

20 YEARS OF ACTIVITIES AT USHUAIA GAW STATION. TIME SERIES AND TRENDS

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ABSTRACT

As a part of the Global Atmospheric Watch Programme of the WMO, the Ushuaia GAW Station has carried out several atmospheric measurement projects over more than 20 years. The impetus for the work accomplished by the cooperating organizations and institutions are to make atmospheric researches which will facilitate a better understanding of the global environment.

The Ushuaia GAW Station is part of a global baseline observing network which consists of a limited number of stations at selected locations world-wide distributed. The main station goal is to perform measurements of the atmosphere baseline conditions, so called background data, i.e., without local factors influence, under the highest standards of quality and control.

Due to the Southern Hemisphere geography, there are very few stations located in middle or high latitudes which, coupled with its proximity to Antarctica, make the station a strategic point in the global network.

The observatory has played a critical role in detecting and understanding changes in atmospheric composition in the southern atmosphere related to climate change.

A complete data cycle of surface ozone and carbon monoxide, ozone column, greenhouse gases and solar radiation measurements are presented.

The entire time series analysis for surface ozone shows a not well-defined or a small decreasing trend. For surface carbon monoxide we can note also a no significant trend or a slight downward trend in the entire time series (1994-2014), with a slope slightly higher from 2004 to 2014.

In reference to greenhouse gases, the carbon dioxide levels have a significant positive trend; similar behaviour is observed with methane, especially in recent years (2007 to present). Nitrous oxide and sulphur hexafluoride also shows a well-defined upward trend in the full period.

Column ozone levels over the 1994-2014 period, show no significant trend or a very slight upward trend (+0.007 DU yr⁻¹) being highly variable year to year. Due to its location (55° S - 68° W), Ushuaia is affected every year by the Antarctic ozone hole, which causes brief episodes of low ozone values and high UV radiation. Ozone hole events over Ushuaia are 3 or 4 per year average, occurring between September and November, with minimum values close to 190 UD on average.

Keywords: Reactive gases, time series, trends.