Inter-Comparisons of Satellite, Dobson Spectrophotometer and Ozonesonde Ozone Data Observations Over Nairobi, Kenya

C.C. Okuku

Kenya Meteorological Department, P.O. Box 30259 00100, Nairobi-GPO, Kenya; +254-72-2876175,
Fax: +254-20-3876955, E-mail: colnex2004@yahoo.co.uk

The study sought comparison of satellite ozone data from 1985 to 2003 against ground based Dobson ozone spectrophotometer data from 1985 to 2001 and vertical profile Ozonesonde data from 1998 to 2003. The area of study was Nairobi Global Atmospheric watch station number 175 located at 1.30°S and 36.75°E at an altitude of 1660 meters (5450 feet) and the main objective was to ascertain the similarity of the three ozone data sets.

The inter-comparison was carried out by pairing two data sets of corresponding Julian day. The Root mean Square error, bias and percentage difference were used in order to achieve the objectives of the study. The root mean square (RMS) error for Dobson Satellite was between 3% and 15%, Percentage difference with Dobson as reference was between (0-20)%. Dobson Ozonesonde had RMS error of 27-93 %, Percentage difference of 0.5-17% with Ozonesonde as reference. While Ozonesonde/Satellite data sets yielded RMS error of 4-50%, Percentage difference of 4-50% with Ozonesonde as the reference.

In the three categories the RMS error was highly variable and large, i.e. between 3-93%. Percentage difference was equally variable ranging from 0.5-50% with ground based instruments, i.e. Dobson Ozonesondes. Bias was positive on average; otherwise it ranged between -2du to 19du. It is evident from the results that the three data sets are not comparable at the moment. There is serious need for strict and consistence reading of the ozone data on daily basis especially Dobson and the weekly Ozonesonde flights to allow further investigations and re-calibration of the three instruments. The Ozonesonde data had a lot of discrepancies partly because of vertical dynamics of Ozone and that of the Balloon carrying the Ozone sensors. Therefore during re-calibration the above should be considered.

Figure 1. Dobson D018 now is being operated at the Nairobi Kenyan Meteorological Department Facility.