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Determination and distribution of extreme events in total ozone using the world's longest total ozone record from Arosa, Switzerland

H.E. Rieder (1), J. Staehelin (1), G.E. Bodeker (2), R. Stuebi (3), J. Maeder (1), L. Divis (1), P. Weihs (4), F. Holawe (5), S. Simic (4)

(1) Institute for Atmospheric and Climate Science, ETH Zurich, Zurich, Switzerland

(2) National Institute of Water and Atmospheric Research, Launder, New Zealand

(3) Federal Office of Meteorology and Climatology MeteoSwiss, Payerne, Switzerland

(4) Institute for Meteorology, University of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria

(5) Institute for Geography and Regional Research, University of Vienna, Vienna, Austria

Corresponding author: harald.rieder@env.ethz.ch

Abstract

The destruction of the stratospheric ozone layer through anthropogenic chlorine- and bromine-containing gases has been discussed since 1974. During the last decades, the discussion has focused on negative trends in stratospheric ozone because of the direct link between decreasing stratospheric ozone and increasing surface UV-radiation. Previous studies have examined transient extreme low ozone events termend "ozone mini holes". For the formation of extreme events in total ozone in the mid-latitudes two different mechanisms have been proposed to be important: (a) far-range meridional transport of air masses from regions with different climatological ozone mixing ratios and (b) local adiabatic vertical displacement of isentropes (e.g. Koch et al., 2005). Different definitions for ozone-miniholes can be found in the literature (e.g. James 1998, Bojkov and Balis 2001). In this study an analysis of the world's longest

ozone record, which is available from Arosa, Switzerland using new statistical analyses of extremes is presented. In addition the NIWA combined total column ozone data record for Arosa is also analysed in the study. Within this framework the applicability of different definition approaches for extreme events in total ozone will be discussed. Knowledge about the frequency and distribution of past extreme events in total ozone is an important aspect of the discussion about the recovery of the ozone layer and to provide information for the prediction of such future extreme events.

References

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