

Ozone data assimilation at high resolution over Europe with MOCAGE-PALMJerome Barre[†];[†] Meteo France, FranceLeading author: jerome.barre@meteo.fr

We demonstrate the benefit of data assimilation for studying tropospheric ozone distributions and stratosphere-troposphere exchange, and for providing improved estimates of stratosphere-troposphere ozone fluxes. We use assimilation of MLS stratospheric observations to constrain the MOCAGE model in the UTLS and the free troposphere. We focus on a period (17th July 2009) when there was a stratospheric intrusion. The fidelity of the analysed fields and the free model run fields is assessed by comparison against independent data from the MOZAIC aircraft and the ozone sonde network. Estimates of stratosphere-troposphere ozone fluxes are evaluated by comparison against other studies. The experiments described show that: i. The ozone analyses provide a better description of the stratospheric intrusion than the free model run; ii. The ozone analyses provide a better description of the troposphere than the free model run; iii. Increasing the horizontal resolution generally improves the performance of the analyses and the free model run; iv. The ozone analyses provide a better estimate of stratosphere-troposphere ozone fluxes than the free model run; v. Horizontal resolution is a factor in flux estimates. This may affect adversely results from studies which use relatively coarse spatial resolution. We also propose to extend the geometry of the observations assimilated by combining limb observations from MIPAS (Michelson Interferometer for Passive Atmospheric Sounding) with nadir observations from IASI (Infrared Atmospheric Sounder Interferometer). This combination of geometries is expected to help improve the fidelity of the ozone analyses in the UTLS and free troposphere, e.g., the ozone vertical gradient, and correct for the low bias seen in the analyses for the free troposphere. This will be tested by assimilation experiments using the MOCAGE-PALM system.