



Pic 2005: a field campaign to understand ozone and CO measurements on mountain tops

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The field campaign Pic 2005 took place in summer 2005 in the area around the Pic-du-Midi – a 2875 m-high peak in the Pyrenees. It involved surface ozone and CO analyzers, meteo stations, two lidars and two wind-profiler radars (UHF, VHF). It aimed at two main objectives: (i) to understand the chemical signal measured at the Pic-du-Midi (a station of the French network PAES devoted to monitoring the synoptic scale pollution) and precise in what conditions the data are representative of the free troposphere; (ii) to learn about pollution-exchange processes between the boundary layer and the free troposphere in mountainous areas. A first analysis of the collected data showed a few number of well characterized weather situations and associated chemical signals. The most frequent situation (more than 50% of days) is a slow synoptic flux and sunny weather (at least partly), favouring the daytime development of upslope breezes and the vertical mixing of the low layers. The ozone signal at the lowest stations (in the piedmont and in a valley bottom near the Pic-du-Midi) shows a classical diurnal cycle with maximum concentration in the afternoon, in response to local photochemical production. However the ozone generally peaks below the background concentration of 50-55 ppb observed in altitude at the Pic-du-Midi station (this was especially the case in the forest covering the foot of the mountain where nocturnal destruction was observed to be very important). In daytime the vertical mixing should therefore *lessen* the ozone concentration observed at the summit despite ozone production in the low levels. This is actually what was observed in the data - not only during the campaign but also as a climatologic feature. Those data inspired an idealized model-study at high resolution. The simulation fully supports the above explanation.