**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Transport and mixing patterns over Central California during the Carbonaceous Aerosol and Radiative Effects Study (CARES)" *by* J. D. Fast et al.

Anonymous Referee #3

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The manuscript provides a nice and well-organized description of the meteorological conditions and of the performance of WRF-Chem during the CARES field campaign. In particular, the transport and mixing patterns affecting the Sacramento plume are described.

The findings in the paper are not unexpected and I suppose the main purpose is to serve subsequent papers focusing on aerosol chemistry that can refer to the transport and mixing patterns described in the current paper. Slope flows, mixing heights, and mountain venting processes are well-known to affect transport and mixing patterns in complex terrain as confirmed by the observations in the current study. These transport

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and mixing patterns are very important for understanding the chemistry and I am glad to see a paper focusing on these aspects. I only have a few comments that need to be addressed by the authors.

1) The performance of WRF-Chem is remarkable but it is not entirely clear how the WRF-Chem set-up/configuration was chosen. Does this configuration result in the best performance? Were there any modeling issues encountered that needed to be addressed before WRF-Chem could be run operationally? Did anything need to be changed in the WRF code compared to the released code to make the simulations work so well? If there is no space in the manuscript to describe these issues, please provide this information in an online supplement to the paper. I expect that various modeling groups would like to do simulations for various case studies during CARES and it would be helpful for them to know what was done to make WRF-Chem perform so well.

2) WRF-Chem is only briefly described. Since this paper focuses on transport and mixing processes in the ABL, the authors should at least include a short paragraph about the selected ABL and surface layer parameterizations and the justification for the use of these parameterizations.

3) The model top at 12 km appears very low to me, especially given the high and complex terrain in the model domain including the Sierra Nevada mountains. The authors need to comment on this and provide a justification for using such a low model top (other than computational resources).

Typing error:

line 27 on p. 29951: WRF-Chem, not WF-Chem

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 29949, 2011.

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