TES Nadir and Limb Observations: Implications for the Forward Model

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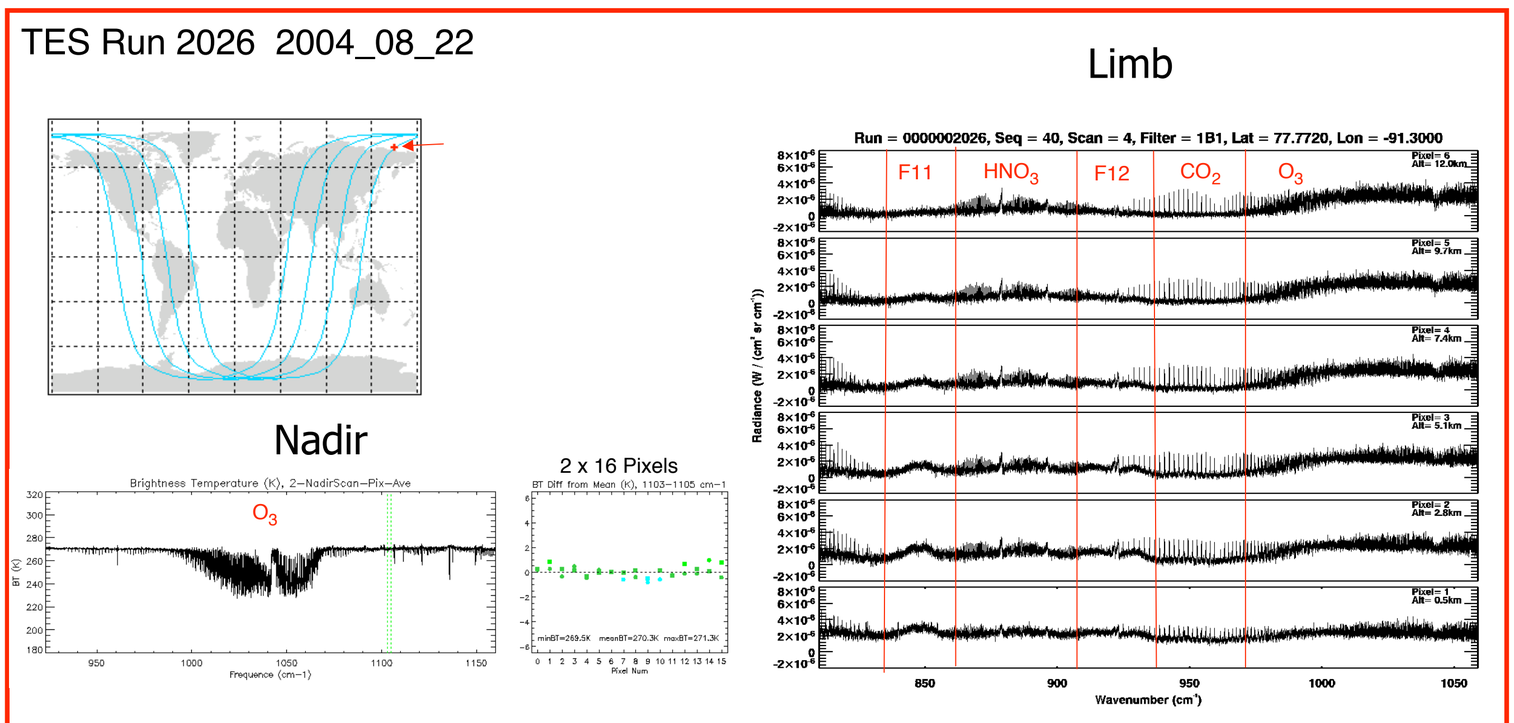
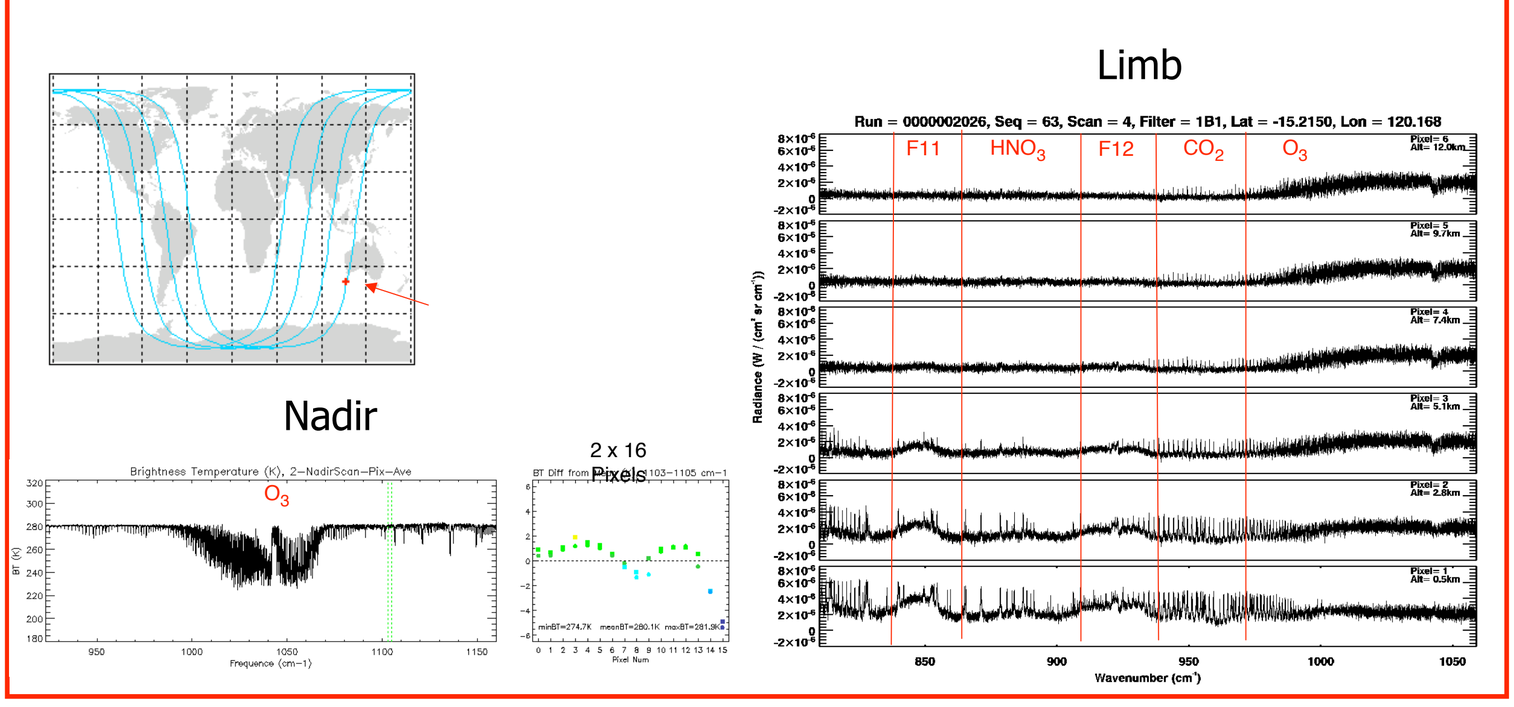
Strategy for HNO3 and O3 Retrievals from TES Limb Observations

- Establish Pointing and Cloud Free View from F11 radiances
  - F11 taken to be uniformly mixed
- Retrieve HNO_3 in the limb layer associated with each pixel
  - assume all absorption originates in the limb layer (quasi linear)
- Retrieve O_3 in the limb layer associated with each pixel
  - assume all absorption originates in the limb layer (quasi linear)
- Temperature and Water Vapor profiles: GMAO
- Simple - Fast - Reasonably Accurate - MIPAS Approach

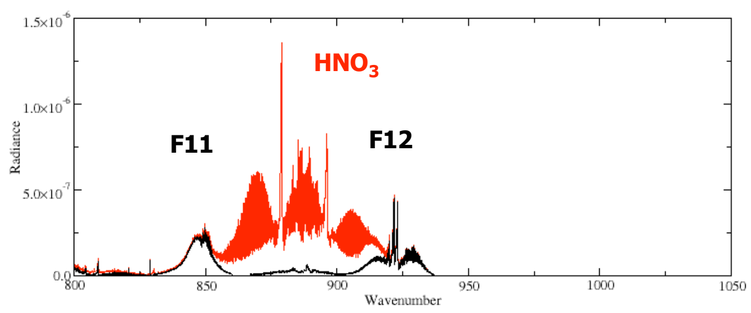
TES Run 2026 2004_08_22





HNO_3 Line Parameters

- HITRAN_2004: see Rothman et al., 2004
  - Consistency with IR regions
  - Many contributing groups (validation: MIPAS and ACE)



Ozone Line Parameters

- Intensity Issue:
  - Microwave, Infrared and UV Intensities should be consistent (and accurate). MLS TES OMI
  - 9.6 μ ozone band intensity: A discrepancy of 8% exists between between the highest (Smith, 2001) and lowest (Flaud 2003) 'best' values.
  - The low value has recently been obtained by Flaud et al. calibrated with the UV Huggins Band.
  - The Huggins Band is not as well known as the Hartley band
  - Hitran_2004 is evidently not consistent with the Flaud 2003 parameters as intended. See Table below.
- Ozone Line Parameters for TES
  - The parameters of Wagner et al. are currently being used.
  - Measured widths (significantly different from Hitran_2000). Accurate widths are required for tropospheric retrievals.
  - The band intensity value is between those of Smith and Flaud.
  - Used by MIPAS.

	MOL	LINES	SUM LBLRTM STRENGTHS	%		
tes_v_1.1	**O3**	**= 43042**	**1.4361E-20**	**0.**	**Wagner et al. +++,**	**2002**
hitran_2000	O3	= 43042	1.4753E-20	**2.73**	Smith et al.,	2001
hitran_2004	O3	= 53059	1.4276E-20	**-0.59**	Flaud et al. ????	2003
		900 < > 1085 cm-1				

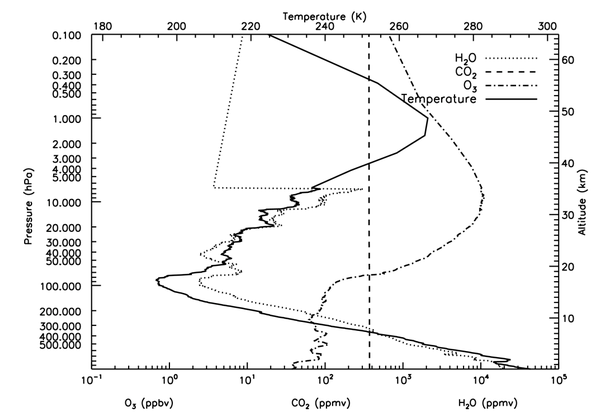
Flaud et al., 2003:

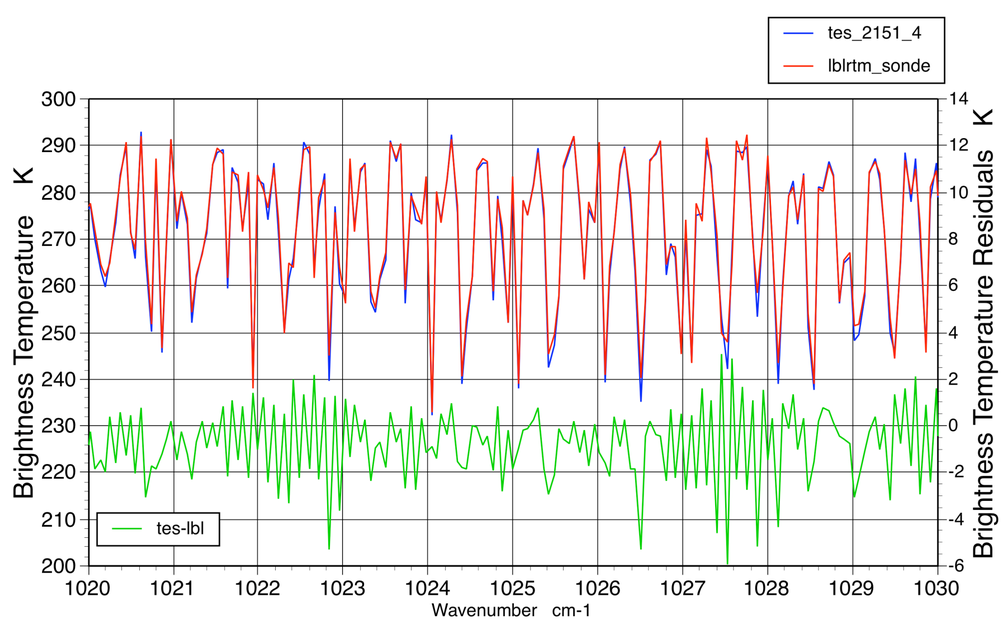
Table 3: Differences in % between IR/UV absorption ratios measured in this study and the $|B|_{IR} / \sigma_{UV}$ ratios derived from literature values.

λ_{UV}	1	2	3	4	5	6	7	8
302.15	1.88%	1.33%	0.79%	2.15%	6.04%	5.47%	4.90%	6.32%
307.59	1.18%	1.32%	-0.21%	1.47%	5.31%	5.46%	3.86%	5.61%
308.08	1.68%	1.60%	0.09%	2.05%	5.83%	5.75%	4.18%	6.22%
312.57	1.57%	0.86%	0.29%	1.43%	5.72%	4.98%	4.38%	5.57%
313.17	1.78%	1.78%	0.42%	1.33%	5.93%	5.93%	4.52%	5.46%
Average	**1.62%**	**1.38%**	**0.28%**	**1.69%**	**5.76%**	**5.52%**	**4.37%**	**5.84%**

1: HITRAN 2000 / Malicet et al., 1995,
2: HITRAN 2000 / Bass and Paur, 1985,
3: HITRAN 2000 / Bogumil et al., 2001,
4: HITRAN 2000 / Burrows et al., 1999,
5: Flaud et al., 2003 / Malicet et al., 1995,
6: Flaud et al., 2003 / Bass and Paur, 1985,
7: Flaud et al., 2003 / Bogumil et al., 2001,
8: Flaud et al., 2003 / Burrows et al., 1999.

TES Validation at Ascension Island





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