Inter-calibrating SAPHIR and ATMS observations

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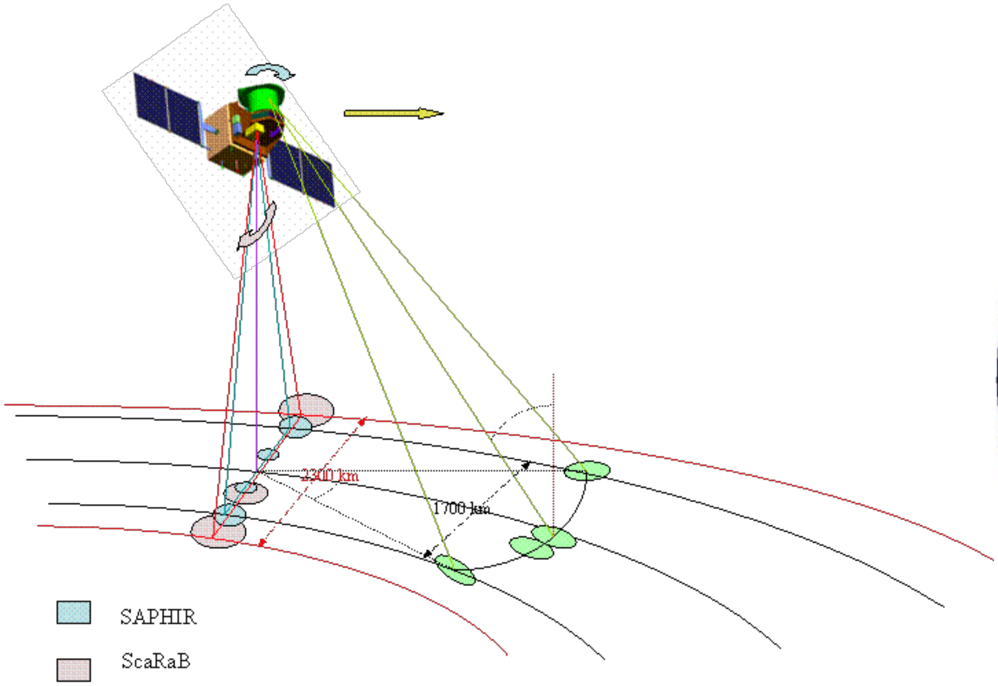
Validating ATMS and SAPHIR Observations

Megha-Tropiques



- A microwave imager (MADRAS) to study precipitation and cloud properties (SSM/I type, with an additional channel at 157 GHz).
- A microwave sounding instrument for the atmospheric water vapor (SAPHIR - 6 channels in the 183 GHz band).
- A radiometer for measuring outgoing radiative fluxes at the top of the atmosphere (ScaRaB).

SAPHIR vs. ATMS

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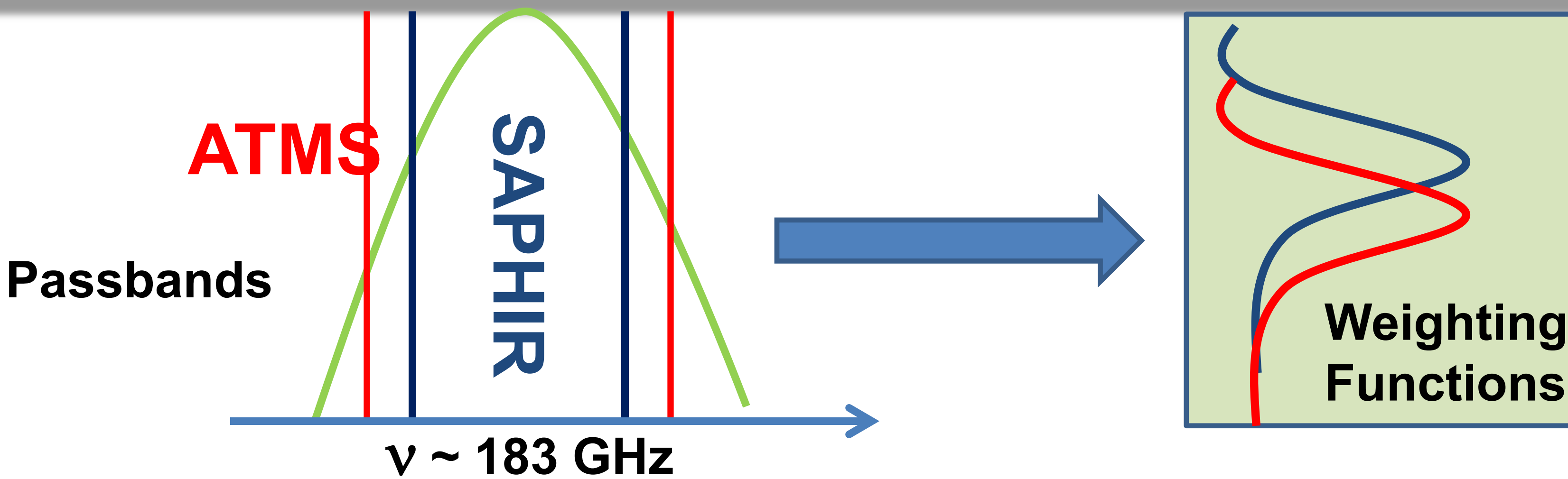
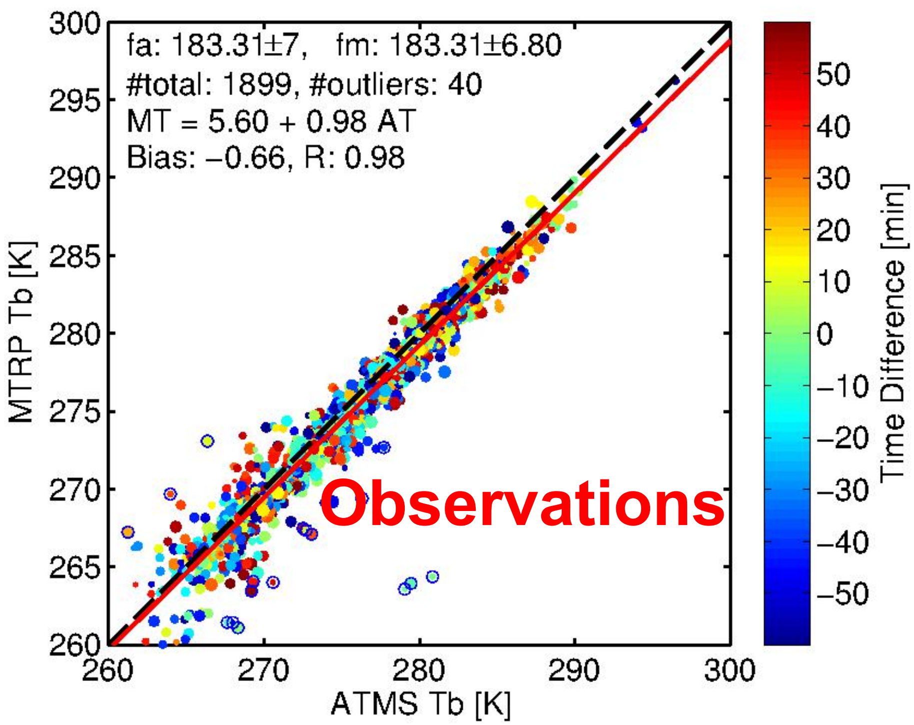
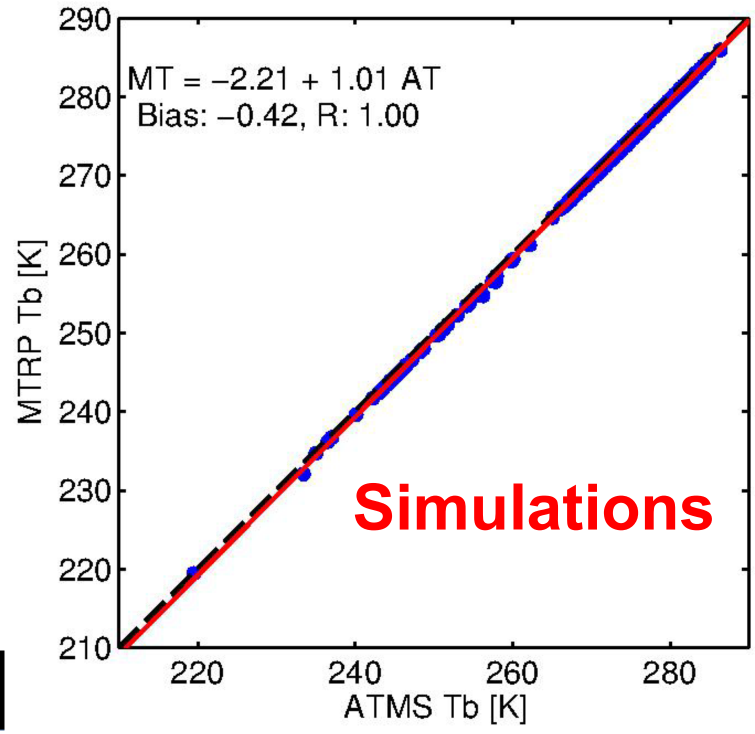
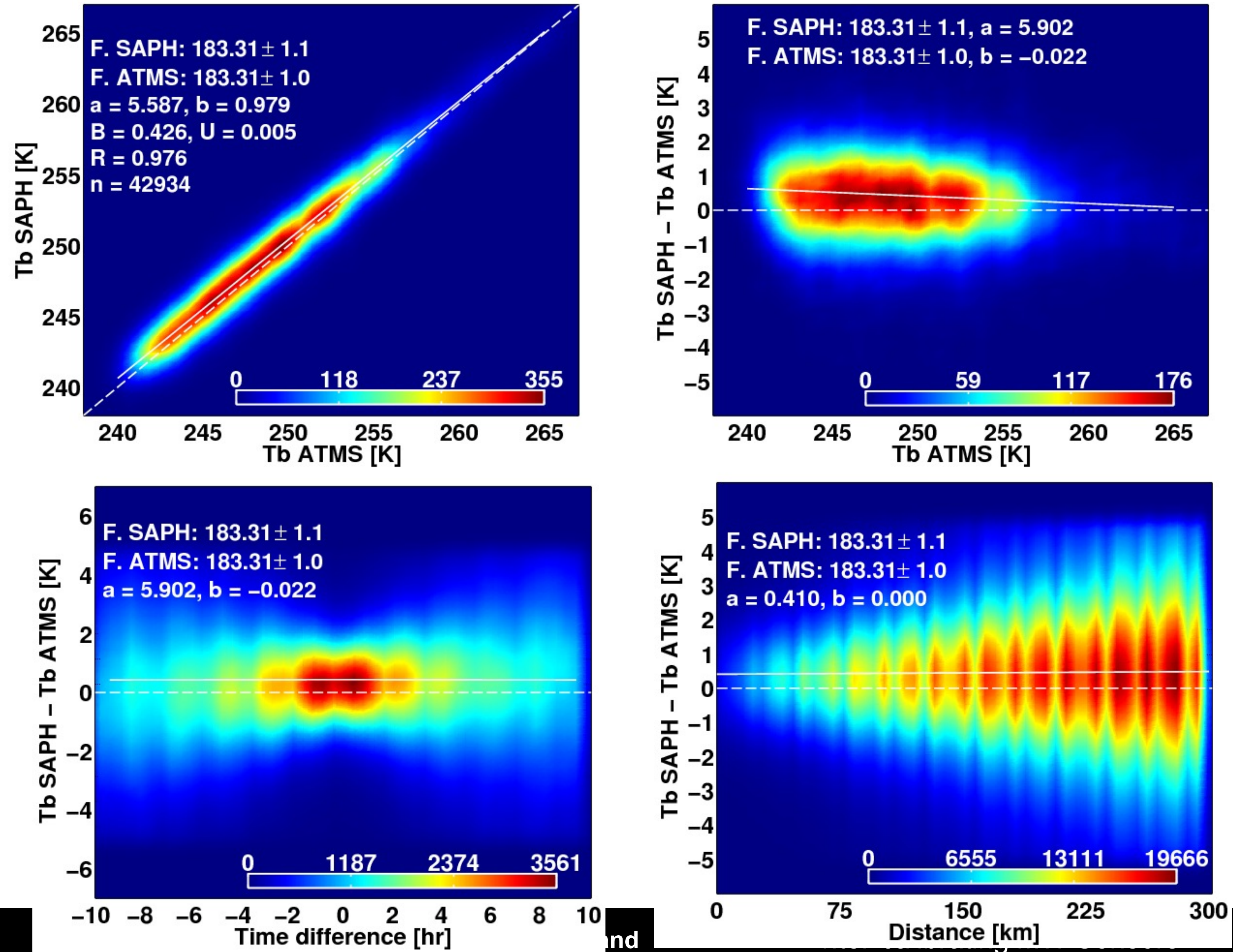






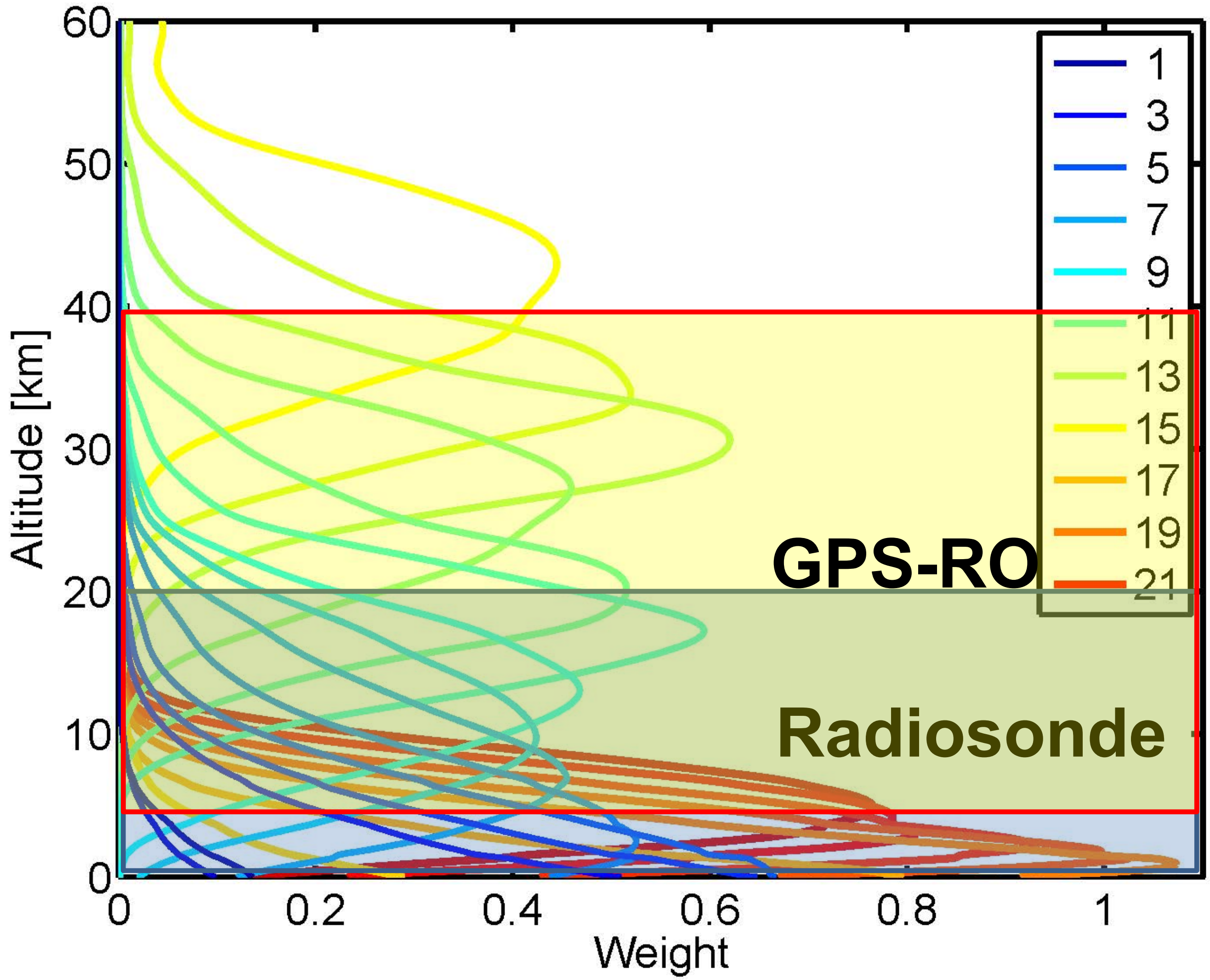
SAPHIR vs. ATMS



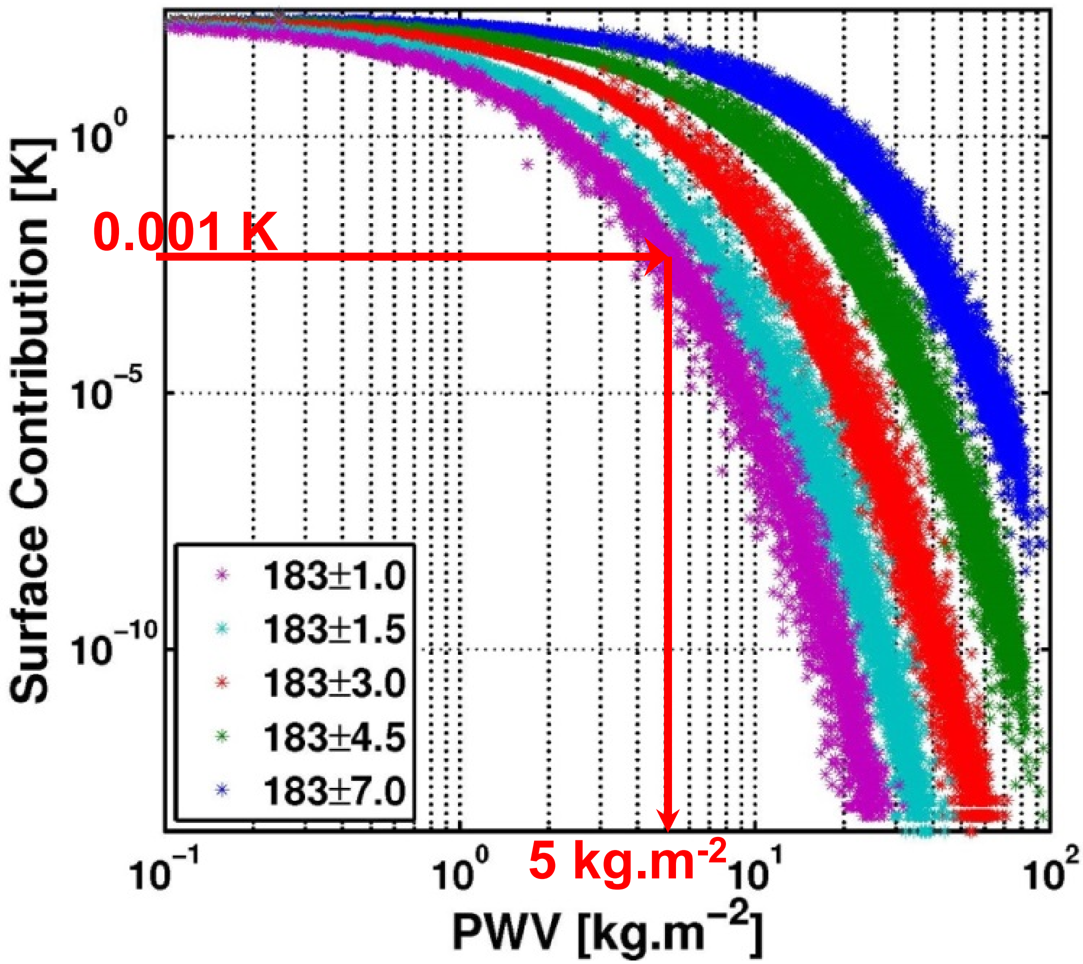
SAPHIR vs. ATMS (double difference)

Freq ATMS	Freq SAPHIR	Bias (Obs)	Bias (Sim)	Obs – Sim
183±7.0	183±6.8	-0.66	-0.42	-0.24
183±4.5	183±4.2	-1.51	-0.91	-0.6
183±3.0	183±2.8	-1.25	-0.93	-0.32
183±1.0	183±1.1	0.52	0.90	-0.38

ATMS Weighting Functions

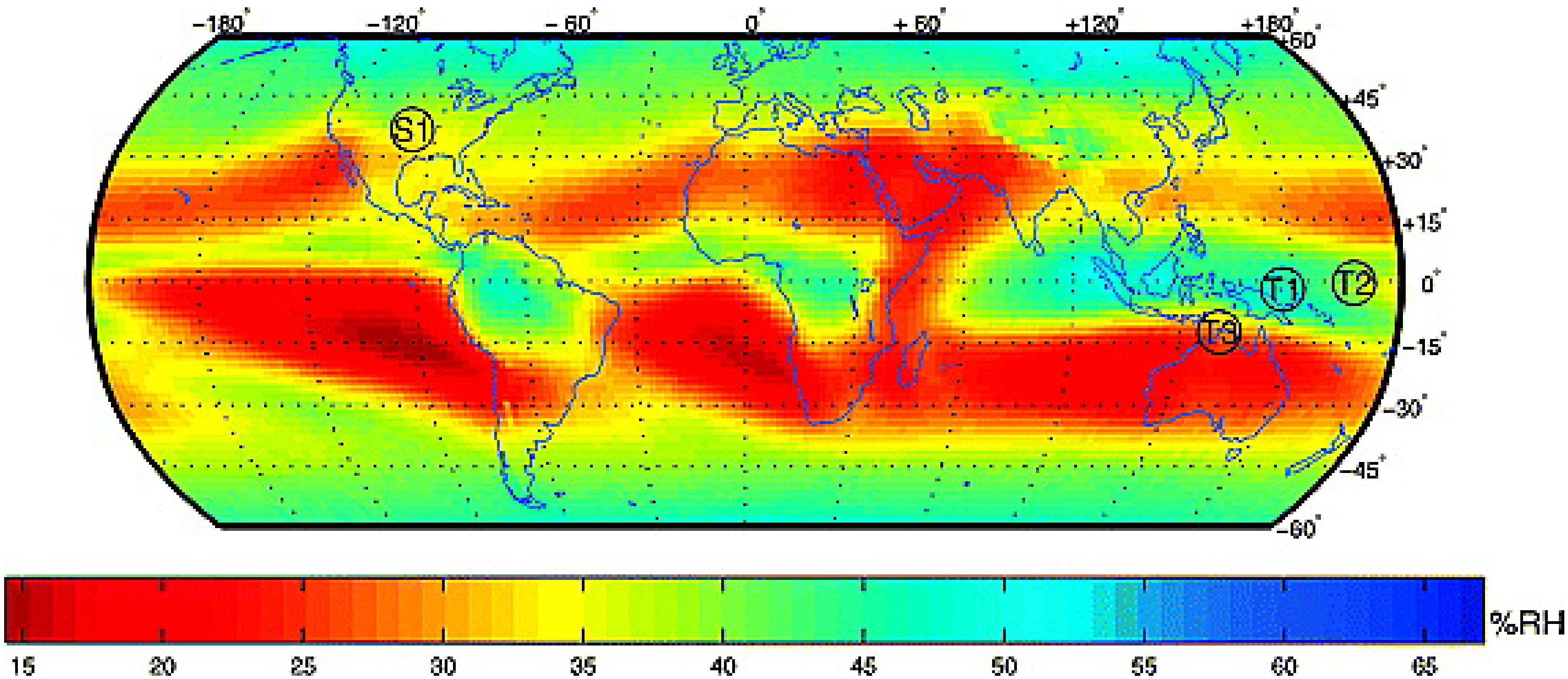


ATMS Weighting Functions



ARM Stations

Comparing upper tropospheric humidity data from microwave satellite instruments and tropical radiosondes



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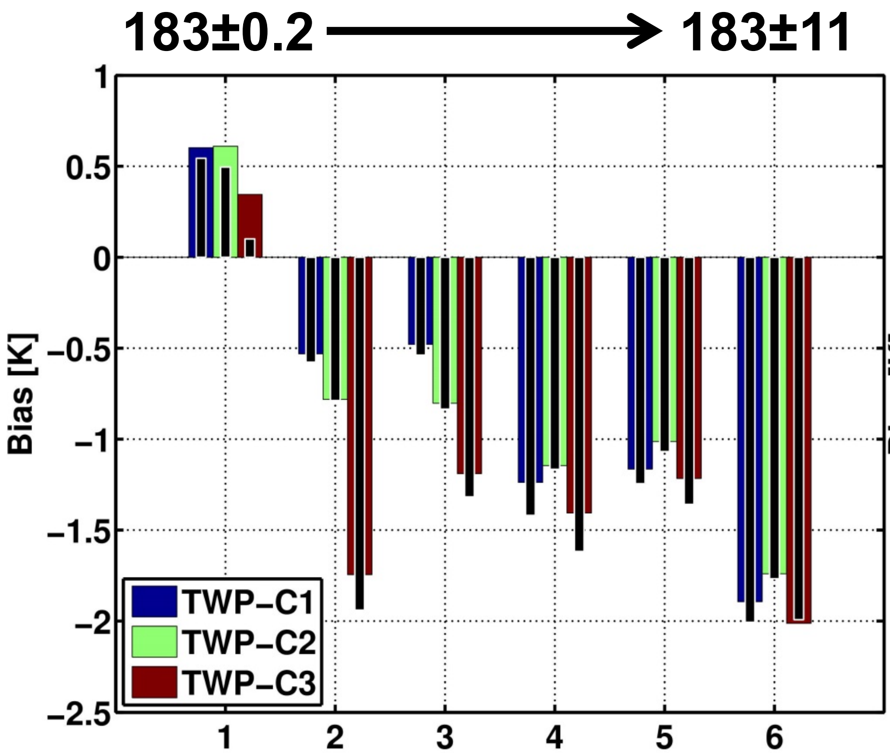
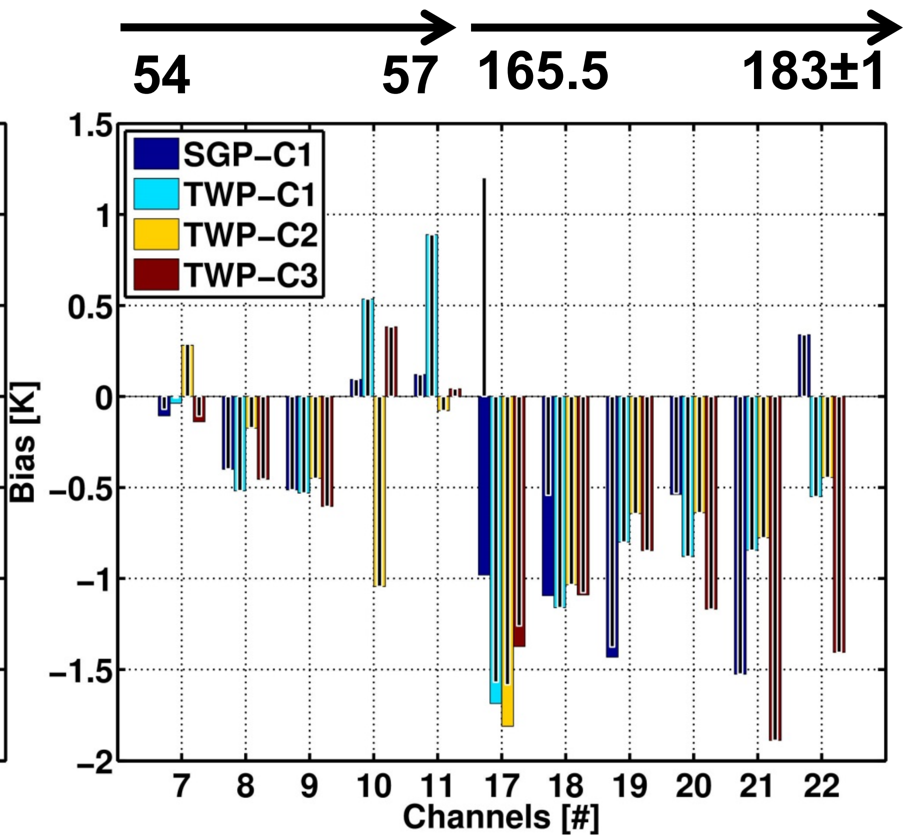
http://onlinelibrary.wiley.com/doi/10.1029/2010JD013962/full#jgrd16419-fig-0001

Validating Using ARM Data

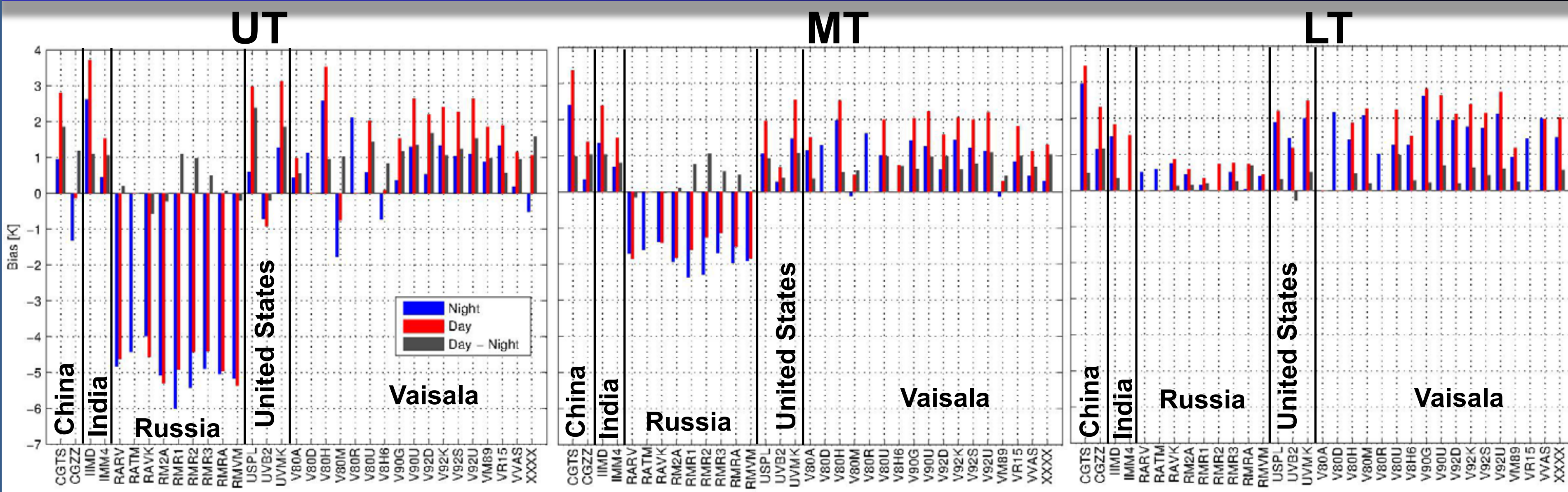


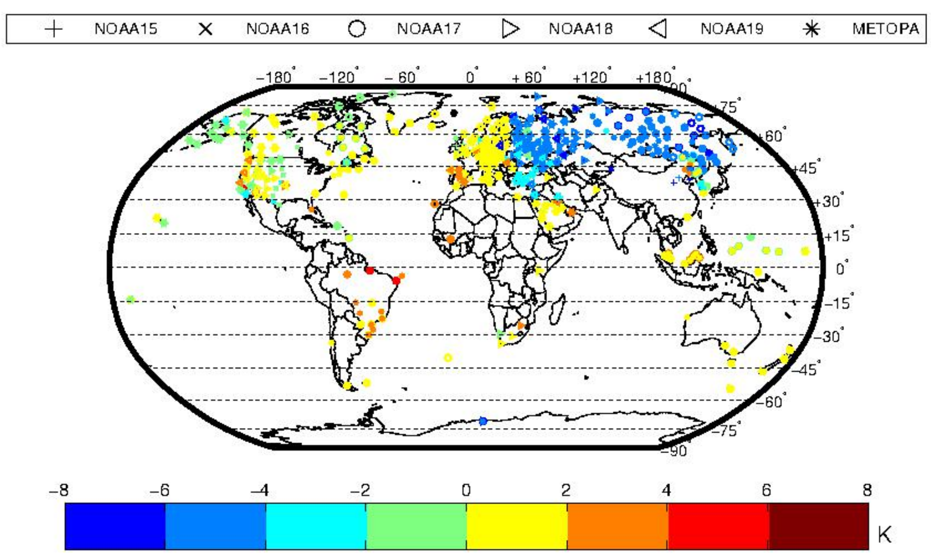
SAPHIR vs ARM

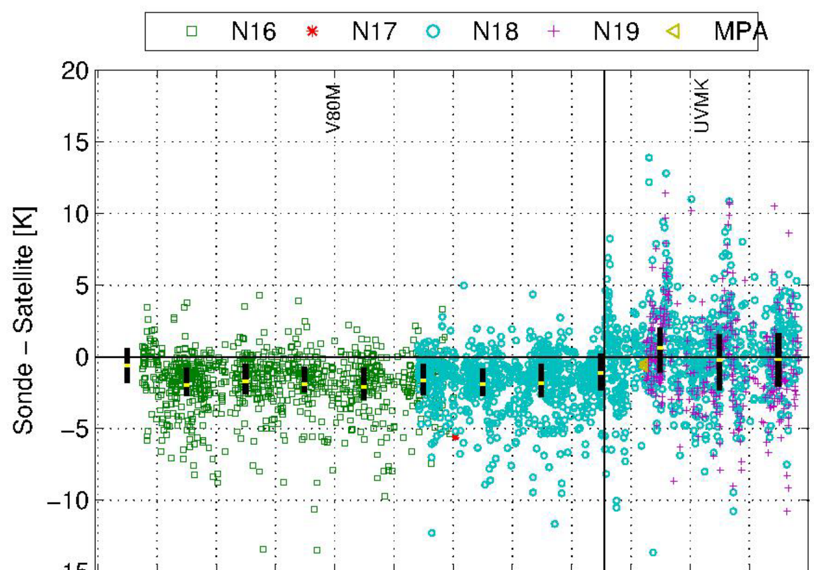


ATMS vs ARM

Only Vaisala







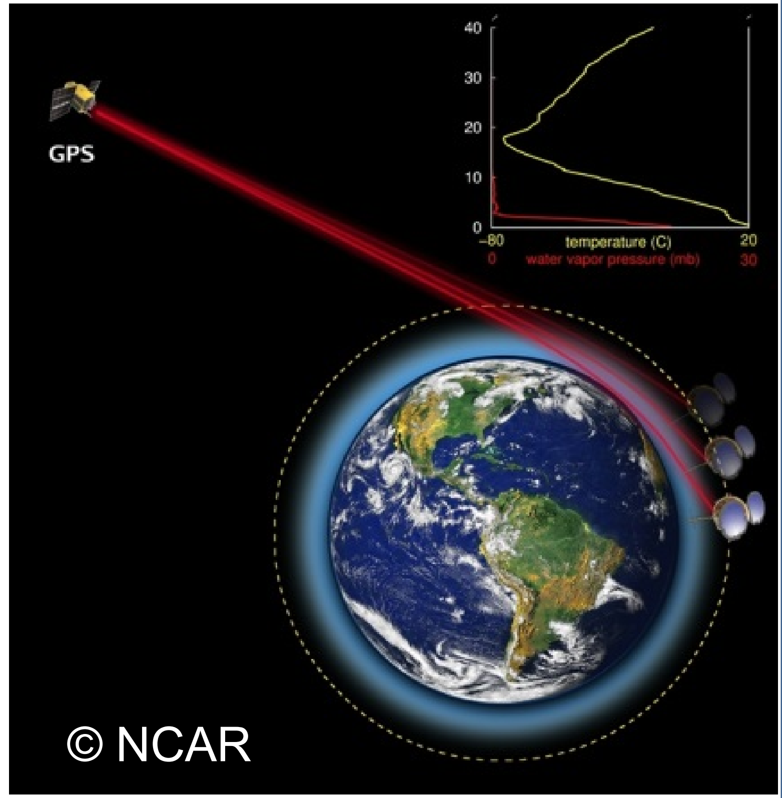
GPS Radio Occultation Data

- Radio signals transmitted by Global Positioning System (GPS) satellites are received by a receiver on a LEO satellite

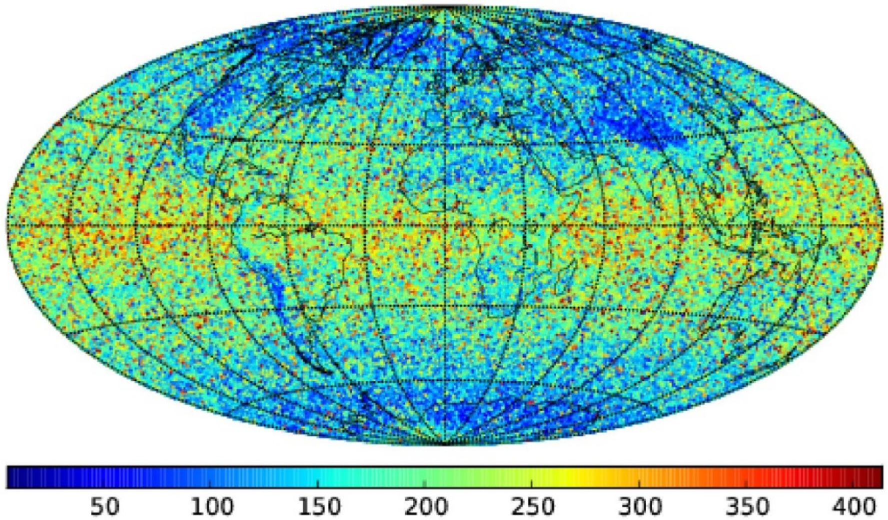
- Temperature and water vapor profiles are derived from bending angles using a-priori profiles and inversion techniques

- Raw GPS-RO data (time delay) have very high accuracy in the upper troposphere and lower stratosphere (500 hPa to 40 km) but different

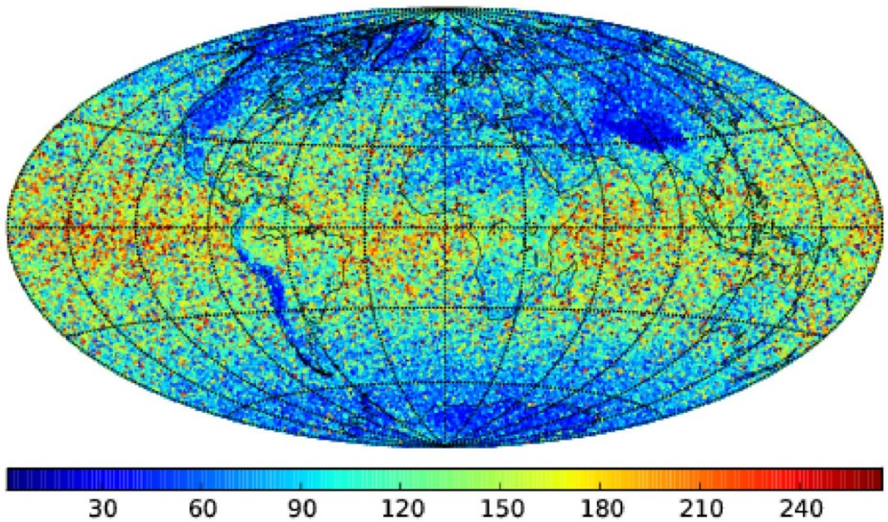
- errors and uncertainties are introduced during inversion to the atmospheric state variables



Drift in GPS Profiles



2 hPa



400 hPa

Questions?