

Southern Hemisphere Additional Ozonesondes (SHADOZ): Data Quality and Characteristics of Tropical Ozone Behavior

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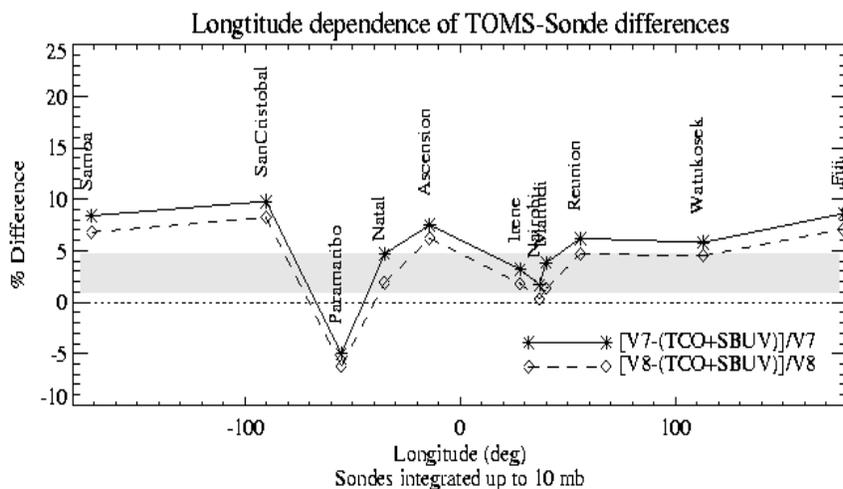
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The Southern Hemisphere Additional Ozonesondes (SHADOZ project) began in 1998. SHADOZ augments ozonesonde launches at selected tropical sites and provides an archive of ozone profiles and radiosonde data at: <<http://croc.gsfc.nasa.gov/shadoz>>. Analysis of ozone profiles from the SHADOZ data set revealed certain characteristics of the ozonesonde measurement. All SHADOZ stations use the electrochemical concentration cell (ECC) sonde, but small variations in instrument type (there are two ECC sonde manufacturers) and preparation procedures may affect the ozone measurement. Total ozone column amounts from the SHADOZ sondes are compared to version 8 (v 8) Total Ozone Mapping Spectrometer (TOMS), a new processing of the satellite ozone measurement that uses SHADOZ ozone profiles as a source for tropospheric ozone climatology. Offsets of sonde total ozone with TOMS version 8 and with colocated total ozone instruments from six SHADOZ stations were compared with offsets between the sonde total ozone and version 7 (v 7) TOMS data. The tendency for the TOMS ozone column to exceed that of the Dobson by overestimating tropospheric ozone in the satellite algorithm appears unchanged in the transition from v 7 to v 8. There is a tendency for the Pacific SHADOZ stations and Watukosek, Indonesia (Figure 1) to be biased lower, relative to TOMS, than the Atlantic and African stations. The Northern Hemisphere (NH) ozonesonde site at Paramaribo, Surinam, has slightly higher column amounts than TOMS. The TOMS algorithm (both v 7 and v 8) assumes a greater tropospheric ozone column depth (~30 Dobson Unit (DU)) than actually measured at the SHADOZ Pacific stations (mean tropospheric column depth, ~19 DU). There is only a 1-2 percentage point change to the TOMS-normalized data at the SHADOZ stations using version 8 compared to version 7.

SHADOZ total, stratospheric, and tropospheric column amounts usually peak between August and November. There is a persistent wave-one pattern that is primarily tropospheric in origin with a greater concentration of free tropospheric ozone over the tropical Atlantic compared to the Pacific. This appears to be associated with characteristics of the tropical general circulation and seasonal pollution from biomass burning. In the stratosphere the quasi-biennial oscillation (QBO) plays a significant role in modulating ozone behavior.



Future efforts will focus on better defining NH tropical ozone behavior with additional stations planned north of the equator.

Figure 1. Summary of averaged differences between total column ozone from SHADOZ sondes and from TOMS v 7 and v 8. Shaded region is range of 1998-2000 Dobson data.