

Global tropospheric ozone distribution derived from SCIAMACHY limb-nadir matching observations.

Felix Ebojie[†]; Christian von Savigny; Annette Ladstetter-Weissenmayer; Stefan B[^]tel; Heinrich Bovensmann; John Burrows

[†] University of Bremen, Germany

Leading author: felix@iup.physik.uni-bremen.de

The limb-nadir-matching technique of the scanning imaging absorption spectrometer for atmospheric chartography (SCIAMACHY) instrument onboard the ENVISAT satellite has been used to retrieve tropospheric ozone. This method simply involves the subtraction of the stratospheric column derived from the limb observations from the total column derived from the nadir observations. This novel approach to retrieving tropospheric ozone is a state of the art technique that removes the uncertainties that may arise when comparing measurements made by different instruments probing slightly different air masses in different observation geometries. Tropospheric ozone has a significant adverse effect on the climate system, especially of the troposphere. It generally has great impact in the lower, middle and upper troposphere. In the lower troposphere, during summer, it can lead to the production of photochemical smog and excess of it are toxic to the ecosystem, animal and man. It is equally known as a major oxidant and also involved in the production of other oxidant such as hydroxyl (OH) radicals. In the middle and upper troposphere, ozone acts as a greenhouse gas. A good knowledge of the distribution of tropospheric ozone production and fluxes on the global scale would lead to a better understanding of how it directly affects the climate as well as its role in atmospheric photochemistry. This study presents the global distribution of tropospheric ozone from January 2003 to December 2009 with the corresponding influence of photochemical and stratospheric sources as well as some seasonal variations with the expected latitudinal gradients which are evident on the global scale. Global maps showing the distribution of tropospheric ozone are shown. It equally shows that errors still remain at high latitudes, particularly in the northern hemisphere. Also presented are validation results of the data products used.