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Sub-continental transport mechanisms and pathways during two ozone episodes in northern Spain

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Abstract. Two ozone episodes (occurring in June 2001 and June 2003) in the air quality monitoring network of the Basque Country (BC) are analyzed. The population information threshold was exceeded in many stations (urban, urban-background and rural). During this type of episodes, forced by a blocking anticyclone over the British Isles, ozone background concentrations over the area increase after the import of pollution from both, the continental Europe and the western Mediterranean areas (Gangoiti et al., 2002). For the present analysis, emphasis is made in the search for transport mechanisms, pathways and area sources contributing to the build-up of the episodes. Contributions from a selection of 17 urban and industrial conglomerates in the western European Atlantic (WEA) and the western Mediterranean (WM) are shown after the results of a coupled RAMS-HYPACT modelling system. Meteorological simulations are tested against both the high-resolution wind data recorded at the BC coastal area by a boundary layer wind-profiler radar (Alonso et al., 1998) and the wind soundings reported by the National Centres of Meteorology at a selection of European and north-African sites. Results show that during the accumulation phase of the episodes, background ozone concentrations increase in the whole territory as a consequence of transport from the Atlantic coast of France and the British Channel. For the peak phase, intrusions from new sources, located at the Western Mediterranean, Southern France, Ebro Valley, and, occasionally, the area of Madrid are added, resulting in a further increase in the ozone concentrations. Direct day and night transport within the north-easterly winds over the sea from the WEA source region, and night-time transport within the residual layer over continental areas (southern France, the Ebro Valley, and central Iberia) modulate the import sequence of pollutants and the local increase of ozone concentrations. The alternative direct use of low resolution meteorological data for the estimation of back-trajectories shows a more simple transport scheme with no contributions neither from the Western Mediterranean nor from the Madrid area.

◻ Final Revised Paper (PDF, 7408 KB)   ◻ Discussion Paper (ACPD)

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mechanisms and pathways during two ozone episodes in northern Spain, Atmos. Chem. Phys., 6, 1469-1484, 2006. �«ⁱ Bibtex �«ⁱ EndNote �«ⁱ Reference Manager