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Comment

## ***Interactive comment on “Chemical and aerosol processes in the transition from closed to open cells during VOCALS-REx” by J. Kazil et al.***

**J. Kazil et al.**

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We would like to thank the reviewers for the review of our manuscript, and for their helpful comments, which address important points. Shortcomings in the manuscript have been corrected as documented in the individual responses.

A recurrent theme in the review are imperfections in the model as a source of uncertainty. We understand and share the desire for comprehensive, detailed, and complex simulations that reduce uncertainty by avoiding simplifications, and we discuss the shortcomings of the model as openly as possible. At the outset, our approach has been to integrate the key components of the marine boundary layer (aerosol, cloud, dynamics, radiation, chemistry) with reasonable accuracy, and in a balanced manner. By necessity this means that none of the components is treated with the desired level

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of detail. The strength of the model, however is in its integrative aspect, as opposed to a strength based on the details of any given process. Models sometimes elect to describe processes in a very simple fashion. For example, the study of Capaldo et al. (1999) that precedes ours employed a model with one spatial dimension and prescribed clouds and precipitation, but treated aerosol and chemical processes in great detail. Even imperfect models such as that one can be very useful. The goals of the present manuscript are to illuminate the chemical and aerosol processes in the transition from closed to open cells, to compare the model results against observations, and to assess the relative strengths of the different aerosol sources (sea salt emissions, nucleation from the gas phase, entrainment from the free troposphere) for the specific conditions of VOCALS-REx RF06. The model we have built is also imperfect. However, it integrates the key components of the system with reasonable accuracy, and therefore we would argue, is very useful for the stated goals. We have intentionally avoided statements that imply accuracy and general validity, in acknowledgment of the shortcomings of the model and the simulations. Complexity, refinement, and details are often added to the understanding of a phenomenon over time.

## References

Capaldo, K. P., P. Kasibhatla, and S. N. Pandis (1999, February). Is aerosol production within the remote marine boundary layer sufficient to maintain observed concentrations? *J. Geophys. Res.* **104**, 3483–3500.

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