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Differences in microphysical properties of cirrus at high and mid-latitudes

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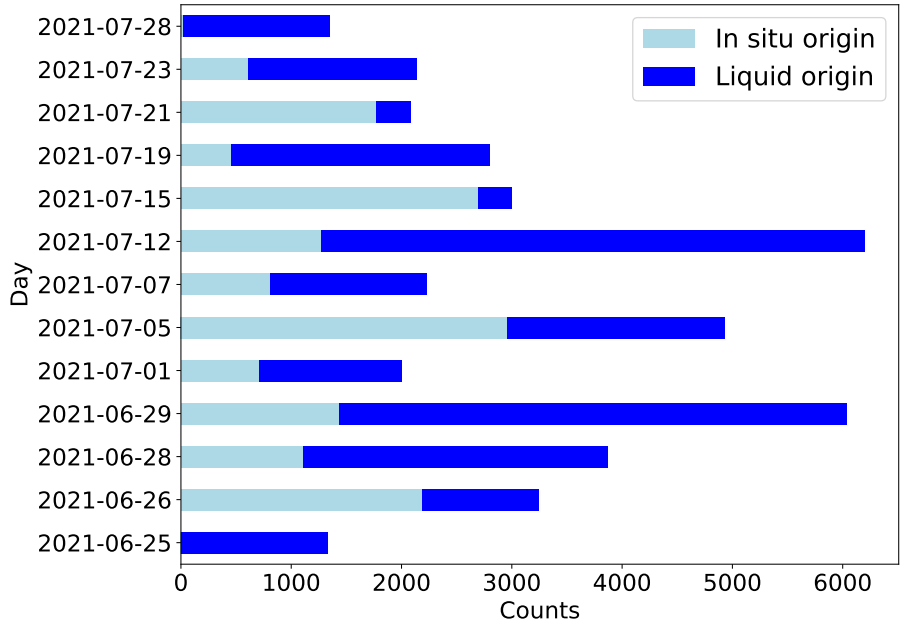

Figure S1. Summary of the 2-s observations frequency of cirrus origin (in situ, light blue and liquid origin, darker blue) per day during the CIRRUS-HL flights. The frequency is represented by the total number of counts.

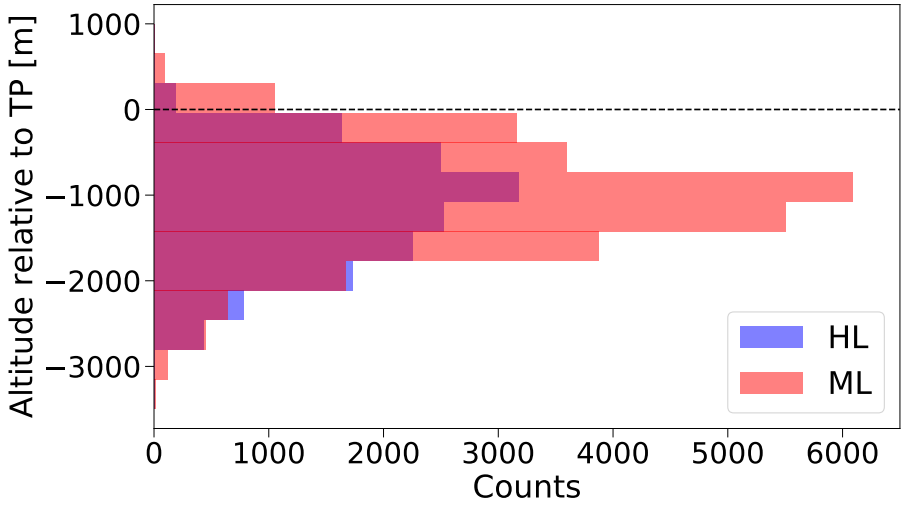

Figure S2. Comparison of the frequency distribution of the cirrus altitudes relative to the tropopause (TP) between ML cirrus (red) and HL cirrus (blue) distributed in vertical bins of ≈ 350 m wide. The TP is marked with a black dashed line as reference and separate measurements in the troposphere (below) and in the stratosphere (above). For details on distance calculation see text (Sect. 4.1).

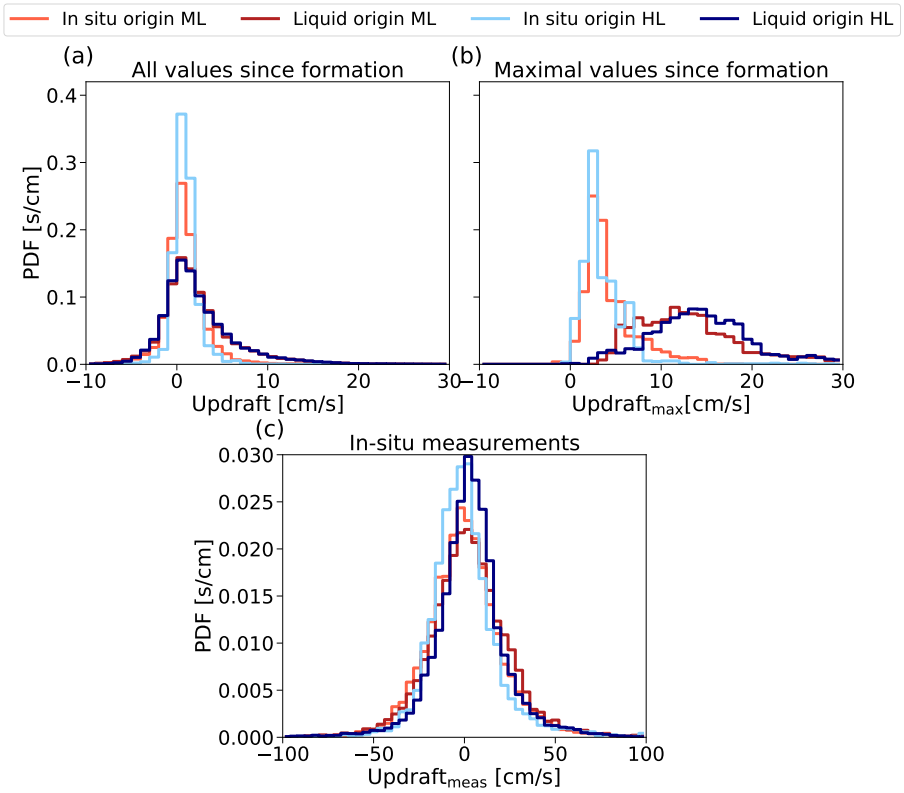

Figure S3. Updraft speed probability distribution functions for in situ ML cirrus (light red), liquid origin ML cirrus (dark red), in situ HL cirrus (light blue) and liquid origin HL cirrus (dark blue). (a) Distribution of all values along the backward trajectories between formation and measurement. (b) Distribution of maximum values along the backward trajectories between formation and measurement. (c) Distribution of the in situ measured updraft speed from the BAHAMAS system. Lower updrafts in (a) and (b) compared to (c) result from the grid point averages of the backward trajectories calculation.

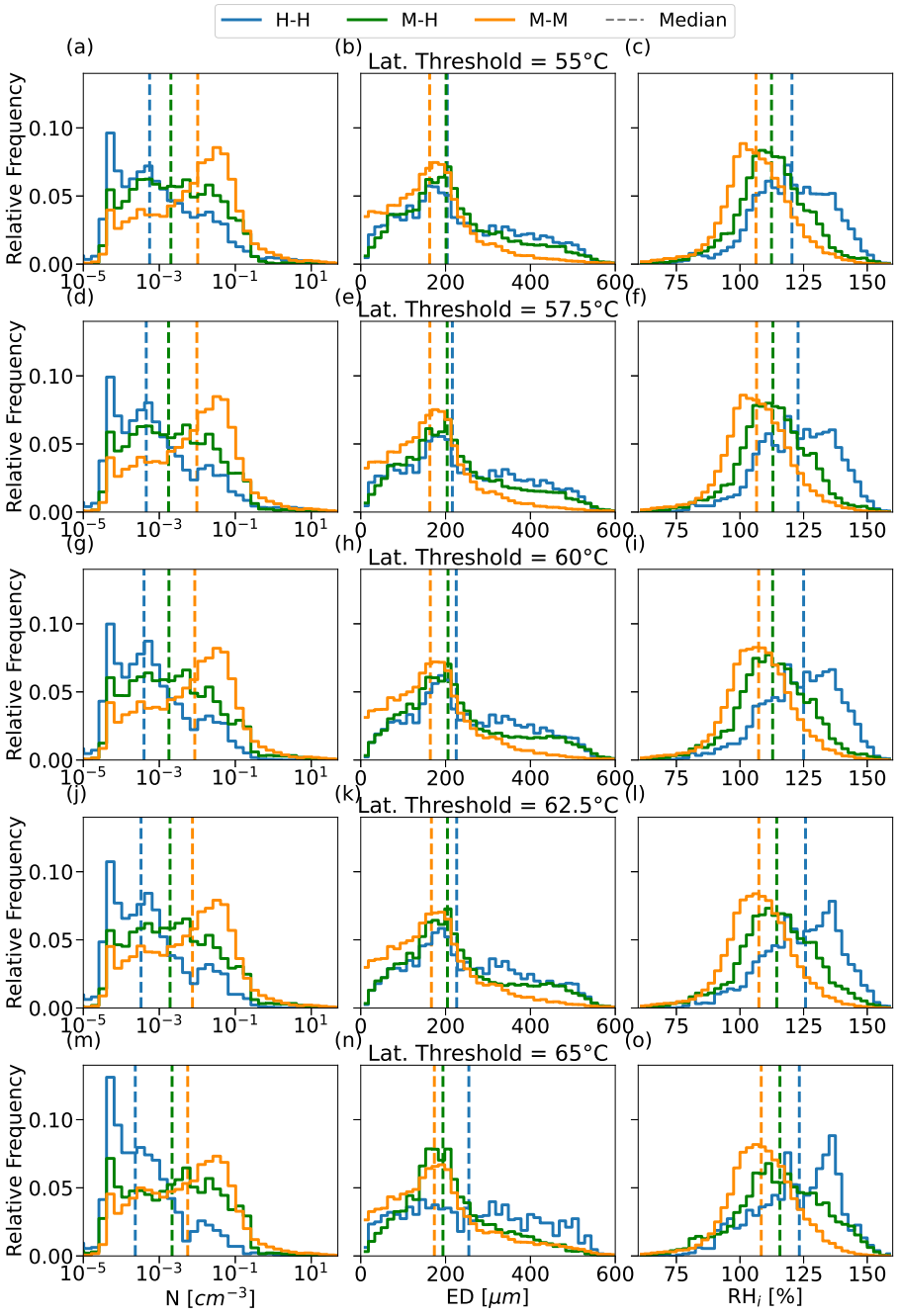

Figure S4. Sensitivity study of the latitude threshold selection. The relative frequency of the variables N (left-hand side), ED (center) and $\mathrm{RH_i}$ (right-hand side) are represented for the H-H cirrus (blue), M-H cirrus (green) and M-M cirrus (orange) depending on the specified latitude threshold: 55, 57.5, 60, 62.5 and 65 °N. See Fig. 6 in the main text for further details on the relative frequency distributions.

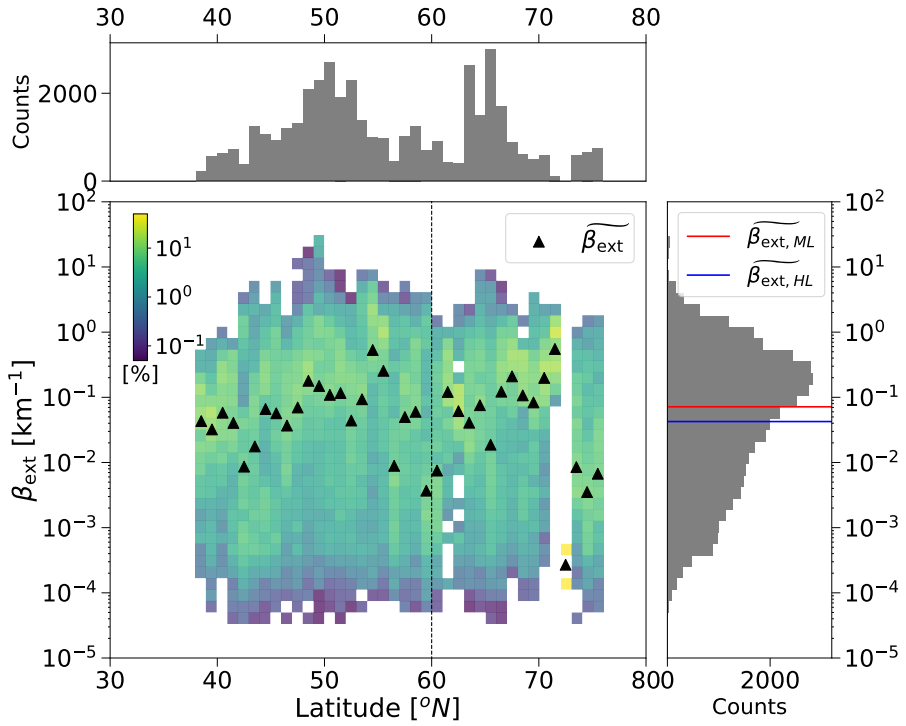

Figure S5. Normalized frequency distribution of the extinction coefficient (β_{ext}) from the observations as a function of latitude of the measurement during CIRRUS-HL. Latitude bins are 1° wide and vertical bins are logarithmic. The colour code indicates the frequency of occurrence in percent per 1 degree latitude bins, normalized by the total counts per latitude bin. The vertical dashed line marks the threshold of 60° N for the differentiation of ML and HL cirrus. Triangular markers are medians per latitude bin ($\widetilde{\beta_{\mathrm{ext}}}$). The top and right panels are histograms of the corresponding variables. See a similar representation for N, ED and IWC in the main text.