

## Total Ozone trends at Natal, Brazil

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Abstract.

During the recent decades, there has been considerable interest in studies related to long-term trends in the atmospheric ozone because of anthropogenic and natural influences. Considering the few measures of the atmospheric ozone in the southern hemisphere in early 1970's, regular observations of atmospheric ozone were started by the Brazilian National Institute for Space Research (INPE) in cooperation with World Meteorological Organization (WMO) installing a Dobson spectrophotometer at Natal (5.8°S, ; 35.2°W), Brazil , in November 1978. In this communication results of long-term trends in total ozone measurements at Natal (November 1978 to December 2015) are presented.

In 1998 important collaboration started with the Southern Hemisphere Additional OZonesondes (SHADOZ-<http://croc.gsfc.nasa.gov/shadoz/>) program from NASA. A short break in the ozone sounding programs was experienced during 2011 - 2013.

Measurements with Dobson spectrophotometer are used to study ozone trends at Natal (5.8°S, 35.2°W) in Brazil. The time series are from 1978 to 2015 and . Using a model that accounts for the quasi-biennial oscillation, seasonal variation, and solar cycle, a trend in total ozone was  $-0.8 [U+F0B1] 0.8\%$  per decade over the period 1978 to 1997 and 2006 to 2010. From a monthly analysis it is shown that these ozone decreases have occurred in all months of the year. There was no statistically significant change between the 1980s and 1990s at Natal. The annual values of column ozone reported at Natal are normal in the period 2010 to 2015.

The results with ozone sounding and Brewer spectrophotometer are analyzed.