

Seasonal and interannual variations of tropical ozone in the Southern Hemisphere Additional Ozonesondes (SHADOZ) data

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The 1998-2007 data from ten SHADOZ tropical ozonesonde stations are analyzed to investigate seasonal, year-to-year, and decadal variations of ozone in the troposphere and the tropopause region. For the two southeast Asian stations, Watukosek and Kuala Lumpur, the 1993-1997 data are also included in the analyses.

The equatorial wave-one structure with a clear seasonal cycle, a maximum over the Atlantic during September and November and a minimum over the Pacific during March and May, is a robust characteristic for 1998-2007.

Interannual variations of tropospheric column ozone are greatly controlled by the El Nino-Southern Oscillation (ENSO) at Watukosek, Indonesia. El Nino events cause drought and biomass burning there, both of which result in net photochemical production of ozone. The interannual variability in the eastern Pacific (Galapagos) and in the Atlantic (Natal, Paramaribo, and Ascension) is smaller than in the western and central Pacific (Kuala Lumpur, Watukosek, and Fiji).

Around the tropopause and in the lowest part of the stratosphere, a significant decadal-scale variation is observed. At Watukosek and Kuala Lumpur, ozone at 16-20 km showed a maximum around 1999 and an increase in 2006 to 2007. The ozone decrease after 2000 and the increase after 2006 are also seen in most of the other eight stations. However, the stations in and around the Atlantic (Natal, Ascension, and Nairobi) do not show significant changes. This longitudinal inhomogeneity suggests a tropospheric contribution to the decadal variation of ozone at 16-20 km.