

OZONE FORMATION DOWNWIND AN INDUSTRIAL COMPLEX IN THE WESTERN MEDITERRANEAN

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It is widely known that the formation of ozone (O₃) is chemically linked to the emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOC). This chemical interdependence is highly complex and gives rise to non-linear and coupled pollutant formation processes. In the present study, airborne measurements of sulfur dioxide (SO₂), NO_x, total reactive oxides of nitrogen (NO_y), and O₃ taken from an instrumented aircraft (IFU HS-125) within MECAPIP-1989 project are presented and analyzed. The experiment was carried out in the Castellón industrial area, located on the Mediterranean coast of the Iberian Peninsula. Morning near field transects show a strong ozone titration effect downwind the photochemical plume. Moreover, while afternoon measurements still depict ozone consumption near the emissions area, ozone net formation is observed in the mid-field of the Castellón industrial complex. Ozone production efficiencies are derived from the aircraft measurements. This analysis shows a general increase in the ozone production with increasing distance from the industrial area for the morning period. On the other hand, O₃ formation reaches a maximum downwind the emissions complex for the afternoon hours. The marked coastal distribution of the emissions within this area, in addition to the atmospheric dynamics, dominated by coastal-valley mesoscale circulation systems, combine in a way that favors the formation of photochemical pollutants. Furthermore, due to the dynamically driven enhancement of air mass residence times, this particular location offers the unique possibility for studying the influence that local conditions have on the way oxidant production occurs.