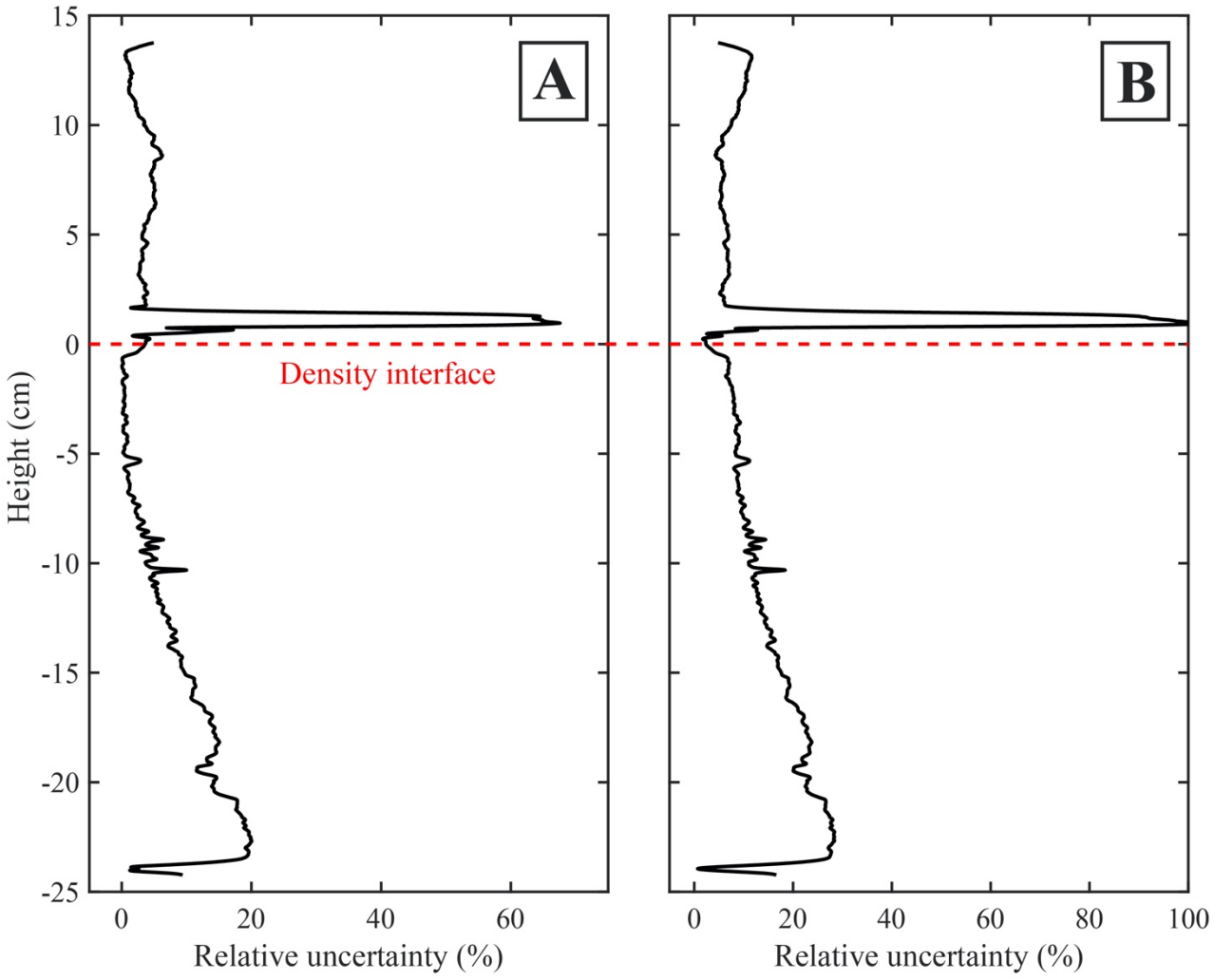

Supplementary Figure 4. In PLIF experiments, the spatial particle distribution cannot be assessed, meaning that the particle concentration in a given volume can vary from 0 g l^{-1} up to the initial upper-layer concentration. Therefore, to assess the uncertainty of PLIF measurements, we use the calibration to infer the R6G concentration of uniform suspensions having different particle concentrations, ranging from 0 to 2 g l^{-1}, whilst keeping the same R6G concentration of 8 µg l^{-1}. The relative uncertainty is then obtained by calculating the difference between horizontally averaged R6G concentration measurements performed on particle suspensions with those performed on particle-free solutions. This difference is 7 % (0.7 % in the first 5 cm below the barrier) between 0 and 1 g l^{-1} suspensions and 13 % (7 % in the first 5 cm below the barrier) between 0 and 2 g l^{-1}. Therefore, in the region of interest where the PBL grows, R6G concentration measurements are associated with an uncertainty dependent on the input particle concentration which is 0.7 % and 7 % of the initial R6G concentration for 1 and 2 g l^{-1} experiments, respectively. For our experimental conditions where the fluid phase density varies from 997 kg m^{-3} in the upper layer to 1008 kg m^{-3} in the lower layer, the uncertainty in the determination of R6G concentrations results in an average uncertainty in fluid

density of 0.08 kg m^{-3} for 1 g l^{-1} experiments and of 0.77 kg m^{-3} for 2 g l^{-1} experiments. The relative uncertainty on R6G concentration measurements as a function of height is shown for **(A)** 1 g l^{-1} experiments and **(B)** ≥ 2 g l^{-1} experiments. The peak in uncertainty located above the position of the initial density interface is an artifact and due to light extinction on the barrier track.