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The ASSET intercomparison of ozone analyses

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This study examines 13 sets of ozone analyses from 7 different data assimilation systems. Two are numerical weather prediction (NWP) systems based on general circulation models (GCMs); the other five use chemistry transport models (CTMs). These systems contain either full or linearised ozone chemistry, or no chemistry at all. In most analyses, MIPAS ozone data are assimilated. Two examples assimilate SCIAMACHY observations. The analyses are compared to independent ozone observations covering the troposphere, stratosphere and lower mesosphere during the period July to November 2003. Through most of the stratosphere (50hPa to 1hPa), biases are usually within $\pm$10% and standard deviations less than 10% compared to ozonesondes and HALOE . Biases and standard deviations are larger in the upper-troposphere/lower-stratosphere (UTLS), in the troposphere, the mesosphere, and the Antarctic ozone hole region. In these regions, some analyses do substantially better than others, and this is mostly due to differences in the models. In general, similarly good results are obtained no matter what the assimilation method (3D-Var, 4D-Var, or Kalman filter), or system (CTM or NWP system) and this in part reflects the generally good quality of the MIPAS ozone observations. Using the analyses as a transfer standard, it is seen that MIPAS is $\sim$5% higher than HALOE in the mid and upper stratosphere and mesosphere (above 30hPa), and 10% to 50% higher than ozone sonde and HALOE in the UTLS (200hPa to 30hPa).