Water vapor intercomparisons
TES - AIRS - AMSR

A. Eldering
April 15, 2005

Annmarie Eldering and TES team
California Institute of Technology
Jet Propulsion Laboratory

xx May 2005
Observations made from late Aug 2004 to mid-April 2005 -
global surveys and special observations
Translation mechanism showing signs of increased friction,
as was anticipated from life test unit
Changed GS to only use nadir scans - reduces translation
by 75%
Measurement re-commenced on 4/24
- Using AIRS radiances selected with George Aumann's help to identify clear/homogeneous scenes
- Continuing development of TES algorithms, comparing to AIRS as a reference
AI

Processing status

- PGEs being updated and delivered to SIPS (TES SIPS is at Raytheon)
- L1B now available at DAAC
- Plan to have L2 available in July
- In-house processing for 6 global surveys and many special observations
- 2147 - Sept 20/21, other Nov4-17th, 2004
Data selection for this analysis

- QA approach - TES data is used when
  - radiance residual rms (rms about the mean) less than 1.4
  - radiance residual mean (mean difference divided by the NESR) less than 0.1
- Considering other screens (problematic desert surfaces and cold surfaces not identified with the current approach)
- AIRS data - v3.5 ret type 0 and 10 (by next week, v4 with QC_H2O = 0)
TES Averaging kernels - water

• TES loses sensitivity above 200mb
TES Averaging kernels - temperature

- Sensitivity throughout the atmosphere
TES is ~12% drier than AMSR-E in total column
TES-AIRS column comparison same as TES-AMSR - TES drier
Percent diff is (airs-tes)/tes

TES warmer than AIRS near tropopause, TES drier than AIRS near surface - may be related to AIRS vertical structure in retrieval scheme. Consistent with total column water vapor.
Scatter plots of near surface water 2417 and 2310
Scatter plots of mid trop water
2417 and 2310
Conclusions

- Total column and profile data both show consistency - TES is drier than AMSR and AIRS by 12%. Most of that difference is between 700 and 900mb. Need to investigate a number of possible explanations.
  - Is this an IR-microwave bias?
  - TES uses a different set of channels for retrievals than AIRS
  - TES still modifying radiance calibration
- This analysis holds for all global surveys.
- Beginning analysis of special observations in the tropics