EGU23-6394, updated on 25 Apr 2024
https://doi.org/10.5194/egusphere-egu23-6394
EGU General Assembly 2023

Potential influence of volcanic aerosol on the colour index of ground-based spectroscopic measurements

Bianca Lauster[1,2], Steffen Ziegler[1], Carl-Fredrik Enell[3], Udo Frieß[2], Myojeong Gu[1], Janis Pukite[1], Uwe Raffalski[4], and Thomas Wagner[1]

[1]Satellite Remote Sensing Group, Max Planck Institute for Chemistry, Mainz, Germany (b.lauster@mpic.de)
[2]Institute for Environmental Physics, University of Heidelberg, Heidelberg, Germany
[3]EISCAT Scientific Association, Kiruna, Sweden
[4]Swedish Institute of Space Physics, Kiruna, Sweden

Polar stratospheric clouds (PSCs) are an important component of the ozone stratospheric chemistry in polar regions. Ground-based spectroscopic measurements can be taken for detecting PSCs in various weather conditions using the so-called colour index (CI) and are a valuable complement to other PSC data sets such as satellite observations.

In this study, continuous long-term measurements from two DOAS (Differential Optical Absorption Spectroscopy) instruments at Kiruna, Sweden (68° N, 20° E), and at the German research station Neumayer, Antarctica (70° S, 8° W) are analysed. In 20 years of measurements, no significant trend is detected for either measurement station. However, the years with preceding large volcanic eruptions show unexpectedly high occurrences of PSC-like signatures during springtime which suggests the influence of volcanic aerosol. This is likewise indicated by enhanced aerosol extinction during these time periods as seen from OMPS (Ozone Mapping and Profiler Suite) data, but is not captured by other PSC climatologies. The observed springtime signal looks very similar to the CI of PSCs and can only be distinguished by other proxy data such as temperature. This ambiguity needs to be considered in the interpretation of colour index data. The potential importance of our results to stratospheric ozone chemistry is not yet clear.