ABSTRACT
SATELLITE-BORNE AND GROUND-BASED TOTAL OZONE COLUMN CONCENTRATION MEASUREMENTS IN THE PHILIPPINES: COMPARISONS AND VARIABILITY

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The ozone layer is under threat due to warming in the troposphere brought about by the increase in greenhouse gases (GHG) concentrations. Warming in the troposphere makes the stratosphere cooler, producing polar stratospheric clouds (PSCs) that support chemical reactions that produce active chlorine which destroys ozone. Ozone measurements and analyses with different instrument platforms (satellite-borne and ground-based) must still be performed as they remain essential even with the signing of the Montréal Protocol. The Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) contributes to the Global Atmospheric Watch (GAW) Program of the World Meteorological Organization (WMO) [2006-2013] by measuring daily total ozone column using a Dobson spectrophotometer. Maximum amount of ozone was observed during the summer period and minimum throughout the winter due to unequal solar radiation which is a factor for ozone production. The differences between satellite-borne and ground-based ozone measuring instruments vary due to local weather events, solar zenith angle, sky conditions, and the relatively large footprint of the satellites. Comparing the ground-based Dobson spectrophotometer and the Scanning Imaging Absorption Spectrometer for Atmospheric Chartography (SCIAMACHY) instrument on-board the ENVISAT satellite yielded a correlation coefficient and a root-mean-square error of 0.7261 and 12.45 DU, respectively. On the other hand, comparing the Dobson spectrophotometer and the Ozone Monitoring Instrument (OMI) on-board the Aura satellite produced a correlation coefficient and root-mean-square error of 0.5943 and 16.06 DU, respectively. The effect of water vapor intrusion in the Upper-Troposphere-Lower-Stratosphere (UTLS) to the total ozone column during tropical cyclones was also quantified and investigated using the Weather Research and Forecasting (WRF) model. The study is the first of its kind and the results will serve as the baseline data for the Philippines.