Aquarius Cold Sky Calibration

Emmanuel Dinnat

Aquarius Science Calibration/Validation Workshop

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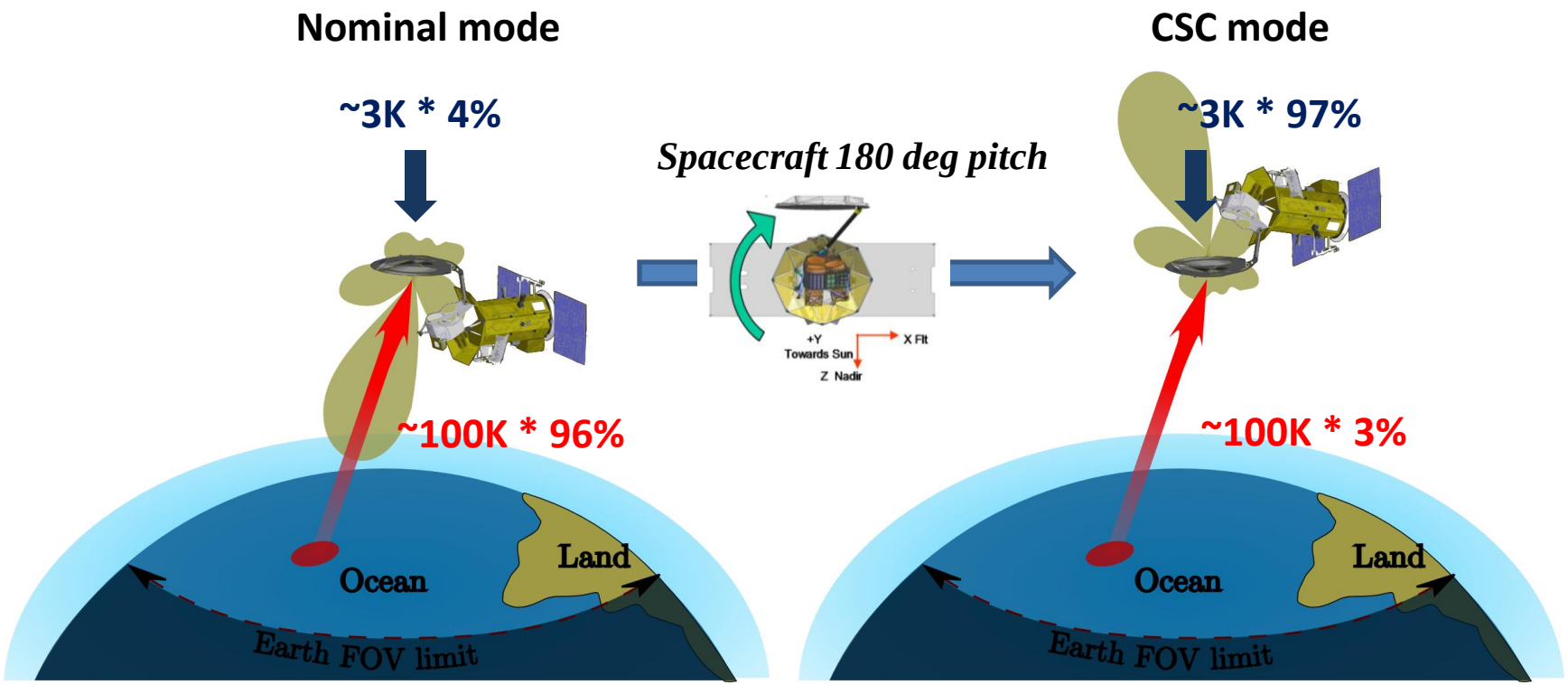
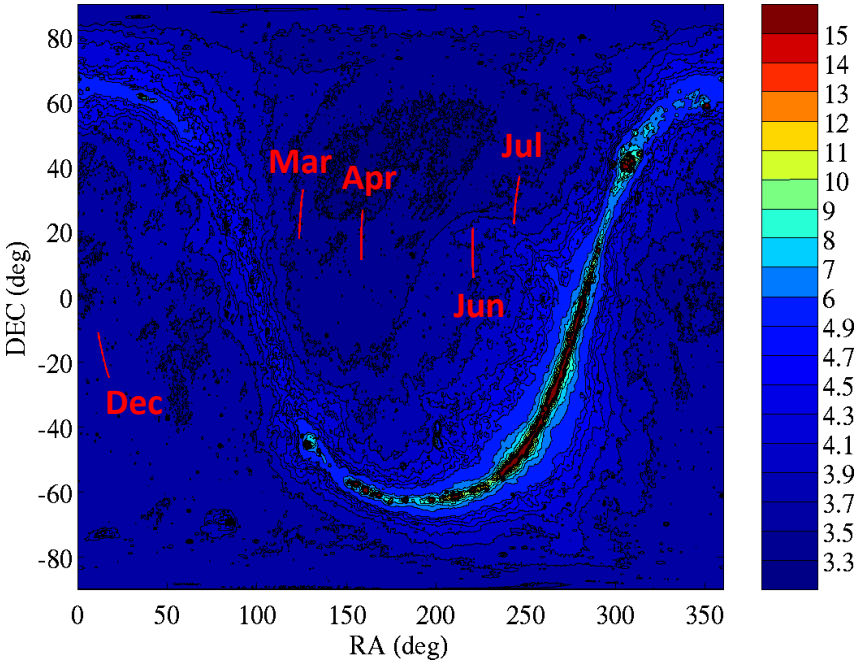
Motivations for Cold-Sky Calibration (CSC)

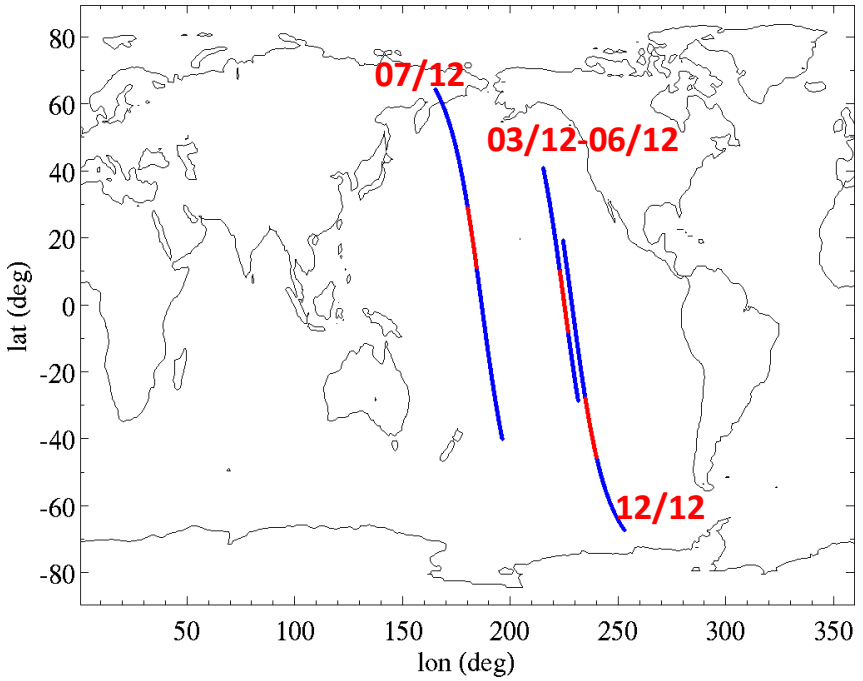
- Objective:
  - Check validity of ocean calibration over large Tb dynamic range
  - Provide calibration largely independent of ocean model
- Limitation
  - not independent of antenna pattern model
  - different geometry than nominal data acquisition
  - just a few minutes of data every few months (limits temporal drift assessment)
  - about 0.5K uncertainty in Sky Tb

Cold Sky Calibration at a glance



Actual CSC
March 2012 – December 2012





Pointing to calm/homogeneous Sky

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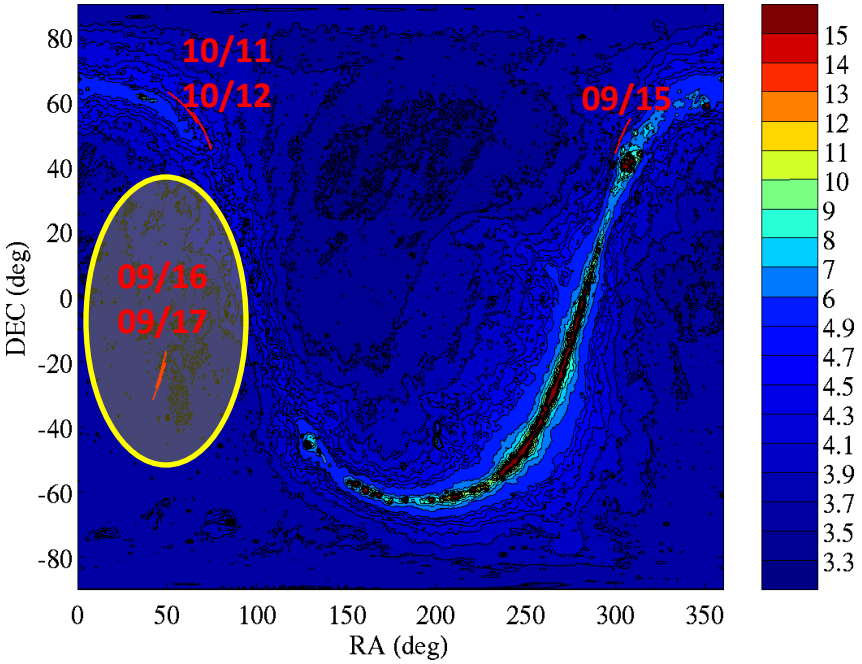
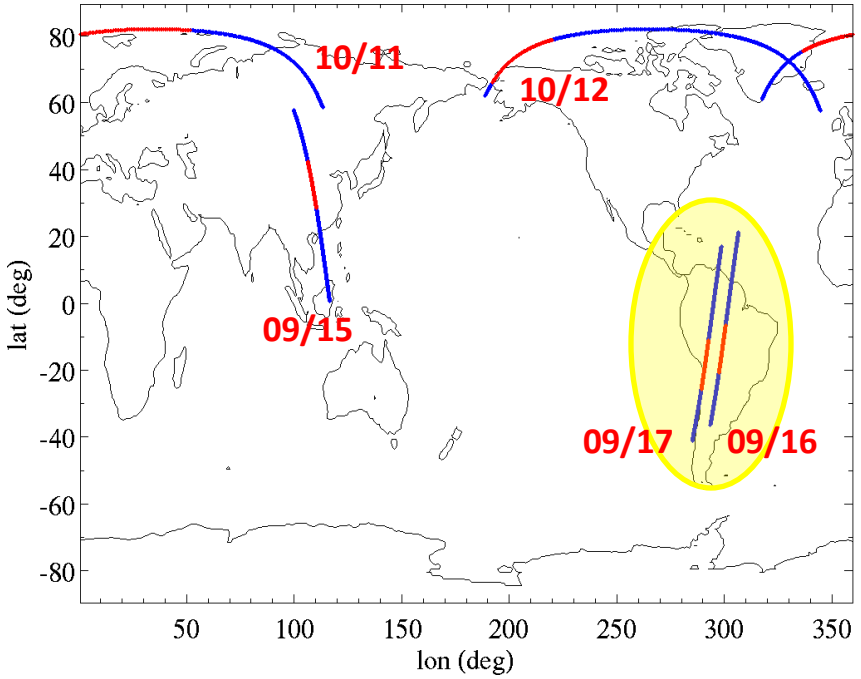
Ocean under spacecraft (lower Tb, more precise, less RFI compared to land)

‘Early’ pseudo-CSC
September 2011 – October 2011





Pointing to calm/homogeneous Sky on Sept 16 & 17

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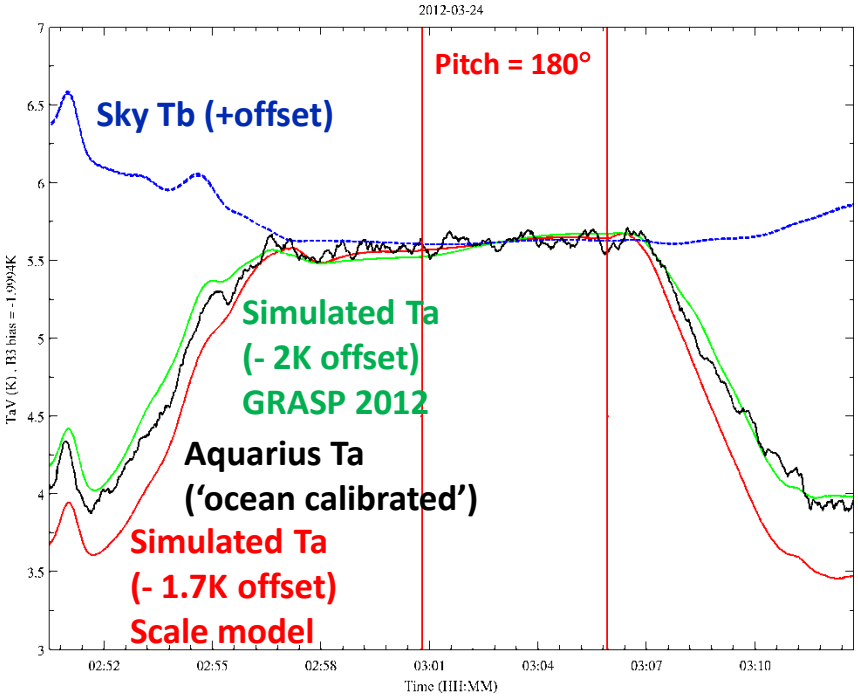
Land with relatively precise Tb and low RFI under spacecraft

Example of Ta during a CSC maneuver



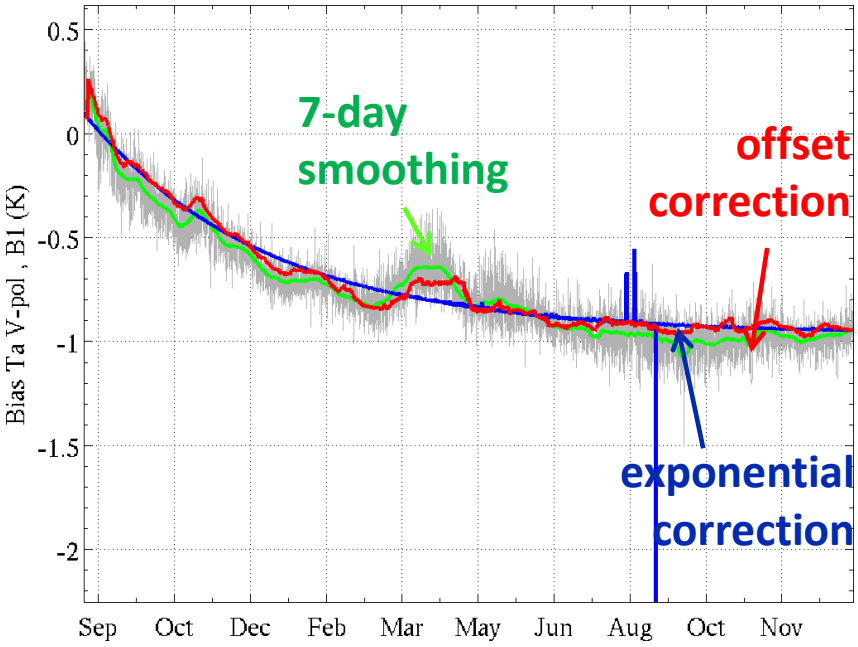
Scale-Model		
	V-pol	H-pol
B1	-1.71	-1.40
B2	-1.51	-2.09
B3	-1.70	-1.26

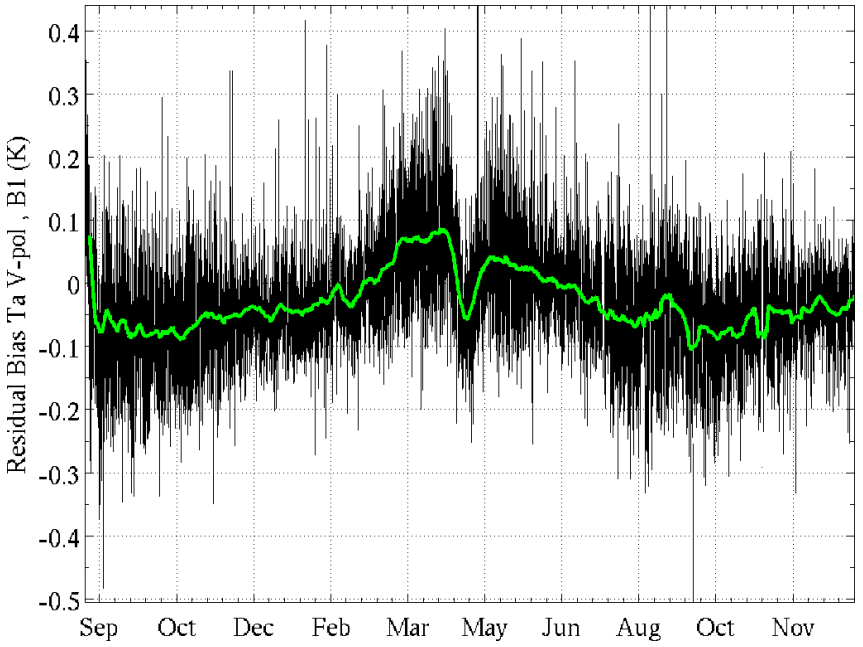
GRASP 2012		
	V-pol	H-pol
B1	-2.37	-2.78
B2	-2.40	-3.06
B3	-2.00	-2.76

⇒ Cold bias of a few K over Sky after ocean calibration

⇒ Bias depends on antenna gain pattern model

Time variation of ocean bias





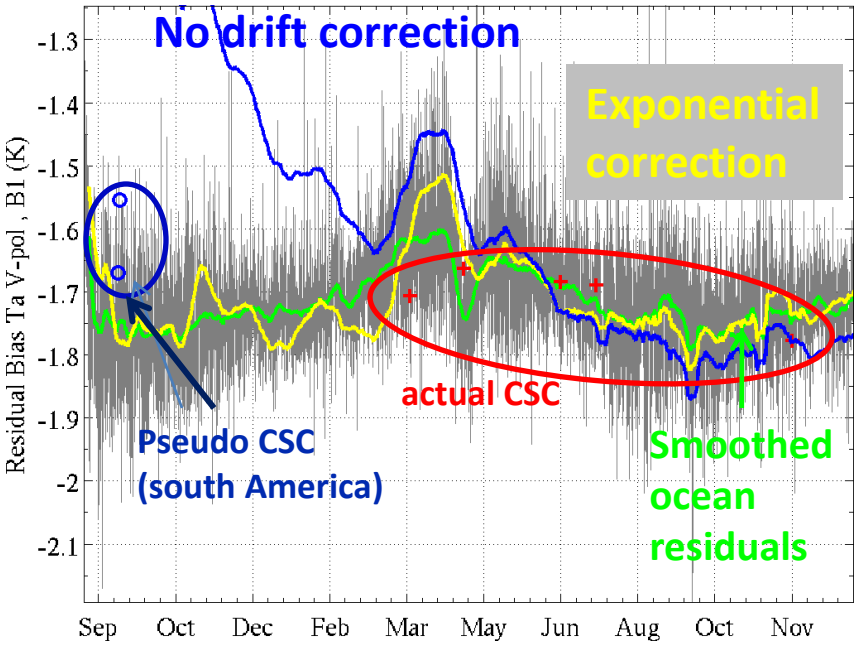
2 major time drift components:

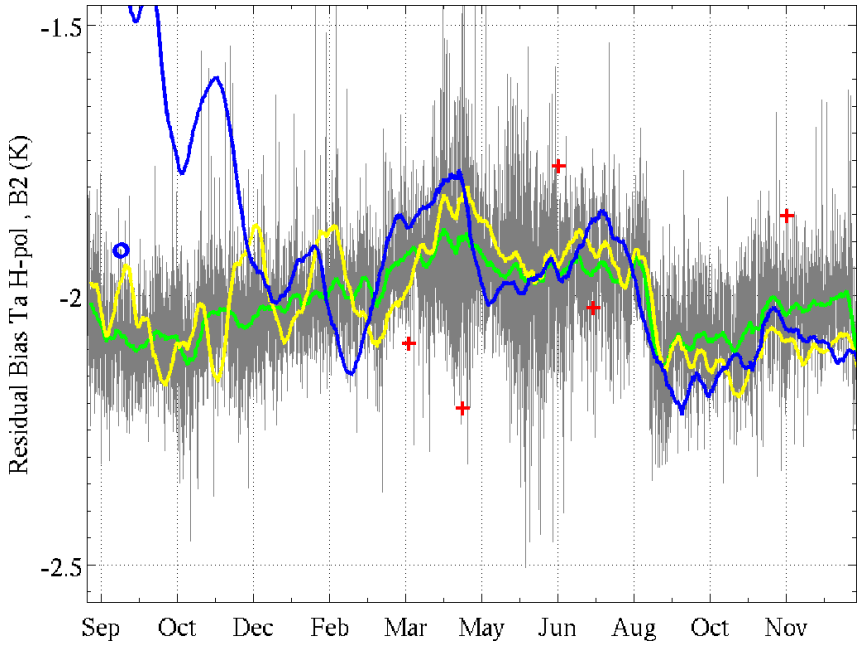
1- exponential decrease = -0.75K over fist few months

2- months-scale offset/wiggles of +/- 0.1K

Residual in ocean bias after both exponential and offset corrections

Time variation of Cold Sky bias





CSC bias varies within ~0.1K

⇒ supports 0.75K exponential correction from 09/2011 to 03/2012

⇒ supports offset/wiggles correction?

CSC bias varies within ~0.4K

⇒ similar as corrections

Conclusions

- Ocean calibration results in a few K cold bias at the low end of Ta's
- Temporal variation of cold Sky bias supports correction for large exponential drift at beginning of the mission (note: using less reliable pseudo-CSC data)
- Temporal variation of cold Sky bias & offset/wiggles = inconclusive
- 1K uncertainty due to antenna pattern model
  - Use ocean/land transitions to assess antenna spillover