

Overall Summary

TES L1B V002 data products are a significant improvement over V001 (Beta release). Several systematic errors have been resolved giving much better agreement with Aqua-AIRS radiance measurements of the same homogenous target scenes (see below). The error estimates given below are representative of TES nadir data. Errors specific to each target spectrum are available within the data products.

Precision

Precision estimates are given in the NESR (Noise Equivalent Spectral Radiance) part of the L1B product, available with each target spectral radiance. The NESR is estimated for each measured spectrum using the noise extracted from the spectral range outside the signal region allowed by the TES optical filter used for the measurement. The NESRs have not changed significantly due to algorithm improvements, however, data acquired after December 7, 2005 (run 3202 and higher) have better NESRs (around 50 nW/cm²/sr/cm⁻¹) due to improved optical alignment following the warmup of the TES optical bench to a higher operating temperature.

Average single detector, single scan Nadir NESRs

Filter	Freq Range (cm-1)	Nadir NESR (nW/cm ² /sr/cm-1)
2B1	660 - 910	700
1B2	950 - 1130	200
2A1	1090 - 1320	150
1A1	1910 - 2230	100

Systematic Errors

Based on our validation with AIRS and our L2 retrievals, we estimate our systematic errors to be less than 0.5 K in brightness temperature. A known remaining error source is due to velocity jitter that affects our interferogram sampling. This sampling error produces the largest uncertainties (<1%) near the edges of our frequency filter bands. To mitigate this error, we suggest only using L1B data within the spectral range boundaries as described in the table above. It might be possible to use spectral radiance somewhat beyond these ranges but additional verification would be needed.

Validation Status

We have compared nadir TES L1B calibrated radiance spectra to Aqua-AIRS radiances by first convolving TES spectra with the AIRS spectral response function (SRF). Mean and RMS AIRS-TES differences in observed brightness temperature for homogenous targets (as determined by TES) are <0.5K. We see similar (small) differences in our comparisons to S-HIS (Scanning - High Resolution Spectrometer) measurements taken from the WB-57 during the first AVE (Aura Validation Experiment) Oct-Nov. 2004, and during CR-AVE, Jan-Feb 2006.