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Analysis of ozone variability during the campaign PIC2005

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During the PIC2005 campaign in June/July 2005, remote sensing and in situ measurements were performed in Pyrenean Mountains in south-western France. The scopes of this campaign were: (i) to examine if the meteorological station of Pic du Midi (PDM) (2875 m a.s.l.) samples the free troposphere, (ii) to study how much orography affects the transport of air masses and ozone measurements at the PDM station (iii) to estimate ozone production in this area. Ozone was measured using the differential absorption lidar ALTO, that was situated in the Centre de Recherches Atmosphériques (CRA) at Lannemezan (650 m a.s.l.), which is 28 km north – east of the top PDM. The ozone stratification and the variability of aerosols scattering ratio, which were observed with the lidar ALTO, are analysed with two models which both compute backtrajectories: the Lagrangian particle dispersion model FLEXPART and the mesoscale model MESONH. Transport phenomena account for most of the observed ozone stratification, either at the synoptic or at the mesoscale. The two models complete each other: the MESONH model describes better the low altitudes (where the air masses are influenced by the orography), while the FLEXPART model the free troposphere (where the long range transport is more important). Using ALTO measurements and several other data sets, ozone variability at the PDM level is also discussed to evaluate to what extent ozone measurements at this station are representative of the free troposphere.