Poster A33A-0127

Preliminary Validation of TES Nadir Retrievals for Tropospheric Ozone Using Ozonesonde Data from Natal (Brazil) and Ascension Island (South Atlantic)

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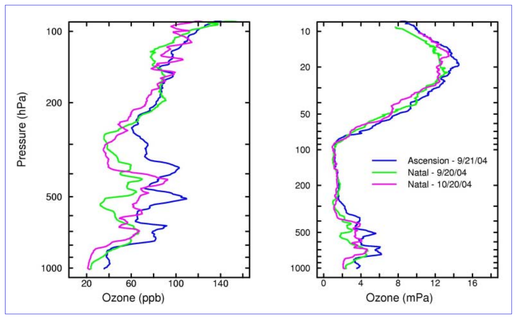
Introduction

Ozonesondes were launched during Aura overpasses in September and October , specifically for early validation studies of the TES nadir ozone product. Here we present the first validation of the TES ozone product using 3 profiles that coincided with TES overpasses. Note that these are preliminary sonde data as well as preliminary retrievals.

The retrieval method is described in Poster A33A-0126 (Worden et al.) and A33A-0127 (Bowman et al.) The a-priori ozone and first guess profiles are from simulations with the MOZART model, and are monthly averages with resolution of 10° in latitude and 60° in longitude.

Natal is located at 5.49°S, 35.26°W in eastern Brazil.
Ascension Island is located at 7.95°S, 14.37°W in the south tropical Atlantic.



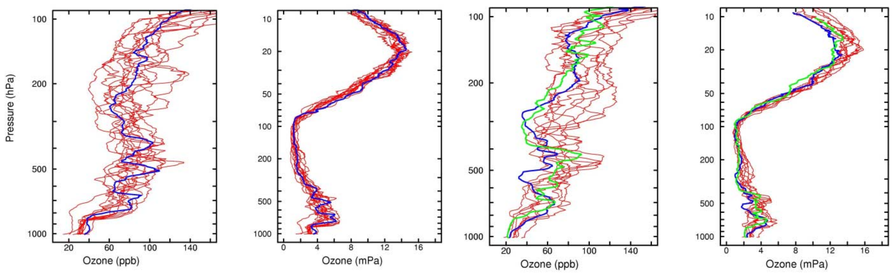
Characteristics of the 3 ozonesonde profiles in the troposphere and stratosphere.

These profiles are typical for the tropical south Atlantic in austral spring, but the Natal profiles are relatively low for this season, as shown in Figures 2 and 3 below.

Fig. 2a

Ascension Island.

Red: 13 profiles measured from 9/02/04 to 10/25/04
Blue: Validation profile, 9/21/04



Ascension Island

Comparison of validation profile on 9/21/04 with monthly mean profiles for September from several years of data. Results are shown with 1 km resolution; dashed lines are mean ± one standard deviation.

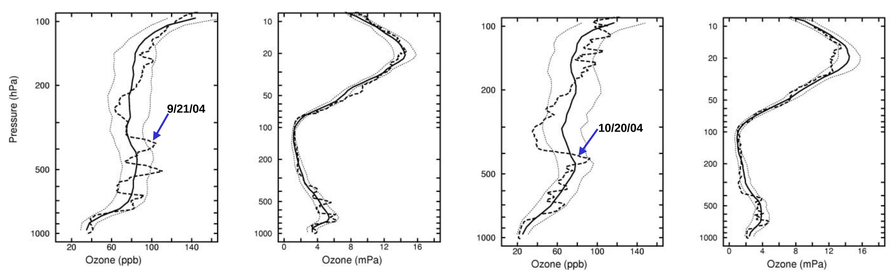


Fig. 2b

Natal

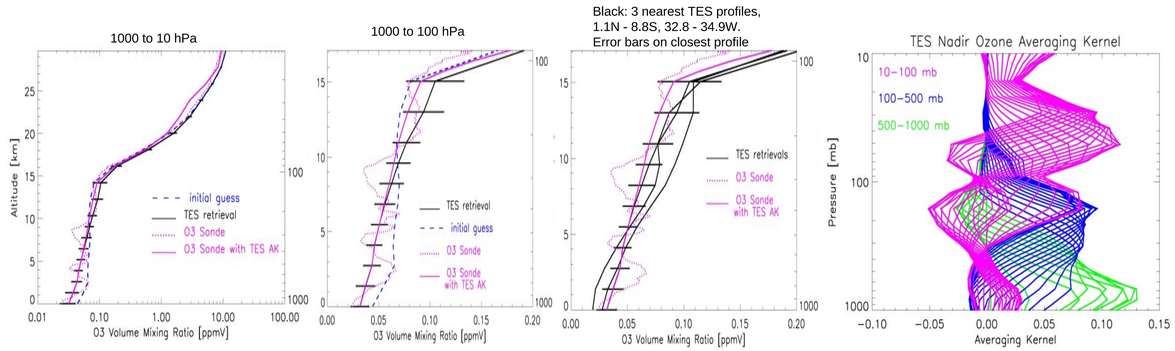
Red: 10 profiles measured from 9/15/04 to 10/20/04
Blue: Validation profile, 9/20/04
Green: Validation profile, 10/20/04

Natal

Comparison of validation profile on 10/20/04 with monthly mean profiles for October from several years of data. Results are shown with 1 km resolution; dashed lines are mean ± one standard deviation.

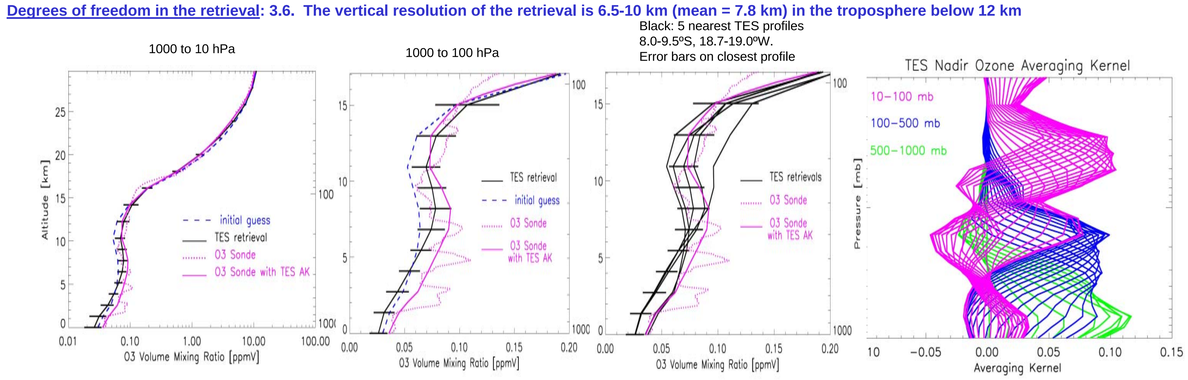
Validation profile 1: In-situ profile from Natal on 9/20/2004 (14:39 UTC) compared to a TES nadir measurement 218 km away, at 3.9°S, 33.9°W (Global survey run 2147).

Degrees of freedom in the retrieval: 4.0. The vertical resolution of the retrieval is 6-9 km (mean = 7.9 km) in the troposphere below 12 km



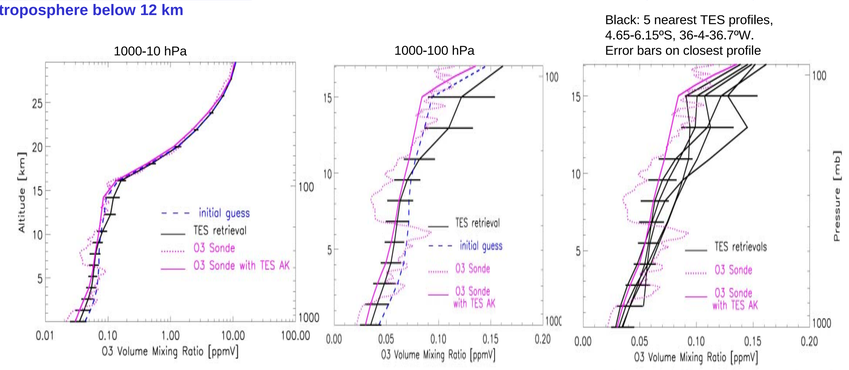
Validation profile 2: In-situ profile from Ascension Island on 9/21/2004 (14:40 UTC) compared to a TES nadir measurement 507 km away, at 9.1°S, 18.8°W (Step/Stare run 2151).

Degrees of freedom in the retrieval: 3.6. The vertical resolution of the retrieval is 6.5-10 km (mean = 7.8 km) in the troposphere below 12 km



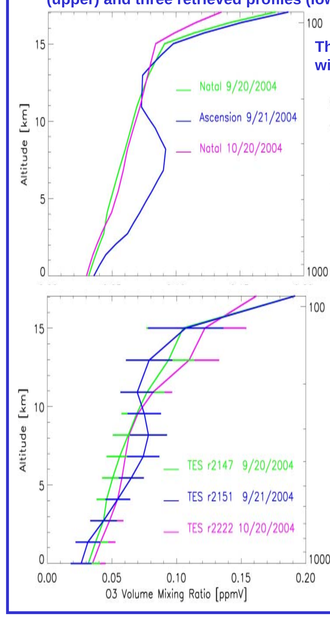
Validation profile 3: In-situ profile from Natal on 10/20/2004 (15:08 UTC) compared to a TES nadir measurement 153 km away, at 5.4°S, 36.6°W (Step/Stare run 2222).

Degrees of freedom in the retrieval: 3.7. The vertical resolution of the retrieval is 7-9 km (mean = 8.4 km) in the troposphere below 12 km



Note the variability in the 5 retrieved profiles that are each 40 km apart

Comparison of three sonde profiles (with AK) (upper) and three retrieved profiles (lower panel)



Three sonde profiles with TES AK

Three retrievals for the above sonde profiles

Conclusions

The first validation of TES nadir retrievals using ozonesonde data is very promising. The vertical resolution of the retrievals is about 8 km in the troposphere, as anticipated.