# SAFARI 2000 TOMS Tropospheric Ozone Data, Southern Africa Subset, Dry Season 2000

**Abstract**

Tropical Tropospheric Ozone (TTO) data from Earth Probe (EP) Total Ozone Mapping Spectrometer (TOMS) for the period of August 8-September 29, 2000 were processed and provided by the Atmospheric Chemistry and Dynamics Branch at NASA/GSFC for the SAFARI 2000 Dry Season Aircraft Campaign.

The TTO measurement is derived from TOMS total ozone using the modified-residual method to separate stratospheric ozone from tropospheric ozone. The tropospheric ozone column thickness is reported in Dobson Units (DU).

EP TOMS is currently the only NASA spacecraft in orbit specializing in ozone retrieval. EP TOMS was launched in 1996 into an orbit 500 km rather than the 950 km that was originally planned. The lower orbit of EP TOMS decreased the size of the "footprint" of each measurement, which increased the resolution and also increased the ability to make measurements over cloudless scenes. This orbit was chosen to improve the ability of the TOMS instrument to make measurements of UV-absorbing aerosols in the troposphere and enhanced the capability of converting the TOMS aerosol measurements into geophysical quantities such as optical depth. Tropospheric aerosols play a major role in the Earth's climate and the capability to measure them from a TOMS instrument had recently been developed using data from Nimbus-7 and Meteor-3 TOMS. The Earth Probe satellite was boosted to 740 km in 1997 when the ADEOS satellite failed.

The TOMS Home Page [http://toms.gsfc.nasa.gov/index_v8.html].

## Background Information

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**Project:** SAFARI 2000

**Data Set Title:** SAFARI 2000 TOMS Tropospheric Ozone Data, Southern Africa Subset, Dry Season 2000

**Site:** Southern Africa

**Westernmost Longitude:** -41 W
**Easternmost Longitude:** 75 E
**Northernmost Latitude:** 0 N
**Southernmost Latitude:** -25 S

**Data Set Citation:**

McPeters, R. D., A. M. Thompson, and D. Larko. 2005. SAFARI 2000 TOMS Tropospheric Ozone Data, Southern Africa Subset, Dry Season 2000. Data set. Available on-line [http://daac.ornl.gov/] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.

**Data Users Guide:** TOMS Users Guide (PDF)

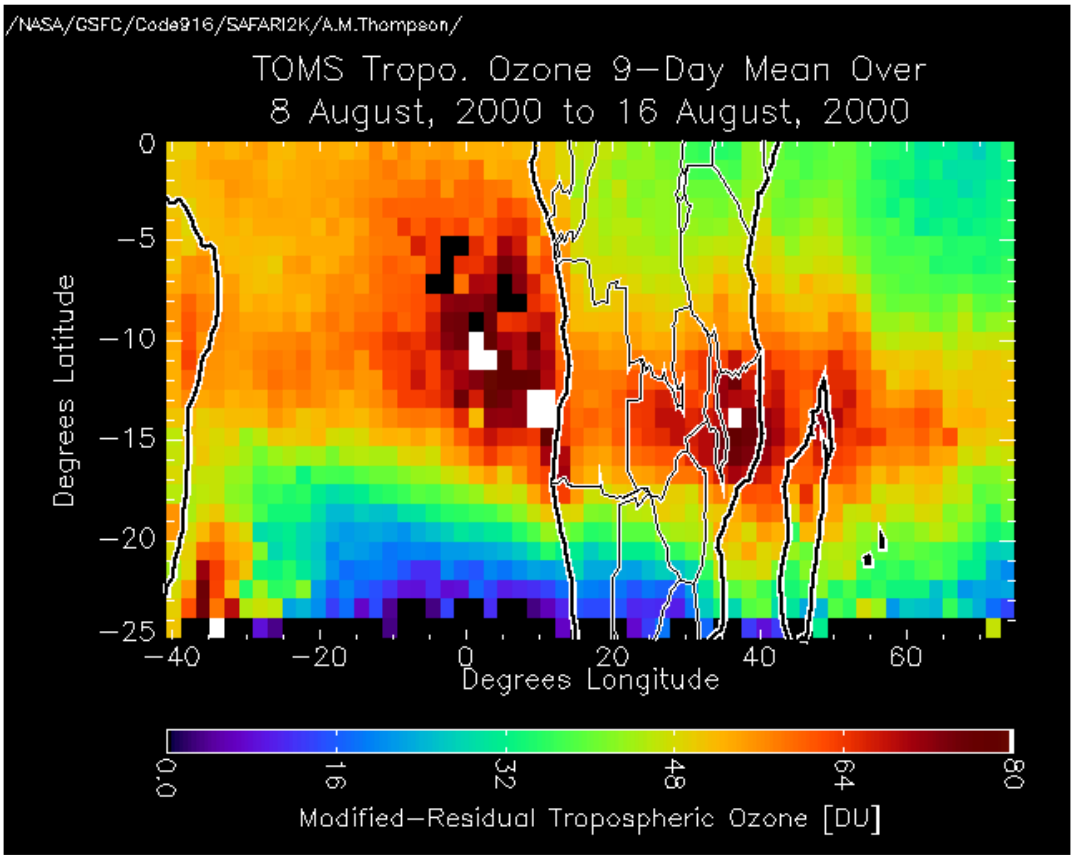
# TOMS Tropospheric Ozone Data

The TTO measurement is derived from Level-2 TOMS total ozone (Thompson and Hudson, 1999; Thompson et al., 2001) using the modified-residual method to separate stratospheric ozone from tropospheric ozone. The tropospheric ozone column thickness is reported in Dobson Units (DU). If the ozone mixing ratio were uniform throughout the troposphere, X DU would be roughly equivalent to X ppbv (parts per billion by volume) throughout the tropospheric column. 20-30 DU is an unpolluted tropospheric column; TTO > 40 DU represents polluted conditions in the tropics. More TOMS TTO data are available at http://metosrv2.umd.edu/~tropo/.

## TOMS Tropospheric Ozone File Information

The TOMS Tropospheric Ozone data files are an 9-day averaged gridded ASCII product. There is also a GIF image of each data file. The data are on a fixed 1-degree latitude by 2-degree longitude grid, which is why the GIF images look "squished" (see image below, and note the "skinny" southern section of Africa).

```
Product: TOMS Modified Residual Tropospheric Ozone [units = DU]
Temporal Coverage:  Aug 8 - Sep 29, 2000
Spatial Coverage: lat (-25 - 0), Long (-41 - +75)
Frequency: Daily 9-Day Averages
Format:  Data = ASCII
         Image = GIF
Resolution: 1 deg Latitude by 2 deg longitude
No data default: -999.0
```




**A sample TOMS Tropospheric Ozone image over southern Africa.**

**Sample TOMS Tropospheric Ozone Data File**

```
 50.8715     -999.000     -999.000      93.2871     -999.000     -999.000
 8.54366      3.71084     -999.000     -999.000     -999.000     -999.000
-999.000     -999.000     -999.000      2.99736     -999.000     -999.000
-999.000     -999.000     -999.000     -999.000     -999.000     -999.000
-999.000     -999.000     -999.000      6.95844     -999.000     -999.000
-999.000     -999.000      7.65175      13.1636      18.4141     -999.000
-999.000      17.3848     -999.000     -999.000      13.0067      8.17660
 12.9440     -999.000     -999.000      31.5229     -999.000     -999.000
-999.000     -999.000     -999.000     -999.000     -999.000     -999.000
-999.000     -999.000     -999.000      46.8945     -999.000
 49.4690      62.0508      74.7121      58.5182      68.8124      45.1899
 47.4994      45.9607      22.6799      24.3605      20.8996      13.5638
 17.6030      7.29865      14.6448      3.84791     -999.000     -999.000
 2.86690      13.9123     -999.000     0.354309      11.8559     -999.000
0.547115      3.00924      6.17706      10.6843      15.6217      14.6132
 14.5057      15.5581      11.1672      12.0930      11.4853      9.86513
 18.5560      27.1463      33.6396      28.4270      38.9284      39.9452
 28.8469      30.4145      23.4023      24.4324      38.7856      35.7172
 48.0225      43.8286      21.5175      26.5311      25.7446      24.6217
 36.3047      27.8967      24.0023      17.6609      14.1835
```

## Acknowledgments

The TOMS Level-3 aerosol product described here were prepared by the Ozone Processing Team (OPT) of NASA/ Goddard Space Flight Center. Please acknowledge the Ozone Processing Team as the source of these data whenever using them.

## References

The TOMS tropospheric ozone product described here was derived from the Level-2 total ozone data. In addition to citing the data set at the the ORNL DAAC, please include the following citations if you use these data.

Thompson, A. M. and R. D. Hudson. 1999. Tropical Tropospheric Ozone (TTO) maps from Nimbus-7 and Earth-Probe TOMS by the modified-residual method: Evaluation with sondes, ENSO signals and trends from Atlantic regional time series. J. Geophys. Res., 26: 961-26,975.

Thompson, A. M., J. C. Witte, R. D. Hudson, H. Guo, J. R. Herman, and M. Fujiwara. 2001. Tropical tropospheric ozone and biomass burning. Science, 291: 2128-2132.

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