

Variability in the Observed Tropospheric Ozone over Equatorial Eastern Africa: An Analysis of Nairobi SHADOZ Ozonesonde Data

W. Ayoma¹, G. Levrat², and B. Calpini²

¹Kenya Meteorological Department, P.O. Box 30259, Nairobi, Kenya; E-mail: ayoma@lion.meteo.go.ke
²MeteoSwiss, Aerological Station Payerne, CH-1530, Payerne, Switzerland

There are still many unresolved problems concerning the present state of the equatorial ozone that plays a vital role in the life of our planet. Ozone absorbs harmful solar ultraviolet (UV) radiation shielding humans and other animals and plants from damage. These challenges can only be addressed if long-term ozone data are available on a global basis. At present there is very little data coverage along the equatorial region. Recent scientific studies indicate a decline in ozone quantity over the globe. These developments demonstrate the need for precise long-term measurements as well as quantification of the short-term variability. More importantly, monitoring needs to be conducted in tropical regions where most stratospheric ozone is formed because of the availability of high levels of solar UV radiation. The Nairobi ozonesonde station mission is to bridge the information gap by assessing the long-term changes in equatorial tropospheric and stratospheric ozone. The variations of tropical atmospheric ozone is crucial for the radiative balance of the Earth-atmosphere system. Moreover, models of the world's climate require information on the tropical atmosphere, especially East Africa because of its position with respect to high pollution sources by countries bordering the Indian Ocean.

We present an 8-year analysis of weekly ozone soundings conducted over Nairobi (1°18S, 36°45'E, 1795-m above sea level). The average ozone vertical profile indicates the largest concentrations of ozone occur approximately above 14 km, and the maximum ozone values occur between 26-28 km above the surface. A statistical analysis of ozone profiles split into three layers reveals strong yearly variation in the free troposphere and the tropopause region, while ozone in the stratosphere appears to be relatively constant throughout the year. Total ozone measurements using Dobson and Microtops instruments confirm maximum total ozone content during the short-rainy season and a minimum in the warm-dry season, a result in good agreement with TOMS satellite data.