Initial measurements of column ozone by the Tropospheric Emission Spectrometer (TES)

A33A-0122

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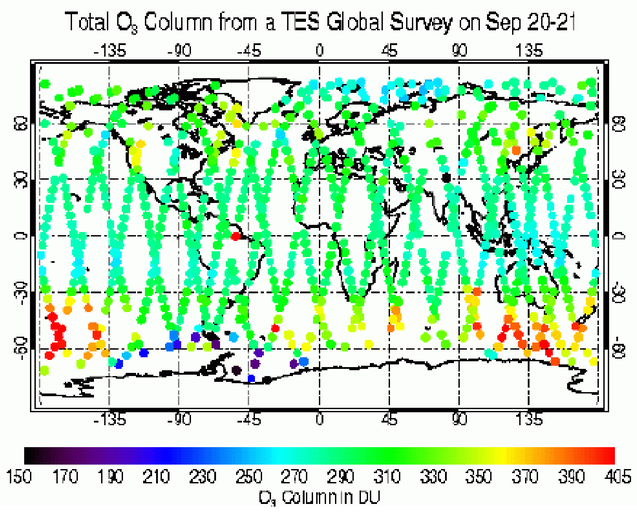
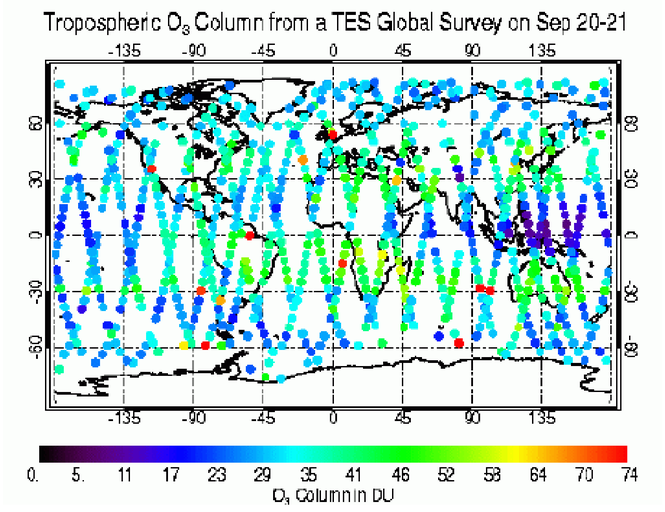
ABSTRACT

We show total ozone column amounts measured by TES on the NASA Aura spacecraft and compare results to TOMS observations. The TES total ozone column is calculated from preliminary retrieved TES ozone profiles, with the column error calculated from the retrieved error covariance. We also highlight TES measurements of the ozone column in the troposphere for different atmospheric conditions.





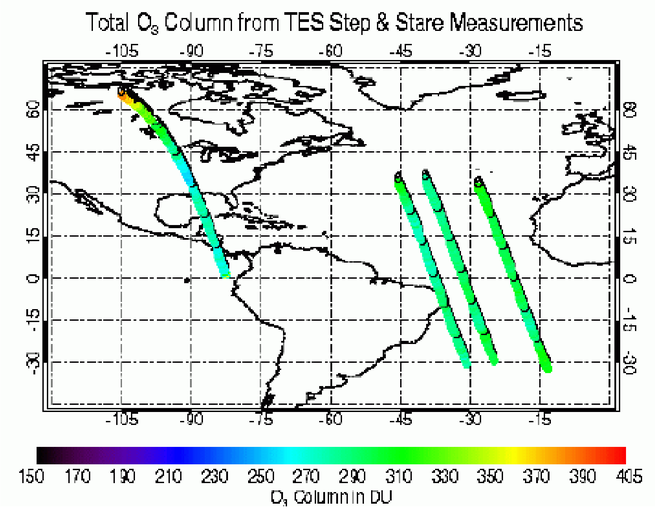
TES Measurements of Column Ozone

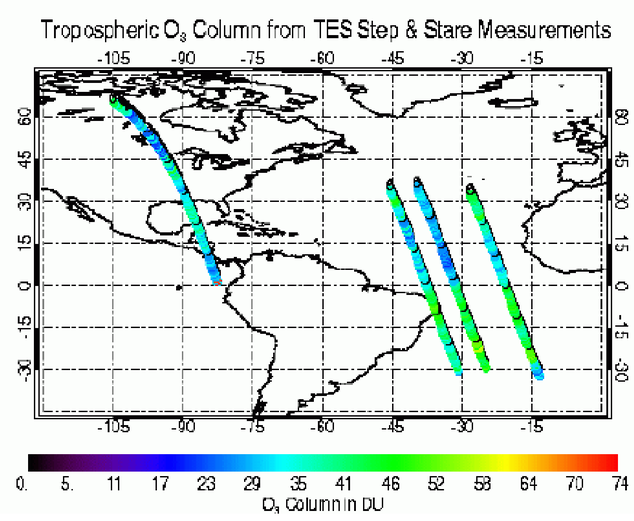
→TES measures the chemical composition of the atmosphere with different types of sampling:
- → 16 orbit Global Surveys (Left)
- → "Step & Stare" observations (Right)

→ TES has sensititivity for measuring ozone in both the stratosphere and troposphere allowing for a determination of an ozone profile.

→ The retrieved profiles allow for an accurate determination of the total ozone column.

→TES is making the first direct space-borne remote sensing measurements of tropospheric ozone.





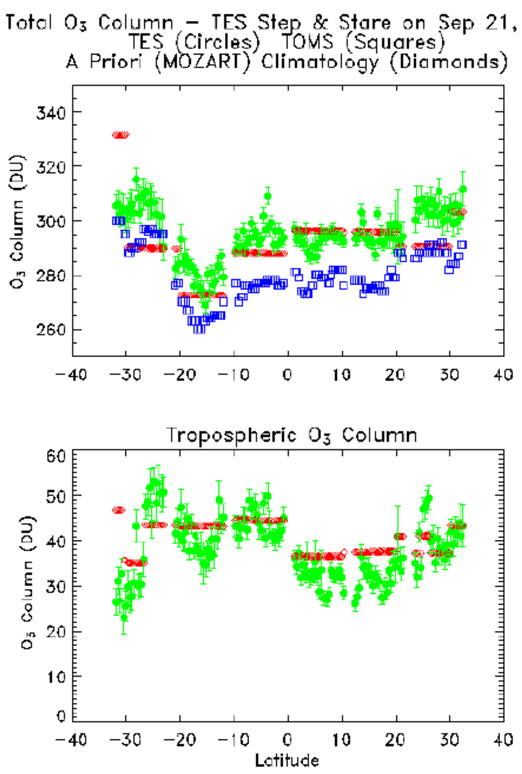
TES Measurement Sensitivity in the Troposphere

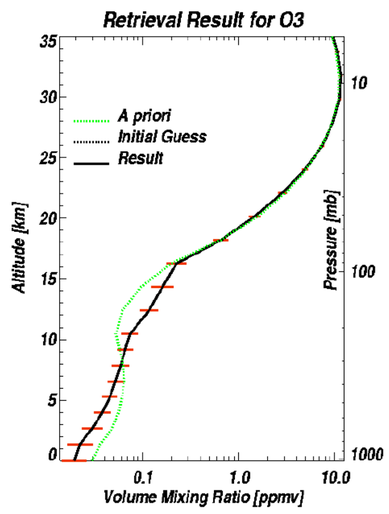
→ Example TES ozone retrieval (23°E, 9°N on Sep 21, 2004).

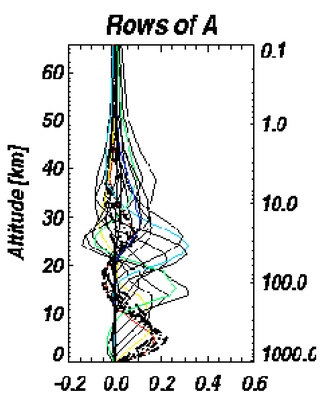
→ TES averaging kernal is plotted (below, right) illustrating the sensitivity of the TES retrieval in the troposphere.

→ A typical TES retrieval gives 4 Degrees of Freedom of Signal for an ozone profile with 1.8 of that in troposphere.

→ The total and tropospheric column as a function of latitude for TES, TOMS and the TES *a priori*(figure to left).
- → TES detects structure in the column values not seen in the a priori.
- → The TES a priori is created using the MOZART Aura climatology.







http://tes.jpl.nasa.gov

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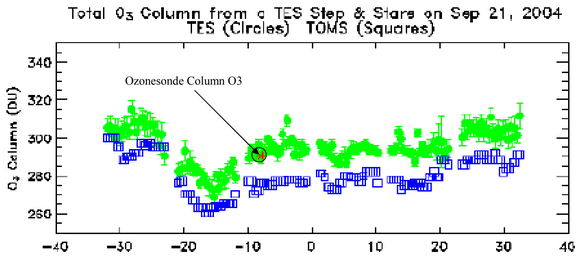
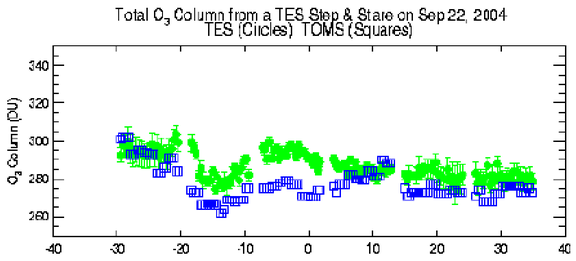
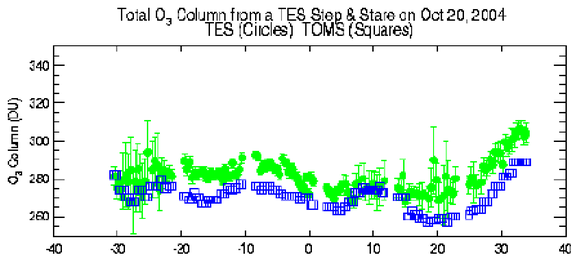
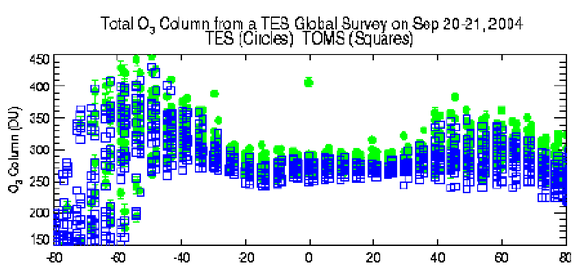
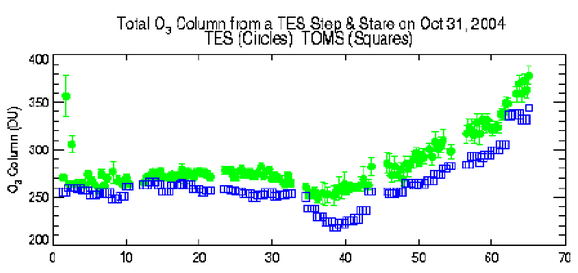
TES – TOMS Ozone Column Comparisons











TES Ozone Column Comparisons with TOMS

→ These figures show a rudimentary TOMS -TES total ozone column measurement comparisons.

→The data is plotted as a function of latitude with the corresponding percentage difference and tropospheric column from TES.

→TES ozone column measurements show similar variations in latitude as those made by TOMS.

→ TES measurements are consistently higher than those of TOMS, generally by 2-8%.

→ On Sep 21, 2004 there was an ozonesonde launch coincident with the TES measurements. The column ozone from that flight appears to agree well with TES measurements.

→ The prevalence of this "bias" in the TES measurements relative to TOMS is not a function of latitude.

Conclusions

→Initial comparisons between the TES and TOMS total ozone columns show very similar geographic structure.

→ The TES ozone column measurements tend to be higher than TOMS by 2-8%.

→ We are trying to better understand this bias and determine possible causes:
- → Ozone spectroscopy.
- → Different a priori climatology.

Future Work

→ More rigorous analysis incorporating TES averaging kernals.

→ Quantify the effects on the *a priori* on the column.

→ Continue comparisons to check for seasonal effects.

→ Similar comparisons with OMI and MLS data.

http://tes.jpl.nasa.gov

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