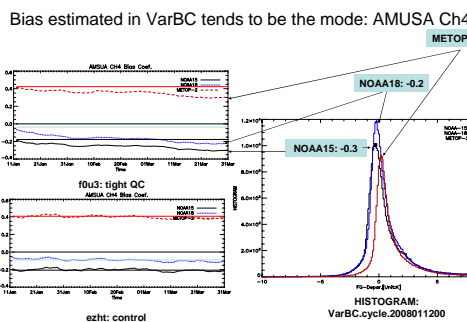
The Toy model Agree well with f0xx



### 1. Mode, Mean and Bias

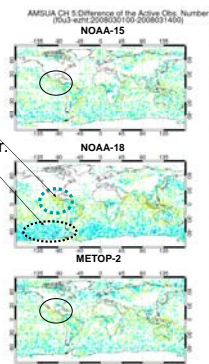
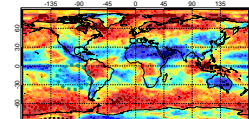


### 4. IFS experiment



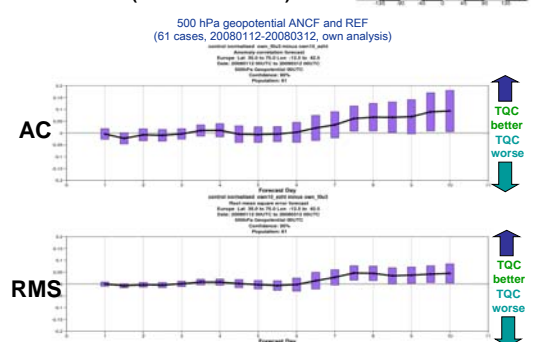
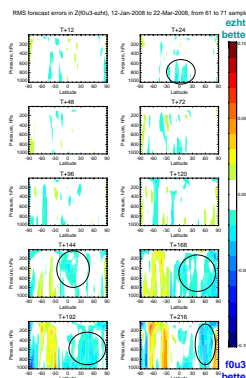
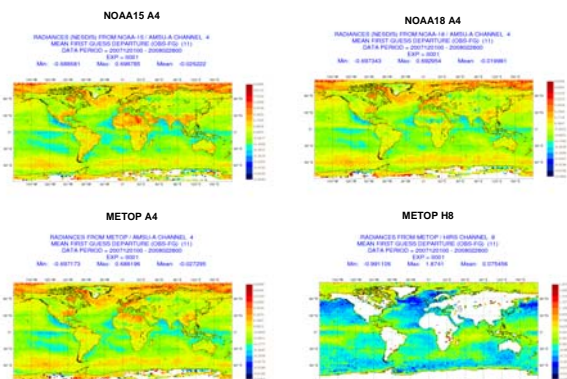
### Impact of tight QC for BC of WinCH on the usage of AMSUA Ch5,6,7,8

Use more data in CLEAR region  
Use less data in CLOUDY region  
It seems that Bias Corrected FG-Depar. of CH4 in clear cases tends to be 0



### 2. Mean F-G Departures (2007D2008JF, bias corrected)

2008DJF(2007120100-2008022800)  
O-B, Window Chs(A4 and H8)



### Reference

Auligne, T. and A.P.McNally (2007). Interaction between bias correction and quality control. Quart. J. Roy. Meteorol. Soc. 133, 643-653.

Han Wei and Anthony McNally, 2008: Bias correction of window channels on microwave and infrared sounders, NWP-SAF Visiting Scientist Report NWPSAF-EC-VS-016.