

## P2.5 Regional Transport of Tropospheric Ozone: A Case Study in the Northwest Coast of Iberian Peninsula

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**Abstract** Relevant tropospheric ozone levels are frequently reached in the NW coast of the Iberian Peninsula (Galicia) during spring and summertime under high pressure conditions (Logan, 1998). In this study, the origin and associated phenomena to tropospheric ozone episodes in rural areas at that region are considered. Most of them are produced by regional ozone transport from Southern and Eastern regions of the Iberian Peninsula. In addition, analysis and simulation of a typical episode (12–22 September 2003) are presented.

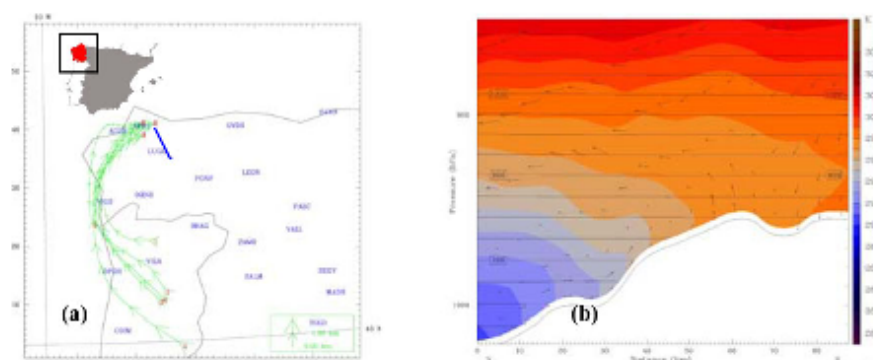
Tropospheric ozone episodes in rural areas of Western Europe have been reported in the past (Logan, 1998). These phenomena appear in Galicia, an Atlantic region with complex topography and strong sea influence. Therefore, a systematic analysis of ozone episodes from 2002 to 2006 was done, considering both field measurements and modelling results. For a typical episode, mesoscale modelling with PSU/NCAR MM5 (Grell et al., 1995) was applied in order to get a better understanding about the origin of O<sub>3</sub> peaks.

Setting an ozone hourly ground level concentration (glc) threshold of 150 µg/m<sup>3</sup>, (close to first legal threshold, 180 µg/m<sup>3</sup>) 26 episodes were identified. Then, an analysis was done considering: (a) field measurements in the region, and its surroundings; and (b) EURAD meteorological and air quality modelling (Memmesheimer et al., 2001).

Analysis of regional conditions during 12–22 September 2003 typical episode shows a synoptic pattern dominated by Central-Europe anticyclone. Weak SE circulation was caused by this synoptic situation in the NW of the Iberian Peninsula, changing to southerly flux on 15th. Then, a typical summertime low pressure gradient was established at Central Peninsula: at this point, maximum ozone glc is achieved, with hourly averages above 135 µg/m<sup>3</sup> (reaching up to 190 µg/m<sup>3</sup>).

Period from 15 to 17 September 2003 was selected to simulate meso-β meteorology and back-trajectories using MM5. Figure 1a shows back-trajectories, covering 12-hour backwards, and showing the transport of air masses from N of Portugal, as in EURAD operational forecast. Figure 1b shows a W-E wind profile over the region, where sea breeze regime (due to the weak pressure gradient coupled with warm land temperatures) causes recirculation of air masses from the coast to inland.

Although in other cases (Alonso et al., 2000) aged pollutants layers from the coastal  $O_3$  can be created, in this episode recirculation contributes to the entrance of  $O_3$ -polluted air from the South, from upper to lower levels, increasing the effect of  $O_3$  external contribution.



**Fig. 1** MM5 simulations results: (a) 12-hour back-trajectories that reach the N of Galicia on 15/September/03 at 16 UTC. Odd and even indexes show 2 and 1,000-m height, respectively; (b) simulated flows showing a convective cell produced by NW sea breeze, opposite to SE synoptic wind, on 16/September/03 at 16 UTC

**Acknowledgments** This work was financially supported by Endesa Generación, S.A. and the R&D Spanish Programme (CTQ2006-15481/PPQ). Air quality data were provided by Environmental Departments of As Pontes Power Plant (Endesa company), Xunta de Galicia and Junta de Castilla-León (Spain), and Ministerio do Ambiente of Portugal. EURAD operational forecasts and technical supports by Meteogalicia and CESGA are acknowledged.

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