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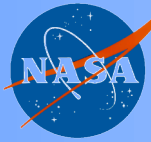
Water vapor intercomparisons TES - AIRS - AMSR

A. Eldering

April 15, 2005

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

4 May 2005



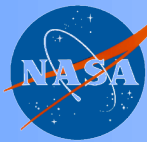
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TES status

- **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**



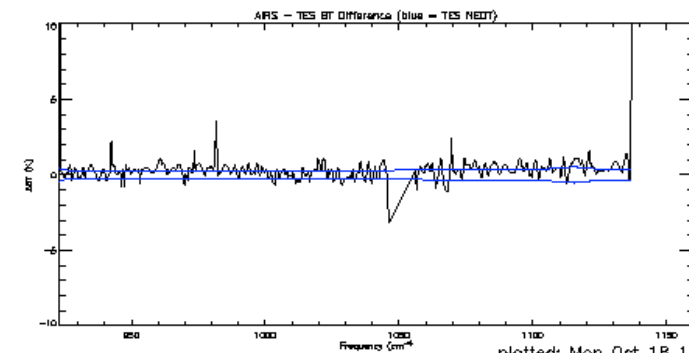
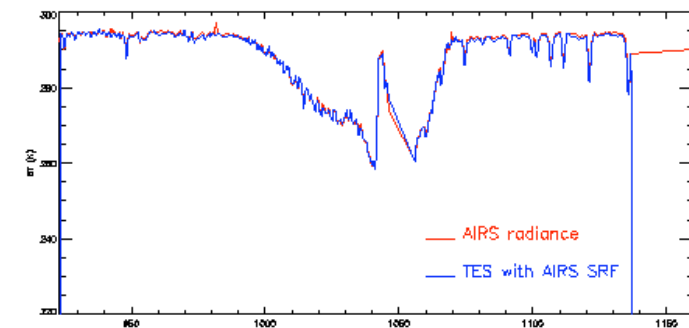
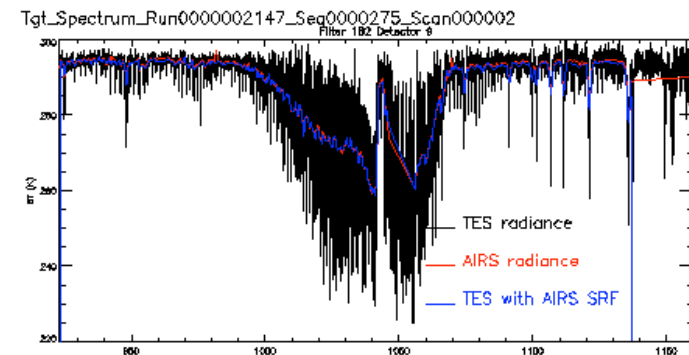
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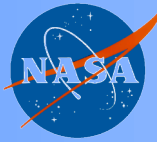


Radiance calibration

- 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



plotted: Mon Oct 18 17:48:03 2004



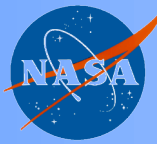
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Processing status

- **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, others (2286 through 2328) Nov 4-17th, 2004**



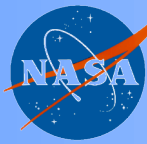
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Data selection for this analysis

- **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
 - Cloud optical depth less than 0.8
- **Considering other screens for TES data (problematic desert surfaces and cold surfaces not identified with the current approach)**
- **AIRS data v4 used when**
 - Qual_temp_bot = 0
 - Ocean only
 - 60N to 60S



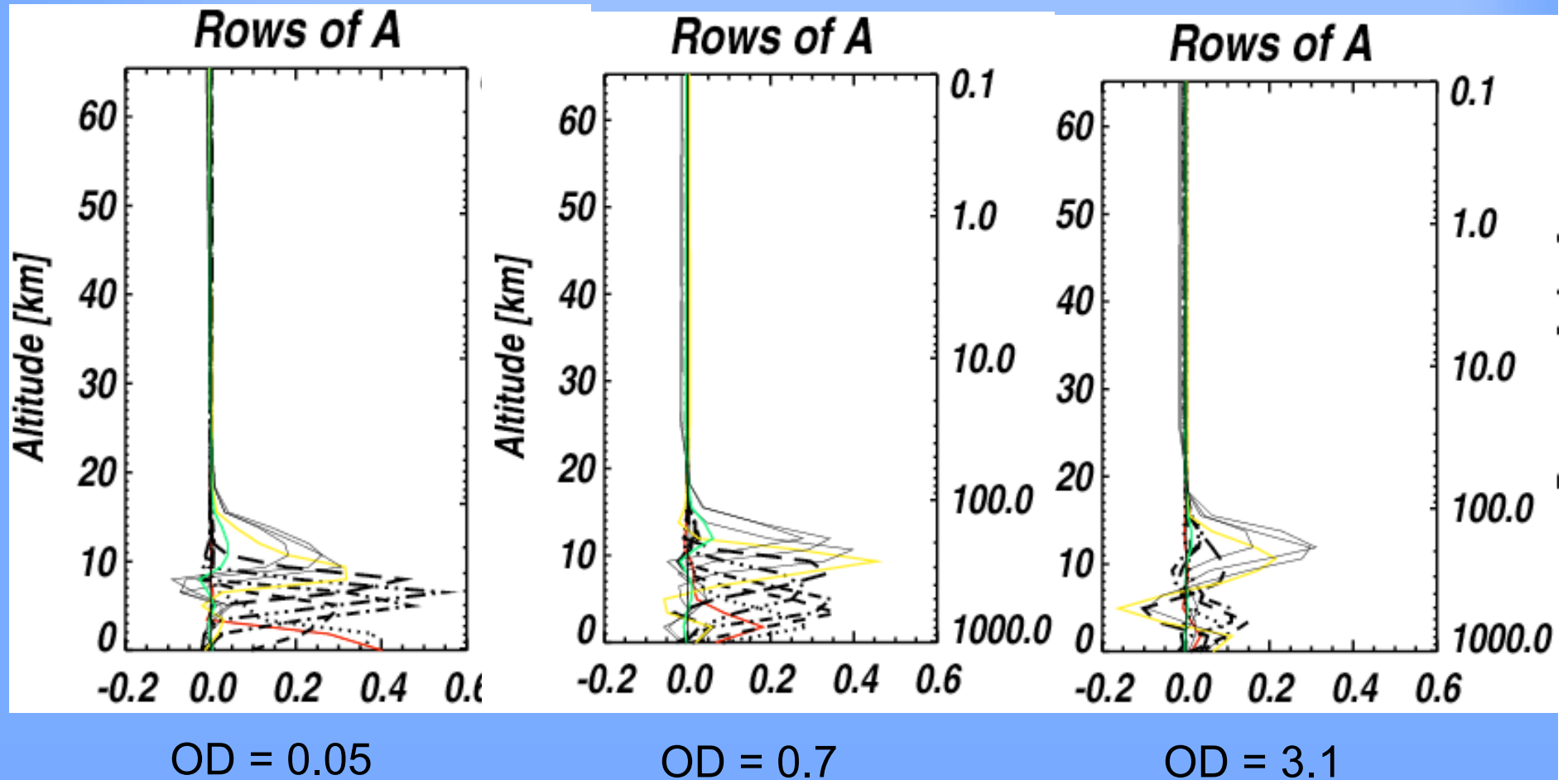
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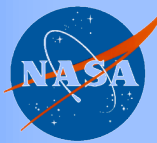
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TES Averaging kernels - water

- TES loses sensitivity above 200mb, impacted by clouds





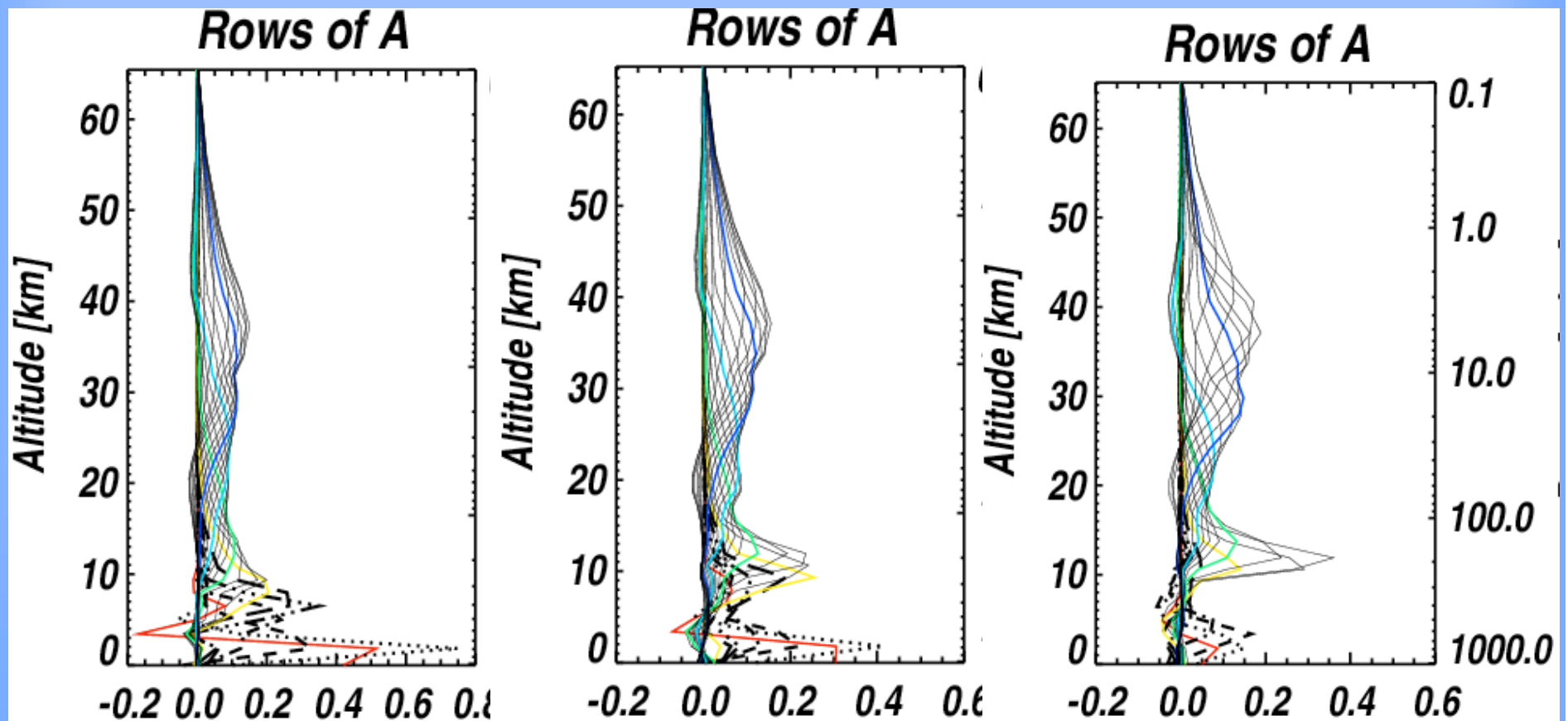
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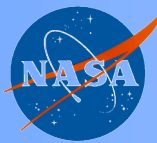
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TES Averaging kernels - temperature

- Sensitivity throughout the atmosphere





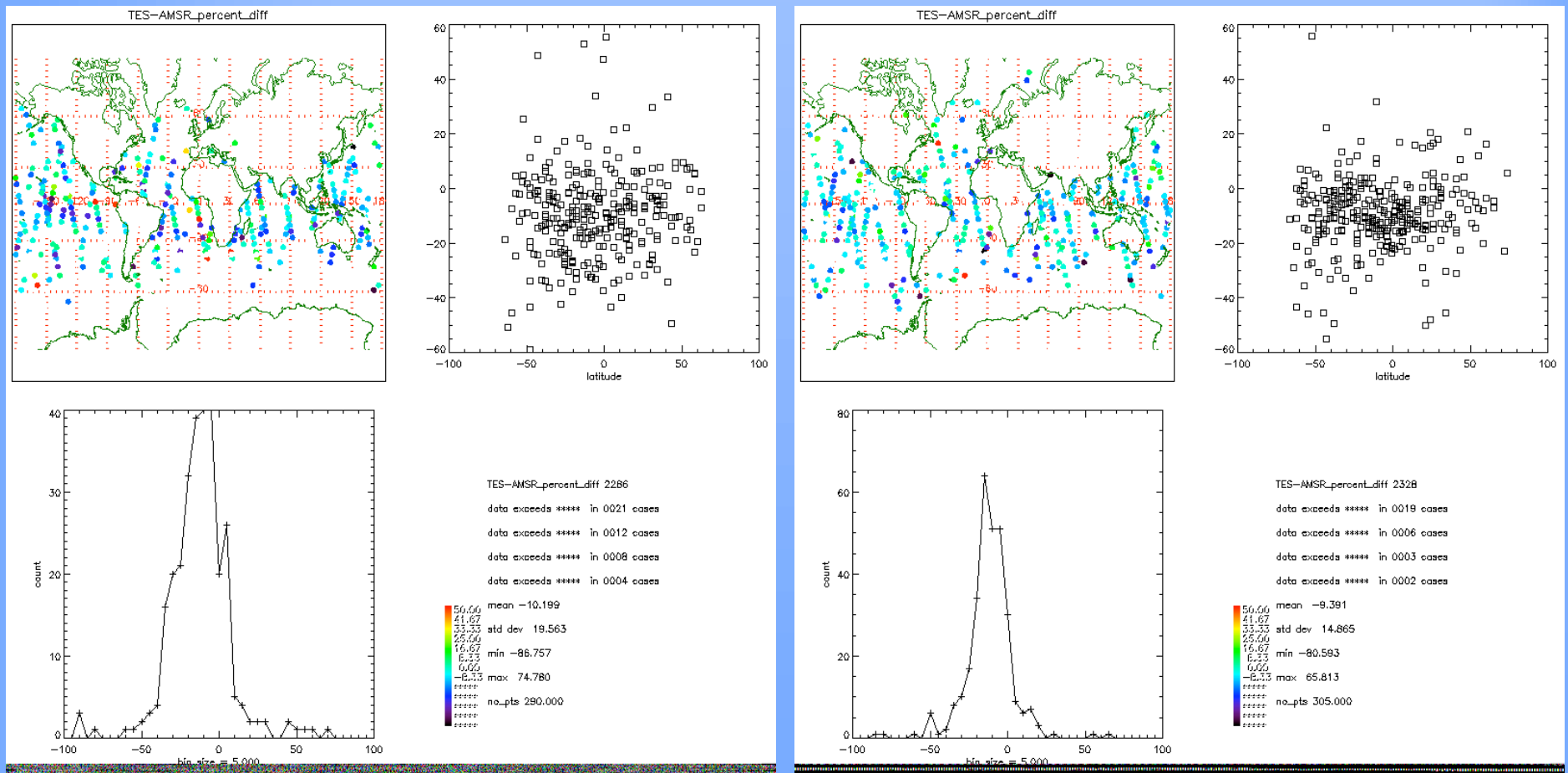
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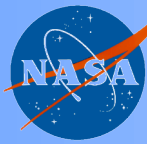
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Total water difference - - 2286 & 2328

TES is ~10% drier than AMSR-E in total column





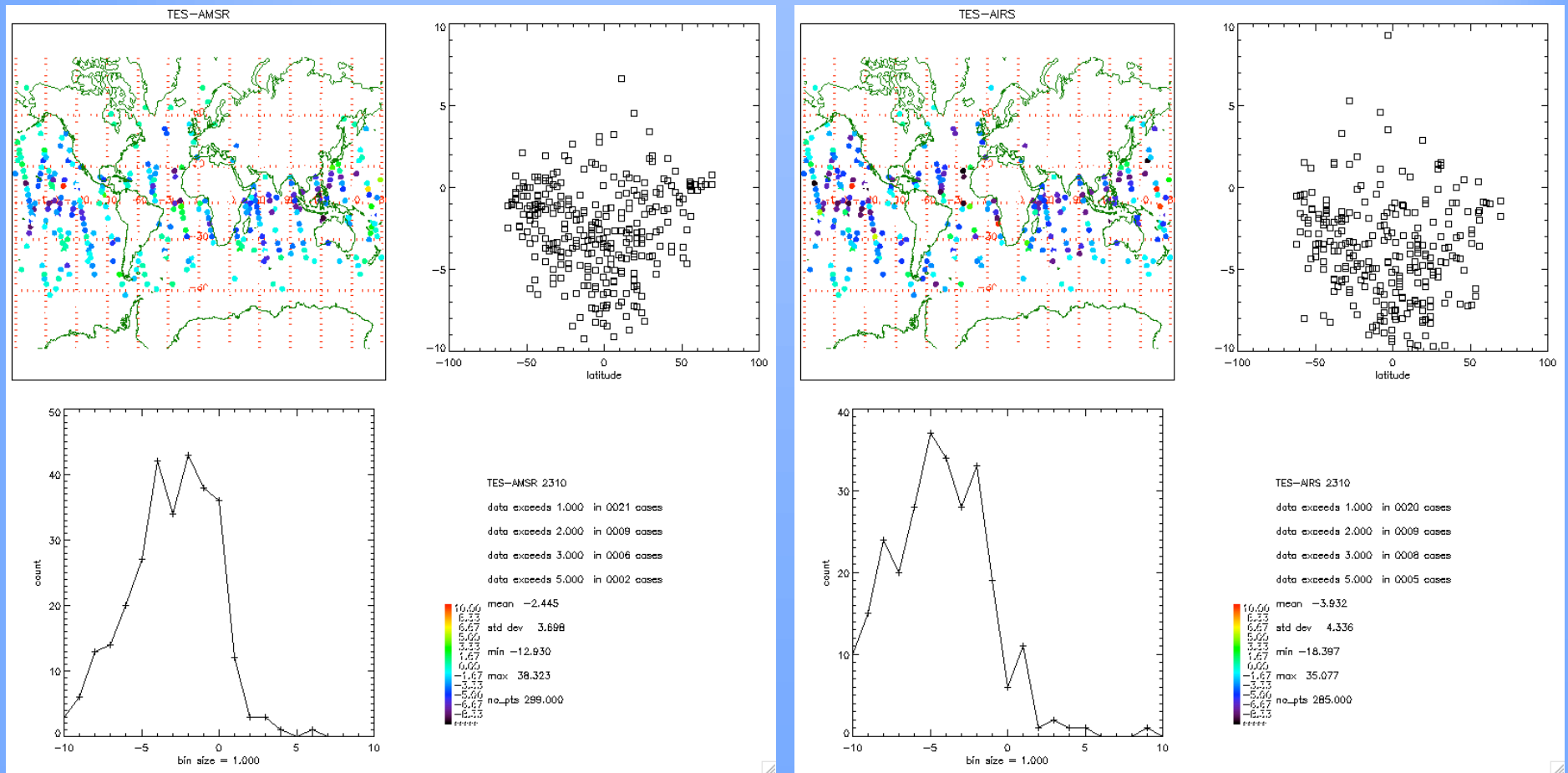
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Comparison AMSR and AIRS - 2310

TES-AIRS column comparison same as TES-AMSR - TES drier



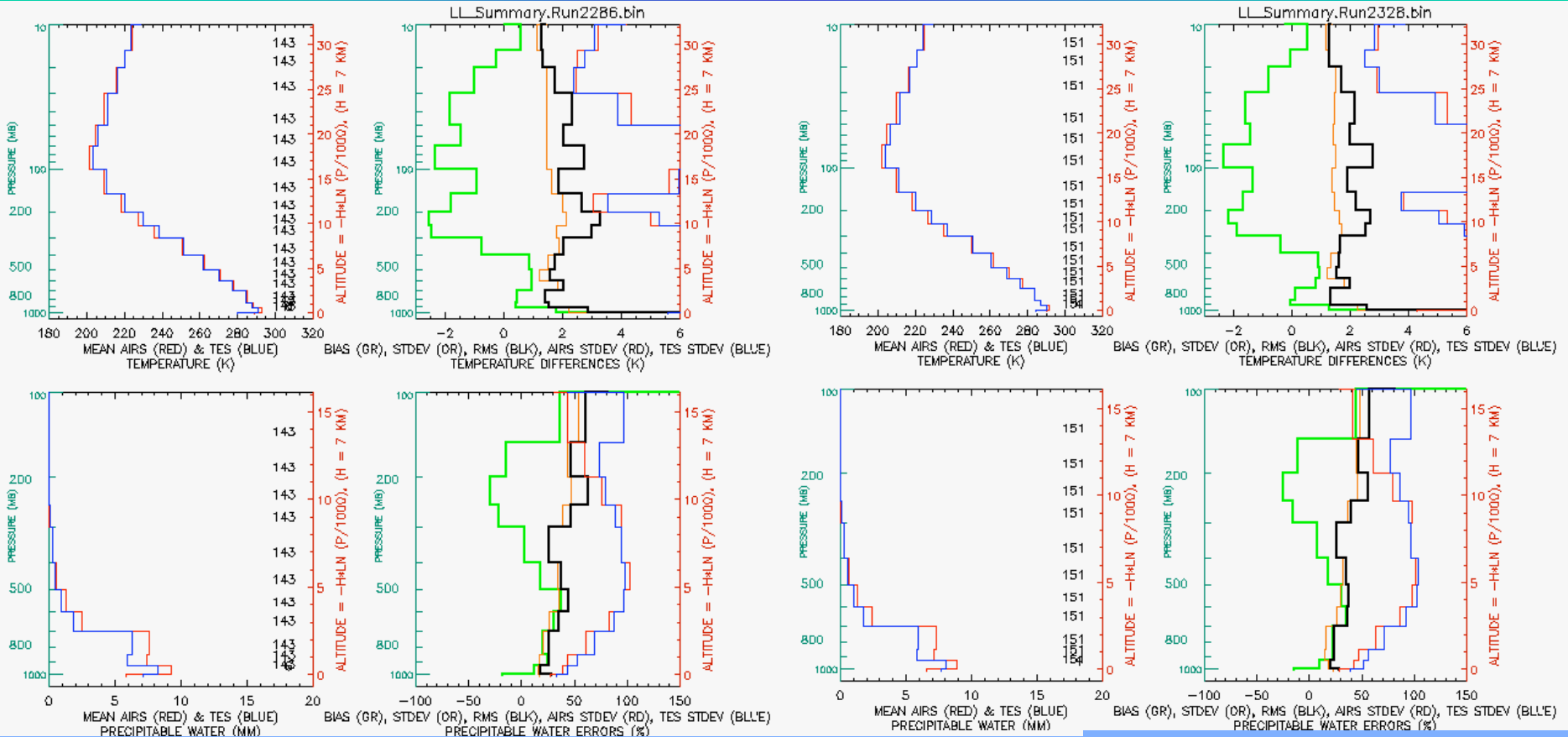


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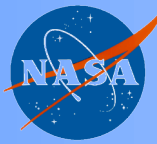
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What do profiles say?



Percent diff is $(\text{airs}-\text{tes})/\text{tes}$
TES drier than AIRS near surface, TES warmer and wetter
than AIRS near tropopause. Consistent with total column
water vapor.

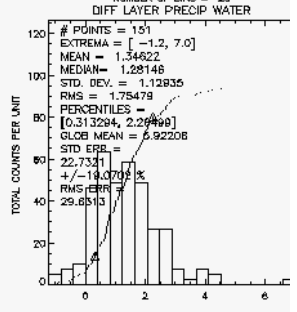
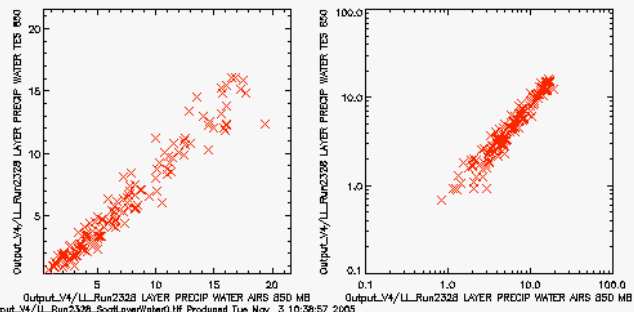
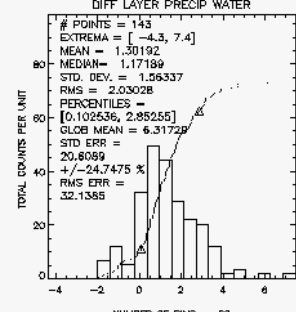
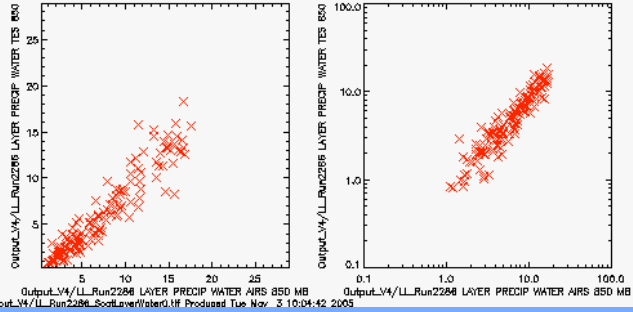
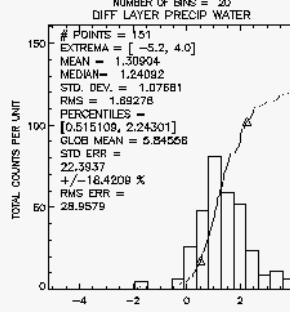
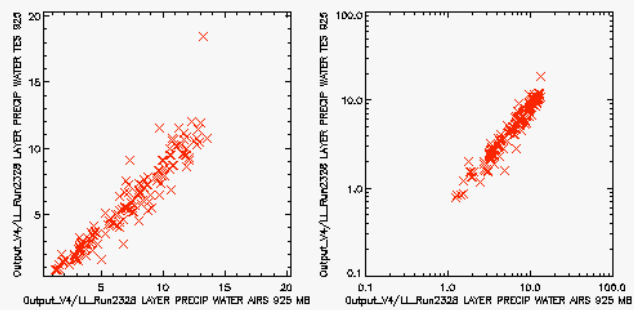
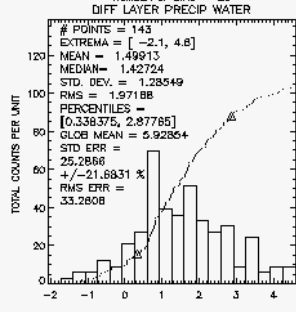
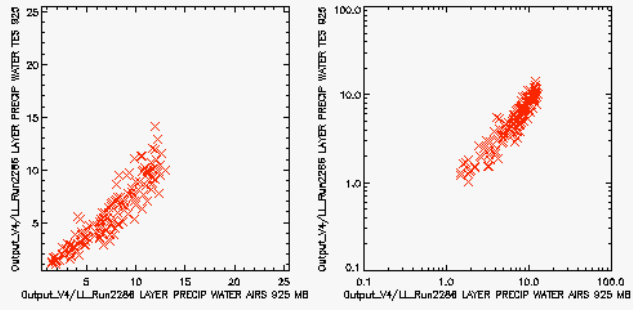
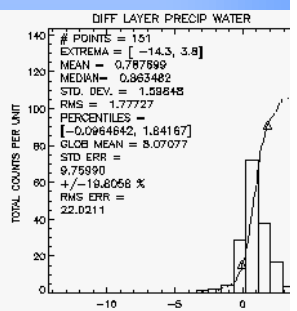
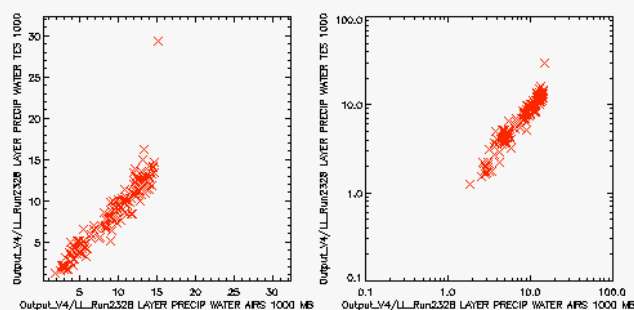
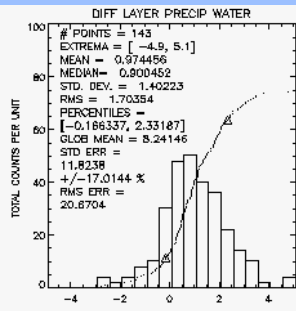
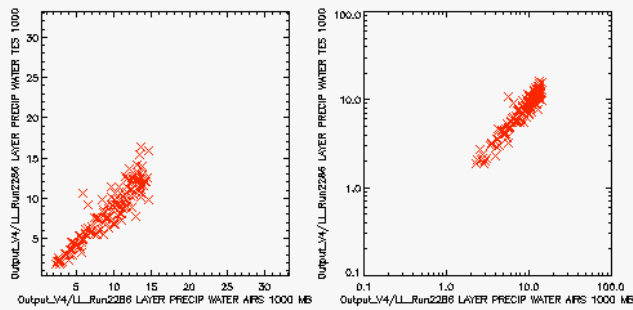


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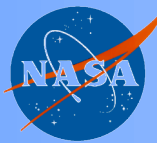
Scatter plots of near surface water 2286 and 2328



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Output_V4/LL_Run2328_SocLaverWater0.HF Produced Tue Nov 3 10:38:57 2003

Output_V4/LL_Run2328_SocLaverWater0.HF Produced Tue Nov 3 10:38:57 2003

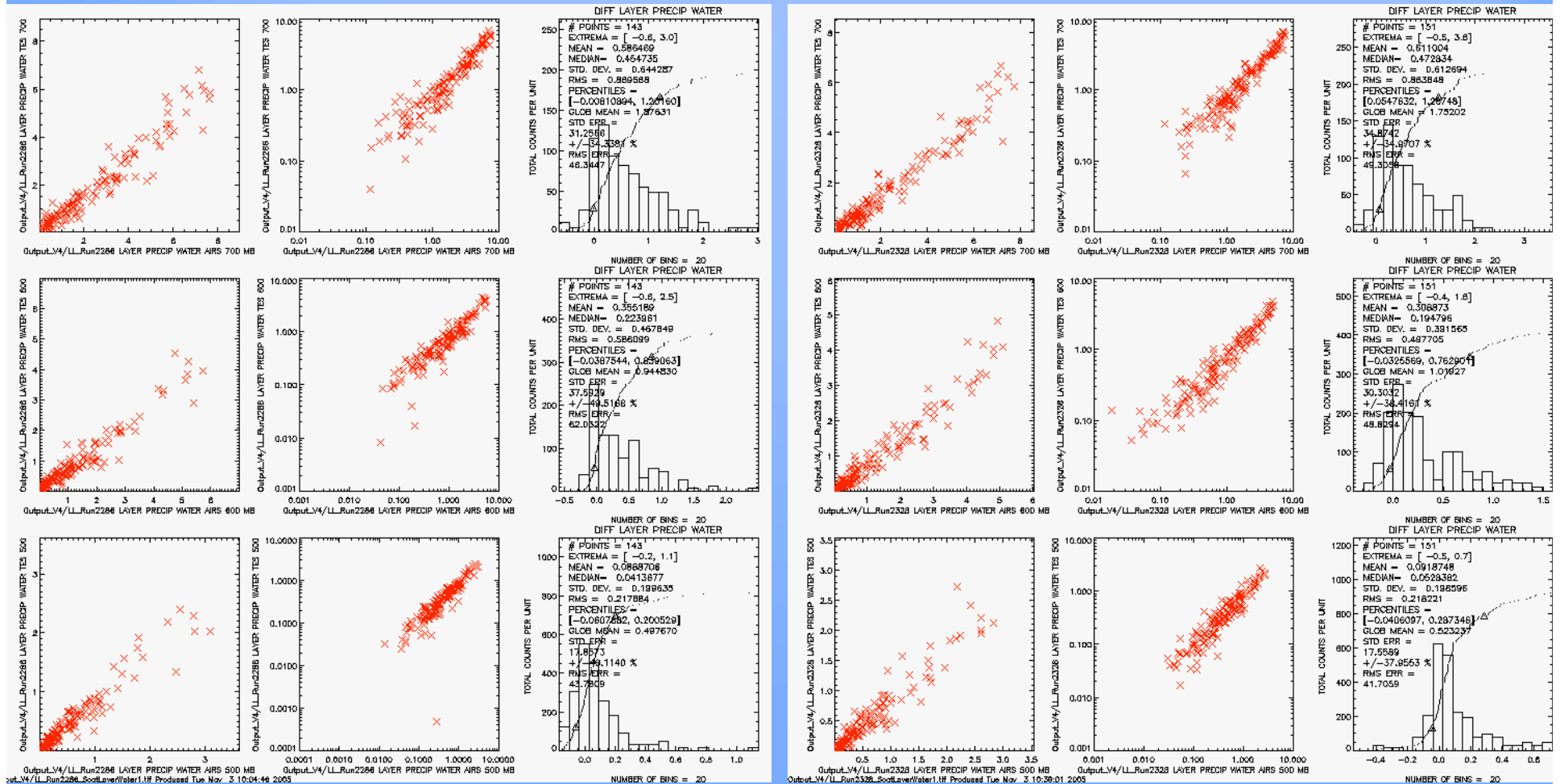


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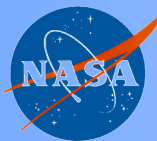


Scatter plots of mid trop water 2286 and 2328



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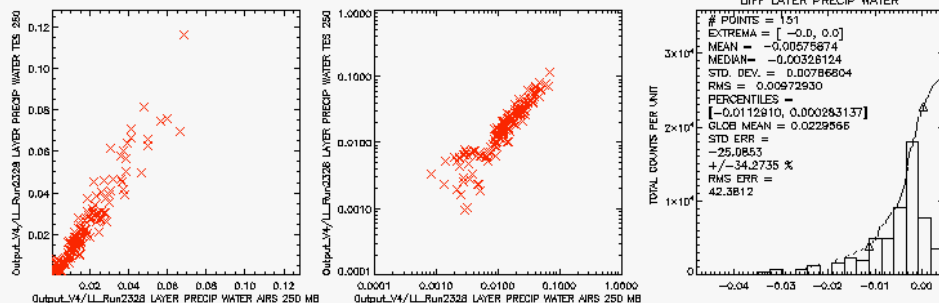
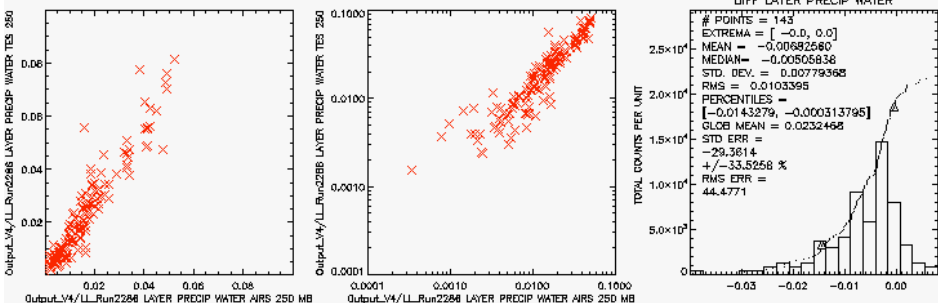
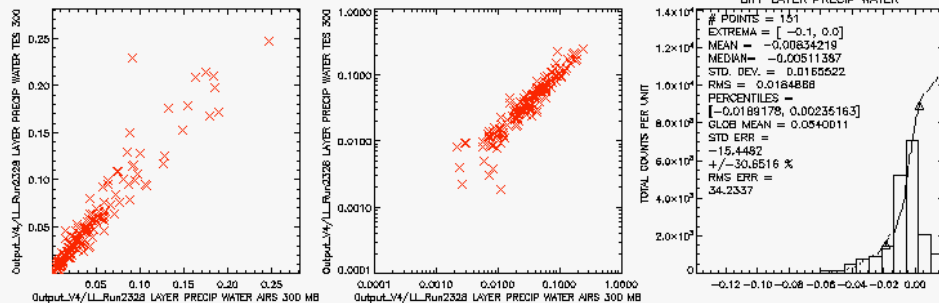
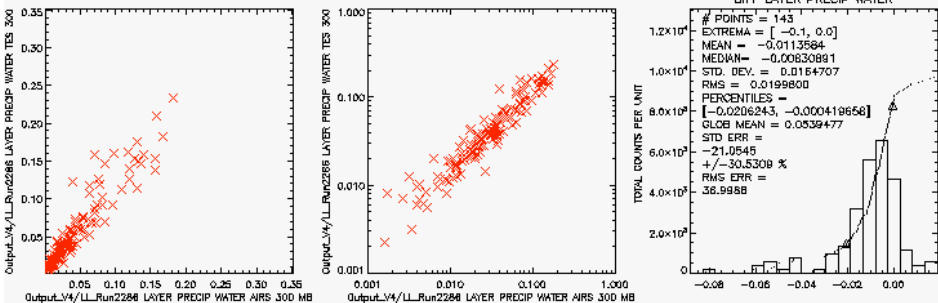
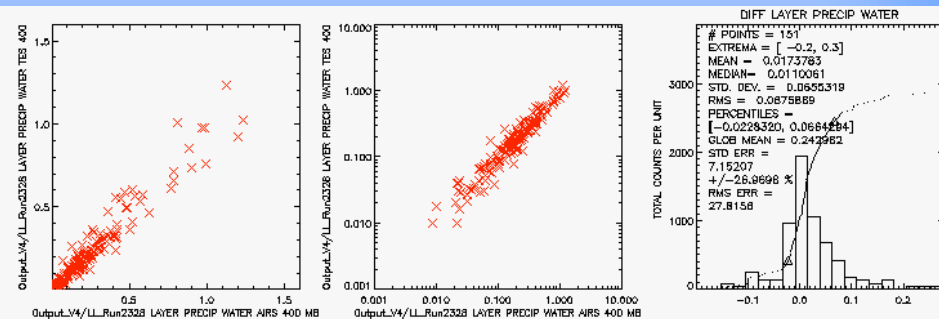
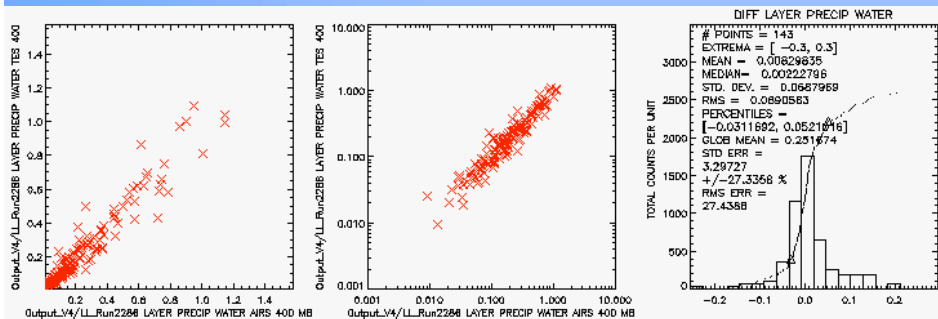


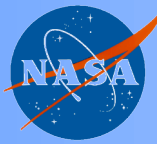
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Scatter plots of upper trop water 2286 and 2328





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Conclusions

- **Total column and profile data both show consistency - TES is drier than AMSR and AIRS by 10%. 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.**