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Atmospheric Chemistry and Physics Discussions

Interactive comment on "How important is the vertical structure for the representation of aerosol impacts on the diurnal cycle of marine stratocumulus?" *by* I. Sandu et al.

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First of all we would like to thank the reviewer for his comments, which helped us clarifying some points and improving thus our manuscript. Here are our responses to the different comments:

1. The study of Caldwell and Bretherton will be cited in the revised version of the manuscript.

2. We agree that a 2-3 K drift of the free tropospheric temperature might in some case be quite large, depending on the considered topic. Here, however, the focus is on differences between polluted (non-precipitating) and pristine (precipitating) BL clouds

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and the drift of the free-tropospheric temperature over the 72 hours is about the same in both cases (see attached figure 1 that is similar to Fig 2 of the article, but for the pristine simulations). So, in our opinion this warming has no significant impact upon the differences between the pristine and the polluted simulations.

The text is revised as: For the simulations presented here, the imbalance between the subsidence warming and the net daily averaged radiative cooling within the free troposphere results after 72 h in a slight temperature drift, from 1 to 3 K depending on the boundary conditions, as illustrated in Fig. 2a for the polluted set of simulations. The pristine simulations experience the same temperature drifts to within a few tens of K (not shown). We can therefore consider that the free troposphere temperature drift does not play a significant role in the differences between the pristine and polluted sets of simulations.

3. By cloud optical properties, we think the ones of the droplets that are used for radiative transfer calculations. The text has been revised as: The vertical profiles of the radiative fluxes within the EML are computed with an off-line version of the Meso-NH radiative transfer code, assuming that the droplet optical properties (asymmetry factor and single scattering albedo) are the same in the polluted and pristine sets of simulations (no semi-direct aerosol effect).

We will also include the technical corrections in the revised version of the paper. the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 5465, 2009.

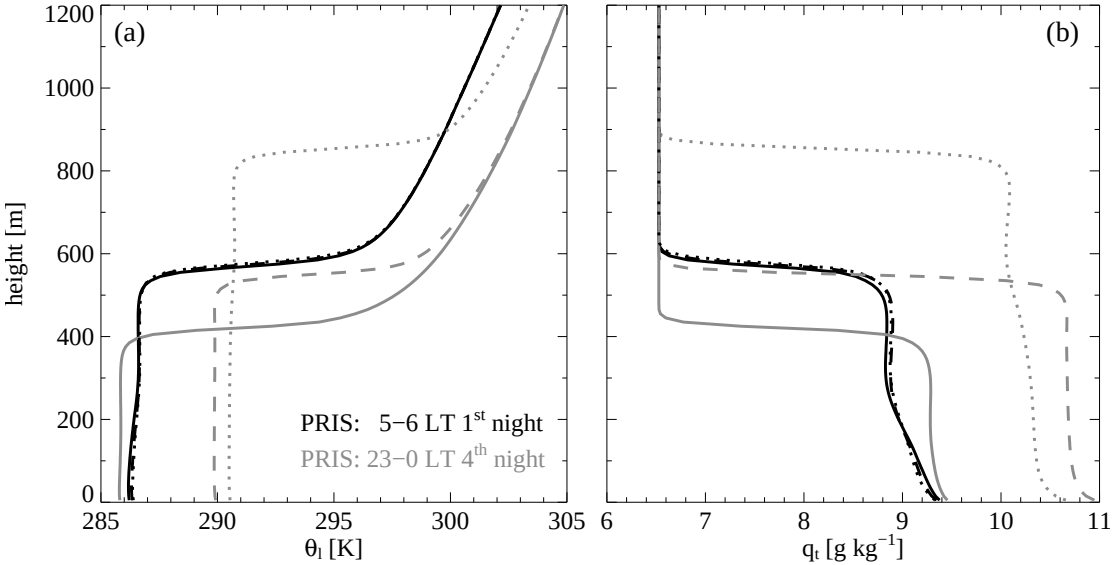

Fig. 1. As Fig. 2 from the manuscript but for pristine simulations.

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