



Ozone observation in France and Switzerland by MERA and PAES surface station networks between 2001 and 2004.

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The PAES (French acronym for Synoptic Scale Atmospheric Pollution) network focuses on the composition (ozone, CO, NO_x/y and aerosols) of the lower troposphere (0-3000 m). Its high-altitude surface stations located in mountainous areas in France complete the low-altitude rural MERA stations (the French contribution to the european program EMEP). They are representative of pollution at the scale of the French territory because away from any major source of pollution. This study deals with ozone observations between 2001 and 2004 at 12 stations of these networks plus 9 Swiss Alpine stations. Averaged levels of ozone increase with elevation in good agreement with data provided by MOZAIC (Measurement of Ozone and Water vapour by Airbus In-service Aircraft). Not only the monthly-averaged levels but also the associated variability show a clear seasonal cycle (with an amplitude of 10 to 20 ppb for mean levels). The higher variability in summer can be related to lasting anticyclonic systems during which the day-to-day net photochemical production is positive. As a result, secondary maxima in July or August may appear in addition to the tropospheric spring maximum. The diurnal-cycle amplitude decreases with elevation down to almost zero at Jungfraujoch (3500 m). At Iraty (1400 m) and Pic-du-Midi (2877 m), the averaged diurnal cycle is reversed. At daytime, ozone-poor air from the lower atmosphere rises due to upslope breezes and dilutes into ozone-rich background air at the mountain top. Ozone concentrations are better correlated between plaine stations than altitude stations. It is probably linked to the role of photochemical processes in the boundary layer at the regional scale whereas high-altitude stations are more affected by long-range transport. This points out the relevance of altitude-station networks such as PAES for the long-term observation of ozone in the free troposphere.