The Effects of TMI 1B11 V7 Solar Beta/Time Varying Bias Correction on 2A12 Rain Rates

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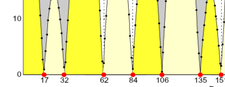
Study Objective

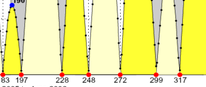
- To assess the effects of the new radiometric calibration for TMI (1B11 V7) on the 2A12 rain rate product
- Data:
  - 2 Months of TMI 2A12 Data (July & August 2005)
  - Covers a full 46 day cycle of Solar Beta angle
  - TMI radiometric correction "On" (1B11 V7) & "Off" (1B11 V6)
  - Analysis performed over oceans and land
    - Zonal average for 0 – 20°N latitude

- Thanks to Yimin Ji for providing the 2A12 data used in this study

Solar Beta Angle

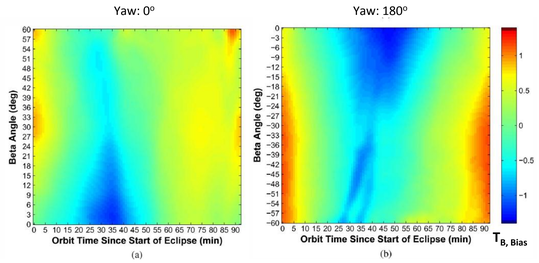
- Beta Angle, β : the Sun elevation above the orbit plane (positive toward the positive-orbit-normal direction).
- Affects illumination and thermal environment.



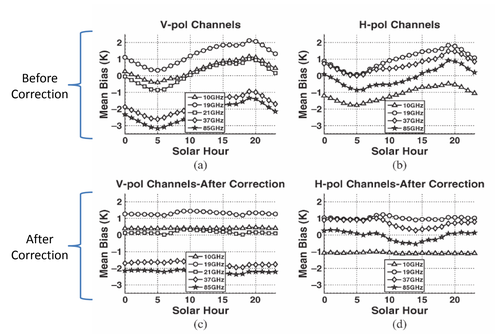


Bias Table

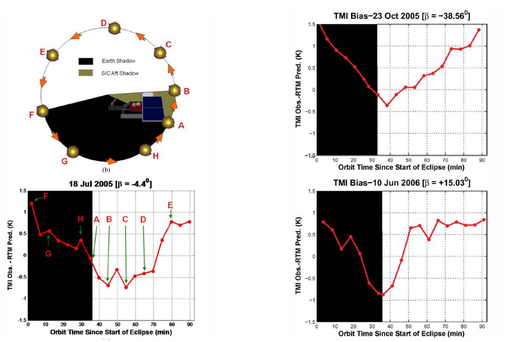
Bias Table Implemented in the TMI 1B11 V7



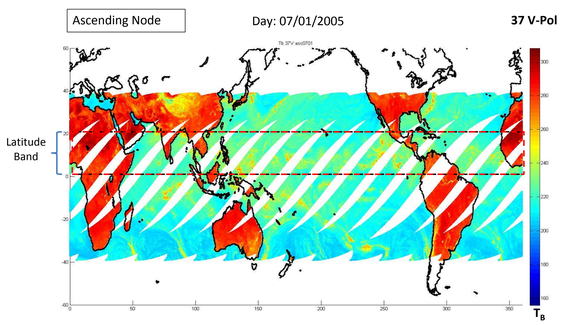
Before & After



Time Varying Biases

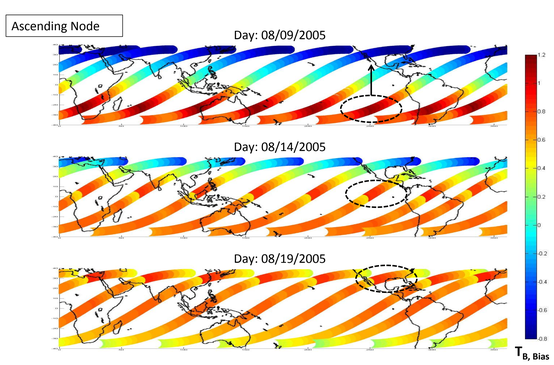


Zonal Averaging: 0° - 20° Latitude

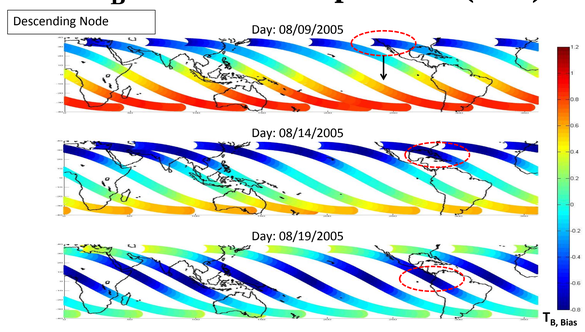


Solar Beta Cycles

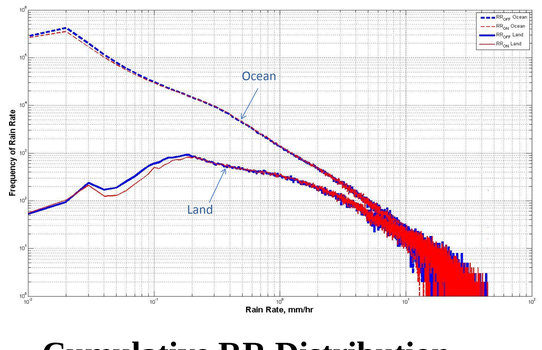
Max T_B Bias for Multiple Revs (85V)



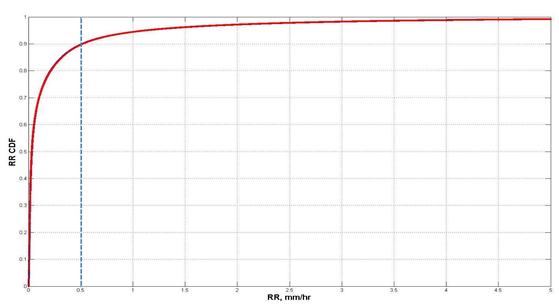
Min T_B Bias for Multiple Revs (85V)



Rain Rate PDF for Local Time 15-19 hrs

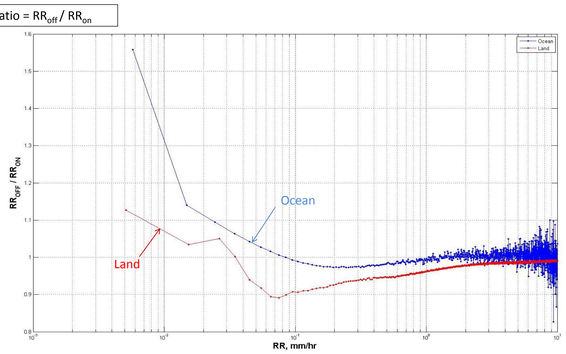


Cumulative RR Distribution

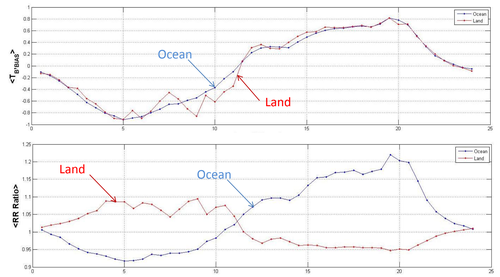


Binned RR Ratio for Local Time 15-19 hrs

RR Ratio = RR_{off} / RR_{on}

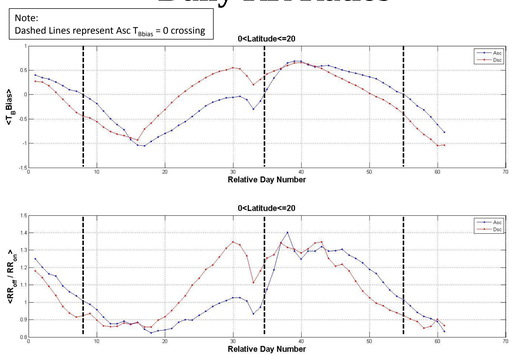


Diurnal Cycle – Ocean & Land

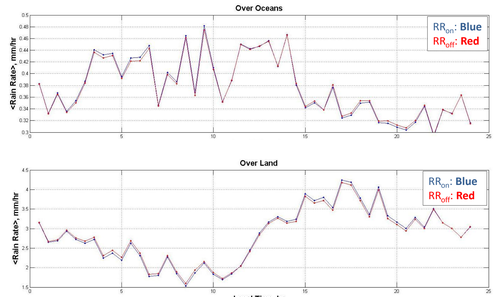


Daily RR Ratios

Note:
Dashed Lines represent Asc T_{Bbias} = 0 crossing



Over Oceans / Over Land



Conclusions

- 1B11 V7 Solar Beta/Time Varying Tb Biases are local time of day dependent
- This affects the diurnal cycle of rain rate derived from 2A12 over ocean and land
- Differences between rain rate retrievals (2A12) using 1B11 V6 and V7 are small (but significant)
  - Average (RR_off/RR_on) vary with time of day between 0.9 – 1.2
- The majority of V6 vs. V7 rain rate differences occur at low rain rates < 0.1 mm/hr.
- Additional work is required to understand the effects over full ± 35° latitude range

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