

6.003 Long-term measurements of atmospheric inorganic gaseous species at Cape Point, South Africa.

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Abstract:

The Cape Point Global Atmosphere Watch (CPT GAW) station is globally considered to be an important atmospheric monitoring site due to its position at the south-western tip of Africa. CPT GAW is a baseline station measuring long-term trends under background conditions, which is predominantly impacted by clean maritime air masses. However, it is also impacted by local sources of atmospheric pollutants, which include the greater Cape Town conurbation and other industrial activities in this region. CPT GAW is also part of the southern African IGAC DEBITS Africa (IDAF) network. Long-term passive sampler measurements of atmospheric inorganic gaseous species, i.e. sulphur dioxide (SO₂), nitrogen dioxide (NO₂), ammonia (NH₃), nitric acid (HNO₃) and ozone (O₃) conducted at CPT GAW from 1995 to 2015 were assessed in order to establish seasonal patterns, inter-annual variability and long-term trends of these compounds. Distinct seasonal patterns were observed for SO₂, NO₂ and O₃, with concentrations of these species peaking during the wet winter/early spring months (June-September). The seasonality was attributed to an increase in long-range transport of pollutant species from the industrialised interior of South Africa and larger impacts of air masses passing over the Cape Town conurbation. Higher NO₂ concentrations were also attributed to increased microbial activity occurring with the onset of the wet season. The inter-annual average concentrations of SO₂ and NO₂ revealed a steady decrease up until 2002, after which an increase in annual average concentrations was observed. These increases could partially be attributed to economic growth and the increasing population in South Africa. In an effort to substantiate long-term trends, the dataset will also be subjected to a multilinear regression model in order to establish the influence of changes in regional and global meteorological patterns on concentrations of these inorganic gaseous species, which will be reported at the IGAC 2016 conference.