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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A study of dispersion in complex terrain under winter conditions using high-resolution mesoscale and Lagrangian particle models" *by* J. L. Palau et al.

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The paper addresses an important issue, mainly the possibility of the up-to-date modeling tools (MM5+FLEXPART in this case) to simulate adequately the dispersion of a plume from a high stack in very complicated meteorological and orography conditions. The study is complemented with intensive 4-day measuring campaign, producing the space distribution of SO_2 concentration aloft and on the ground in direction perpendicular to the plume. The paper presents, what is to my knowledge, a unique dispersive study using measurements aloft and on the ground simultaneously, together with nu-

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merical models resolving mesoscale forcing in a domain with complex topography to reproduce the three-dimensional wind and turbulent fields as well as pollution dispersion. More than 70 papers are referred in the papers showing a solid background permitting to authors to move further.

The measurements and their interpretations are made following an original methodology developed by authors in other publications but described in this paper in Appendixes. In any case, the paper addresses relevant scientific questions within the scope of this journal being of great interest for many air pollution scientists. The description of the experiments and the calculations are sufficiently complete and precise to allow their reproduction by other scientific groups.

Within areas with complex relief strong and extensive micro and mesoscale circulations develop which are enhanced and driven by the topography. These circulations, superimposed on the synoptic flow, influence the advection of momentum, energy, moisture and mass, within scales essentially different from those of turbulence. The aim of the authors is to simulate this complexity in a way as close to the reality as possible. As far as the contemporary modeling tools are up-to-science they are still far to describe adequately such complicated situations. In this sense, the modeling study is an art – the choice of right options between the numerous parameterization schemes provided by the tool during the multiple nesting is critical for the success. The authors have reached this experience as can be seen in presented results, interpretations and conclusions.

The paper title clearly reflects its content, so does the abstract. The presentation is well structured; the language is fluent and precise. the scientific methods and assumptions are valid and clearly outlined. The conclusions are substantial and well validated.

May be it will be useful to stress in the conclusions that the ground-level pollutant concentrations in complex conditions present high spatial variability that are difficult to simulate and compare directly with measurements and that new ways of interpretation of the validation results must be looked for.

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Technical corrections:

Quite few technical errors are obtained and given below:

p. 11973, row 7, in parenthesis must be “Fig.A1”

p. 12006, Capture of Tab.3, contradiction between quantity’s definition and its sign. When nocturnal impact is prevailing the quantity is less than 100% but not negative.

p. 12006, Capture of Tab.3, last sentence, there is no Fig.19

p. 12010, Capture of Fig.2, The sentence “Squares indicate. . . ” is not correct

p. 12011, Capture of Fig.3, The sentence “Finally calculus. . . ” is not correct

p. 12015, Capture of Fig.8, Last row, in parenthesis must be “bottom”

p. 12019, Capture of Fig.11, Last row, in parenthesis must be “bottom”

p. 12028, Capture of Fig. A4, first row, The second “definition” is superfluous

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 11965, 2005.