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Observation of a reverse ozone weekend effect in the South Coast Air Basin (SoCAB) during summer 2010

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Ozone (O_3) and nitrogen dioxide (NO_2) are two important component of air pollution. Ambient levels of these two species are inextricably linked due to the chemical coupling of O_3 and NO_x (NO + NO_2). Horizontal maps of vertical column amounts of NO_2 and O_3 vertical profiles were measured aboard the NOAA Twin Otter research aircraft during the CalNex and CARES field campaigns in summer 2010 by CU AMAX-DOAS and NOAA TOPAZ lidar instruments. A total of 52 flights (up to 4 hours each) were carried out between May 19 and July 19 covering most of California. Measurements of column integrated quantities over boundary layer height characterize the total pollutant load present in the atmosphere.

Simultaneous vertical column measurements of NO_2 and O_3 are used to investigate the horizontal variability in Ox (= O_3 + NO_2) for selected case studies. We evaluate Ox partition over different chemical regimes/air masses such as urban pollution hotspots, clean background conditions, and assess differences in Ox partitioning between weekdays and weekends. The observation of elevated O_3 during weekends is a wide spread phenomenon in California. Our column observations also provide an innovative means to investigate the question of whether surface in-situ measurements of Ox partitioning at monitoring stations are indicative over the entire planetary boundary layer height.