

Response to additional comments by Anonymous Referee #2

We would like to thank Anonymous Referee #2 for reviewing our manuscript and for their further helpful feedback. Our point-by-point responses are provided below. The reviewer's comments are shown on a light green background, whereas our responses appear on a white background.

The authors addressed my comments satisfactorily and improved the manuscript. I only have a few remaining minor comments:

In 205: 5 samples is not a very large ensemble, so why don't you just show the minimum-maximum range instead of +/- 1 standard deviation?

We agree that five members constitute a relatively small ensemble and that displaying the full minimum-to-maximum range provides a more transparent representation of the variability across its members than displaying one standard deviation.

We have therefore revised Figs. 4, 5, 9, and 10. The shaded areas in these plots now cover the minimum-to-maximum range across the corresponding five-member ensemble rather than indicating one standard deviation. For panels whose legends report temporal mean differences, the legends now provide ensemble means and minimum-to-maximum ranges of the five member-wise temporal mean differences instead of their standard deviations.

We have also revised the corresponding figure captions and the relevant passages in Sects. 2.2.1, 3.2, and 3.3.2. These passages now explain that the ensemble spread is estimated using the minimum-to-maximum range, and numerical results are reported consistently as ensemble means followed by the corresponding minimum and maximum values in square brackets.

In 114. "Use was made", I would rephrase to "we made use"

We have changed the sentence as suggested:

"To achieve this, we made use of the fact that the TenStream framework had been coupled to PALM in the past."

In 274-277: This sentence seems to contradict itself which is a bit confusing: we can see that clouds are thicker although in increased thickness is not apparent. Do you mean that you observe the thicker clouds in the data, but made the colorscale such that this is not visible in the figure? If so, I would rephrase the sentence, maybe to something on the lines of "individual clouds become larger, but that is not visible because the colorbar..."

We agree that the original wording was contradictory because it stated that the greater vertical extent of the clouds could be seen in the figure while simultaneously explaining that it was not readily apparent. We have therefore revised the passage to distinguish between the larger horizontal extent visible in the figure and the greater vertical extent established by the subsequent quantitative analysis. The revised passage now reads:

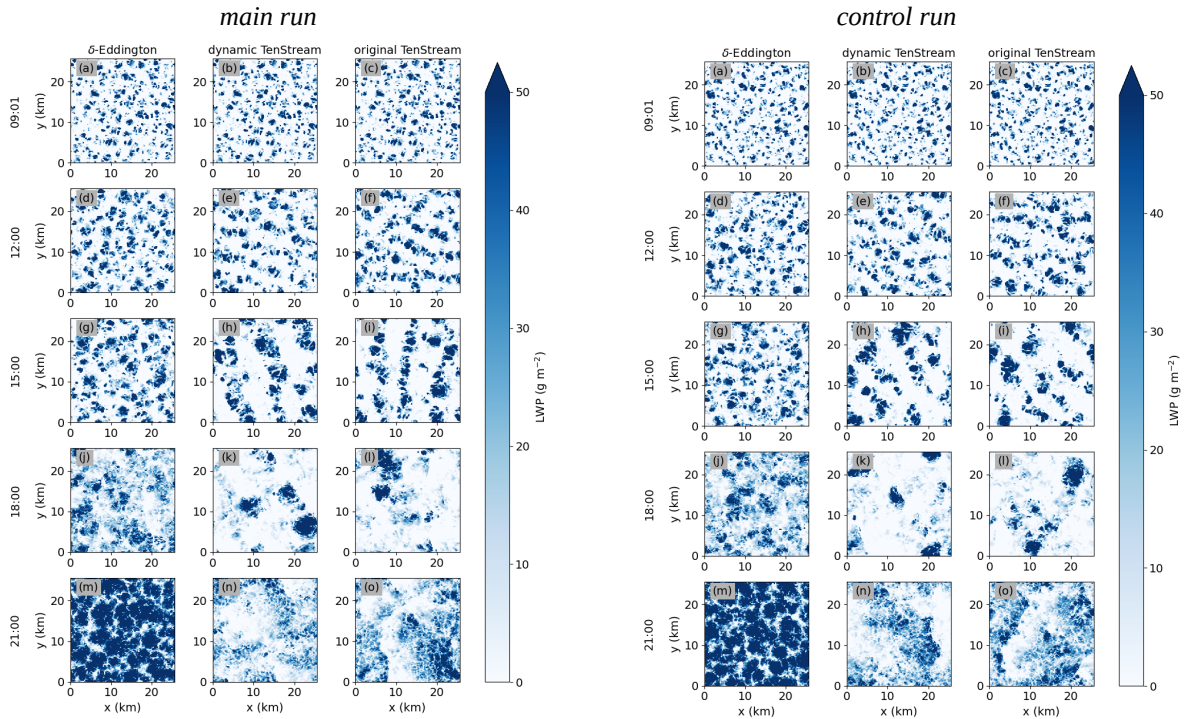
"Apart from these organizational aspects, we can also see that individual clouds in both panels (h) and

(i) are noticeably larger in horizontal extent than those in panel (g). In fact, as we will discuss in Sect. 3.2, the clouds driven by the two 3D solvers grow larger in both horizontal and vertical extent during daytime. Their greater vertical extent, however, is not directly apparent from panels (h) and (i) because the LWP color scale in Fig. 3 saturates above 50 g m^{-2} to enhance contrast.”

Figures 3h and 3i show a different orientation angle, which is worth noting. Do the wind directions develop slightly differently in the dynamic and original Ttenstream approximation, or is that the lag in solar angle updates due to incomplete solves.

Comparison across the full ensemble provides no evidence that the difference in cloud-street orientation results systematically from either differently evolving wind directions in the dynamic and original TenStream simulations or a lag associated with the incomplete solves. To demonstrate this, we provide below the corresponding versions of Fig. 3 for the main run and all four control runs. These figures show that differences in the precise orientation of the cloud streets occur not only between the dynamic and original TenStream simulations but also among the individual ensemble members. Moreover, no consistent difference in orientation between the two TenStream solvers is apparent across the ensemble. The difference between panels (h) and (i) therefore appears to reflect the intrinsic variability of the simulations rather than a systematic effect of the incomplete solves.

Overall, the cloud streets in the simulations driven by 3D radiative transfer tend to follow the changing solar azimuth angle, as described in the manuscript. Their precise orientation and prominence, however, vary among the ensemble members.



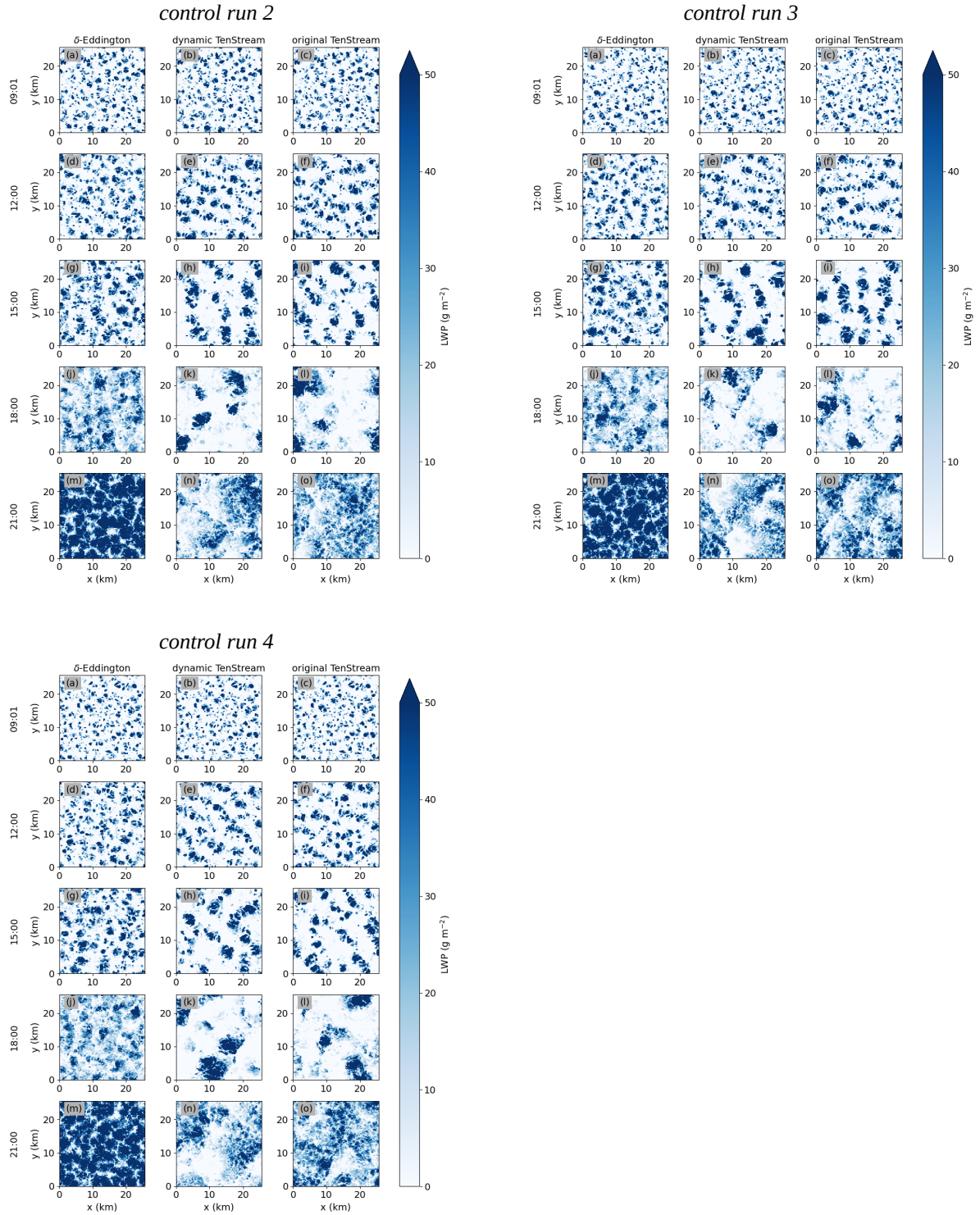


Figure: Temporal evolution of the liquid water path (LWP) for the main run and all four control runs. Each composite plot shows the LWP in the PALM simulations driven by the 1D δ -Eddington approximation (left), the dynamic TenStream solver (middle), and the original TenStream solver (right) at five time steps between 09:01 and 21:00 UTC. To enhance the contrast of the figures, the upper limit of the color scale in each plot was set to 50 g m^{-2} rather than to the global LWP maximum of the corresponding ensemble member.