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An estimate of NO_2 vertical mixing layer in the PO Valley Area from DOAS measurements and radiative transfer modeling

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In this work we present the simultaneous observations of NO_2 slant columns carried out by two zenith looking GASCOD type UV-Vis spectrometers installed in Bologna (44.53 N, 11.30 E, 42 m asl) and in the Mt. Cimone research station (44.18 N, 10.70 E, 2165 m asl) during 2003.

The daily behavior from March 2003 to September 2003 is analyzed also through comparison with in situ observations performed by the local environmental services (Agenzia Regionale Prevenzione ed Ambiente, ARPA). We have used also the meteorological observations performed at the closed airport of Bologna including temperature, humidity, cloud cover, wind intensity and direction. The multiple scattering RTM PROMSAR (PROcessing of Multi-Scattered Atmospheric Radiation), based on the backward Monte Carlo technique, is applied to the difference between simultaneous NO_2 slant columns measurements in order to:

- retrieve the NO_2 vertical column densities (VCD) in a polluted planetary boundary layer (PBL) such that of the Bologna area (PO Valley, Italy);

- supply an estimate of the NO_2 vertical mixing layer in the cases of good agreement between the daily variation of the NO_2 PBL VCD and the in situ observations performed by the local environmental services.