Supplementary Material for: Low and Consistent Asymmetry Parameters in Arctic and Mid-latitude Cirrus

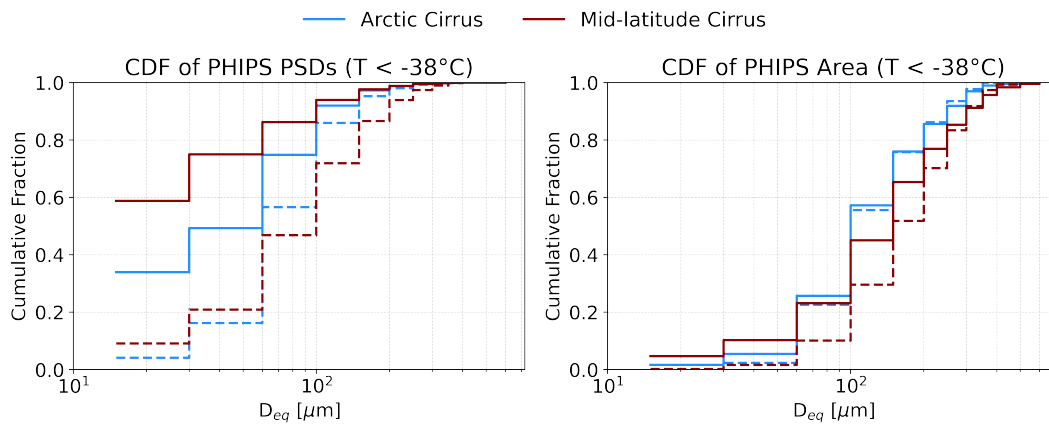Emma Järvinen & Franz M. Schnaiter

Supplementary Figures

Figure S1: Cumulative particle number and area size distributions for Arctic and mid-latitude cirrus clouds as observed by PHIPS under conditions of $T < -38°C$ and $IWC > 10^{-5}\,\text{g/m}^3$. Solid lines show the mean of all 1-Hz particle size distributions (PSD) and area distributions fulfilling the conditions, while dashed lines represent shattering-corrected values based on imaged and manually classified particles. Arctic cirrus distributions are shown in blue, mid-latitude cirrus in red. The distributions are normalised to a cumulative fraction of 1.
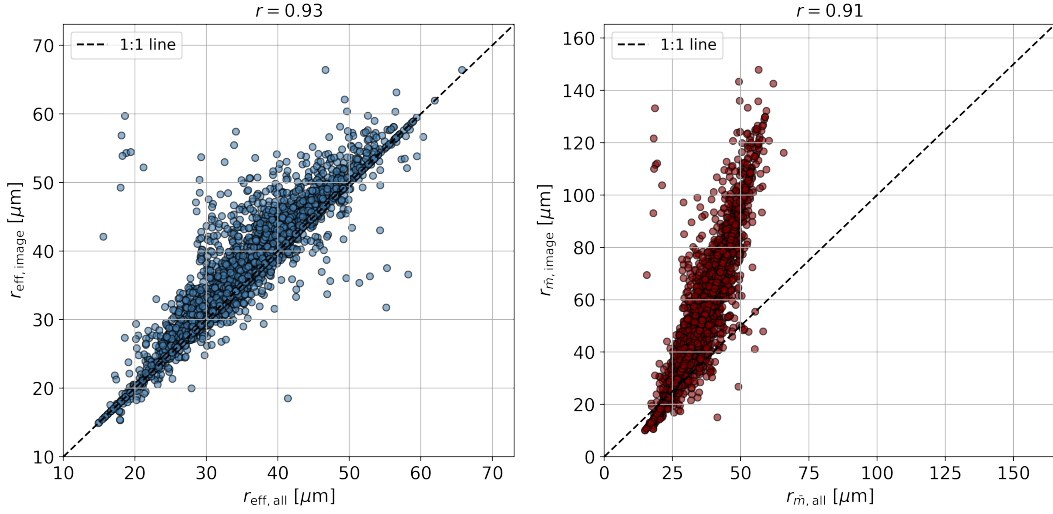
Figure S2: Comparison of effective radius (r_{eff}, left) and mass-equivalent spherical radius ($r_{\bar{m}}$, right) derived from all triggered particles (all) and from manually classified intact particles (image). The 1:1 dashed line indicates perfect agreement. The effective radius shows a strong correlation between the two datasets ($r = 0.93$) and a good agreement, while the mass-equivalent spherical radius exhibits also a strong correlation ($r = 0.91$), but a significant deviation from the 1:1 line, reflecting the higher sensitivity of $r_{\bar{m}}$ to shattering artefacts in the full dataset.

Figure S3: Stereo-image examples of ice crystals classified as plates.

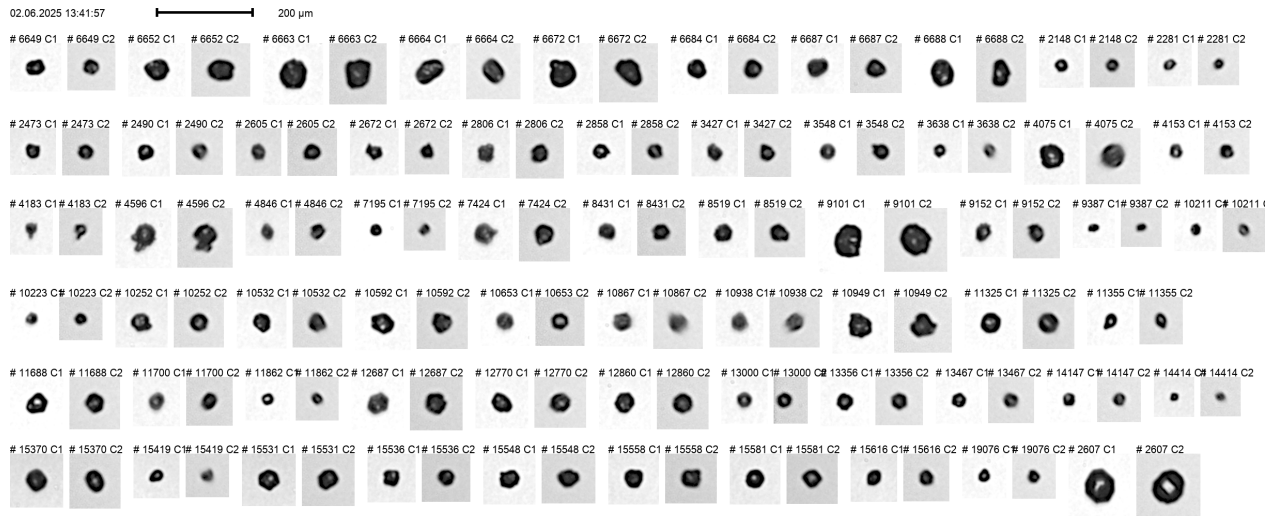Figure S4: Stereo-image examples of ice crystals classified as column.

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Figure S5: Stereo-image examples of ice crystals classified as single frozen droplet.

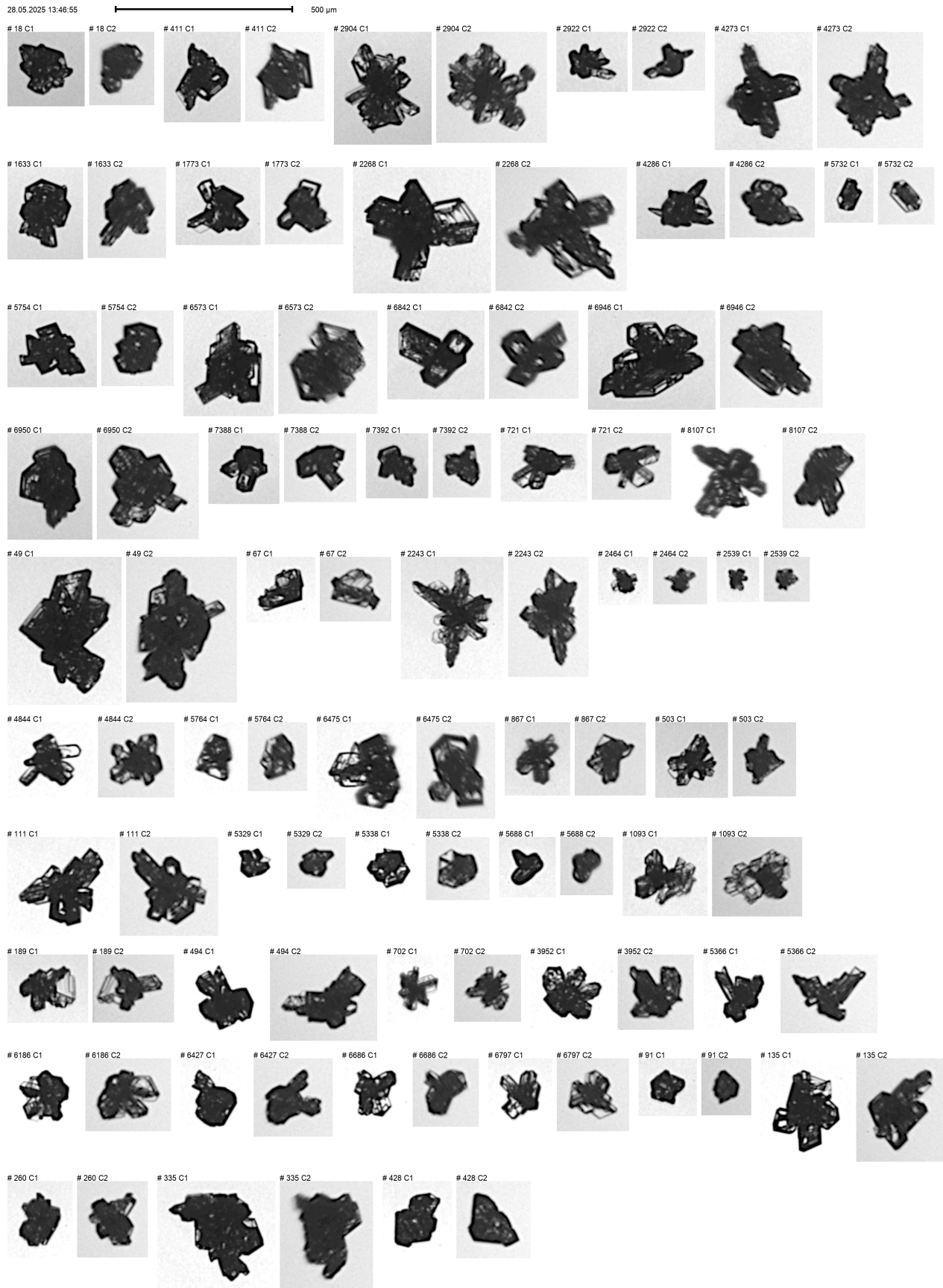Figure S6: Stereo-image examples of ice crystals classified as capped column.

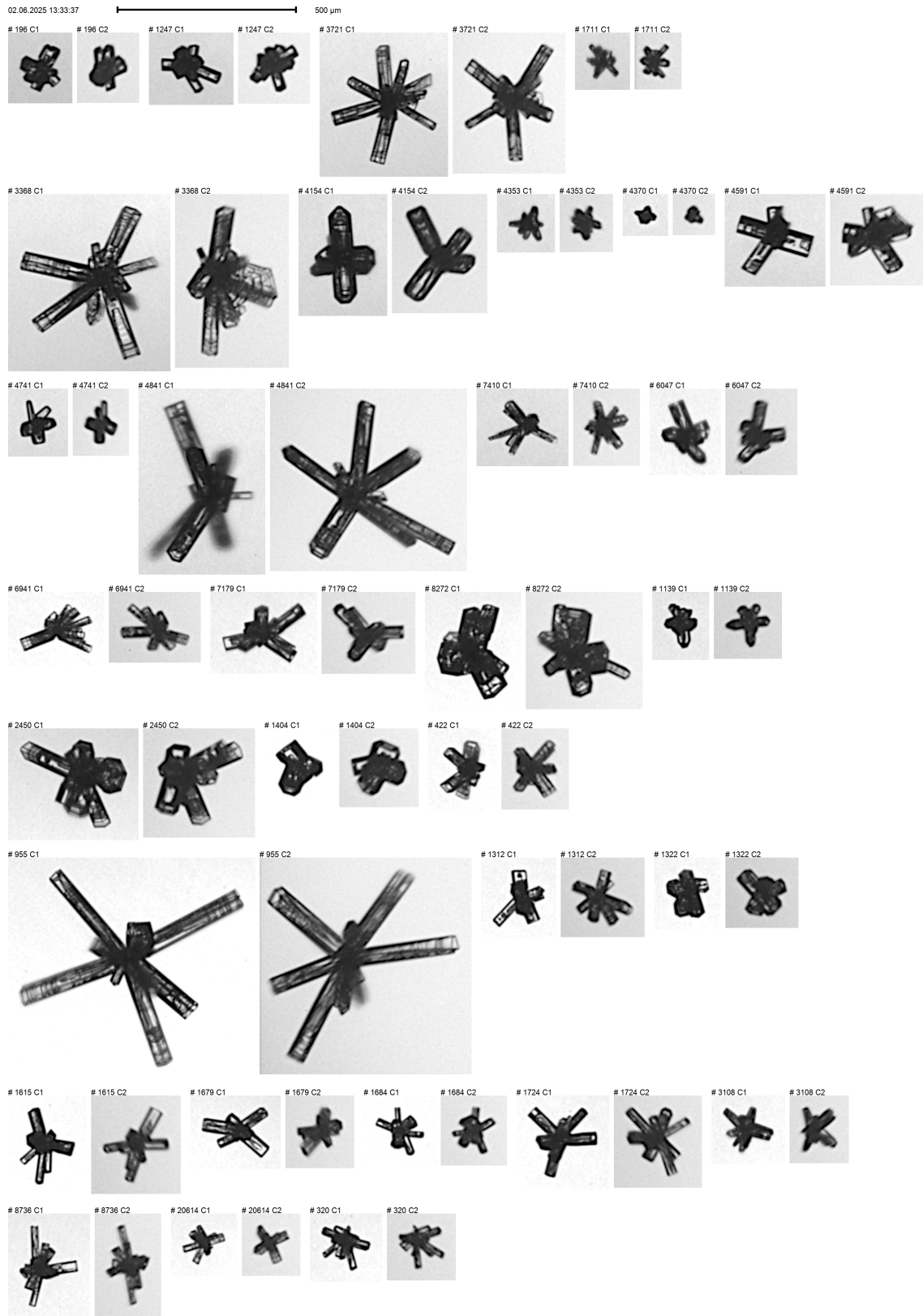Figure S7: Stereo-image examples of ice crystals classified as side planes.

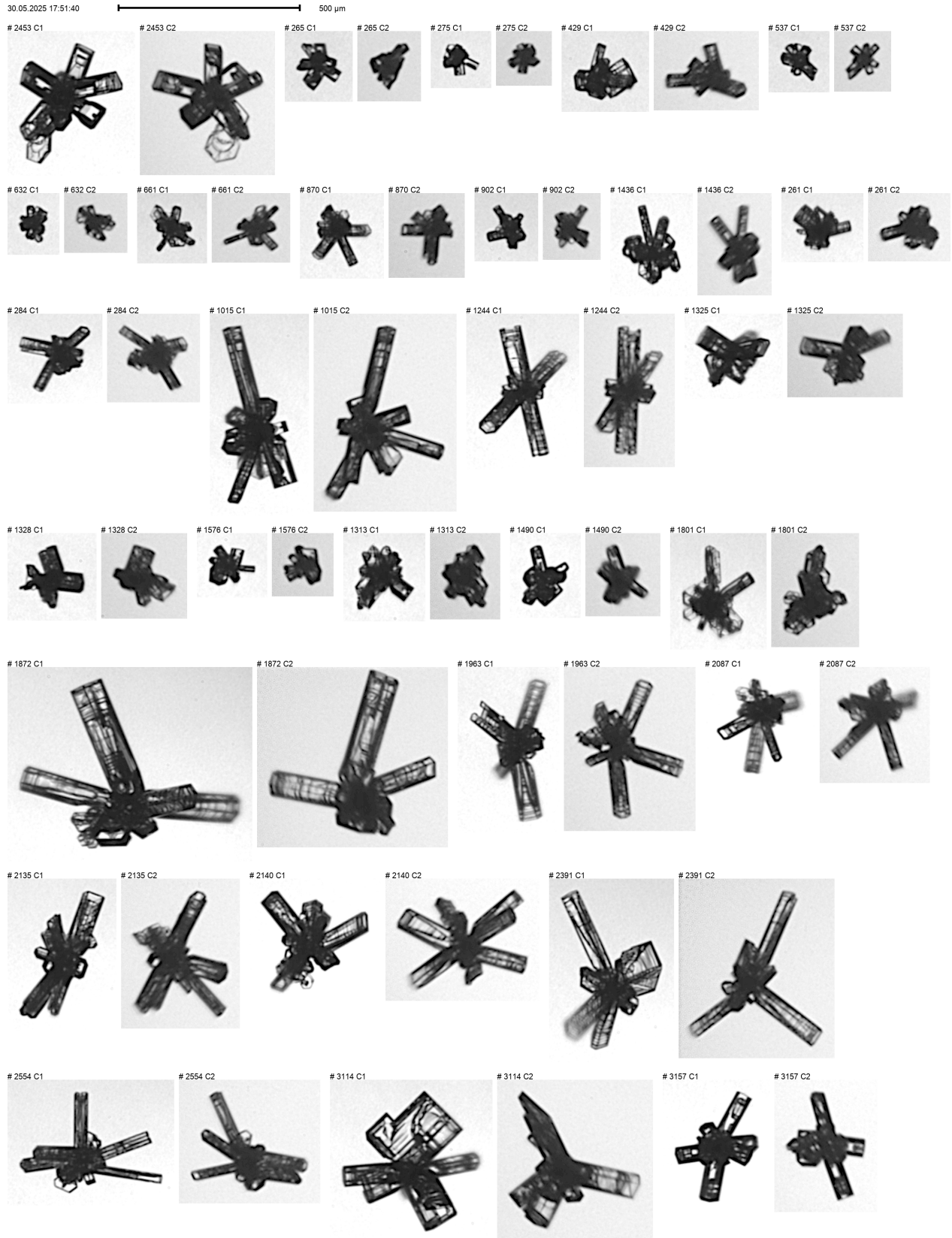Figure S8: Stereo-image examples of ice crystals classified as bullet rosettes.

Figure S9: Stereo-image examples of ice crystals classified as mixed rosettes.

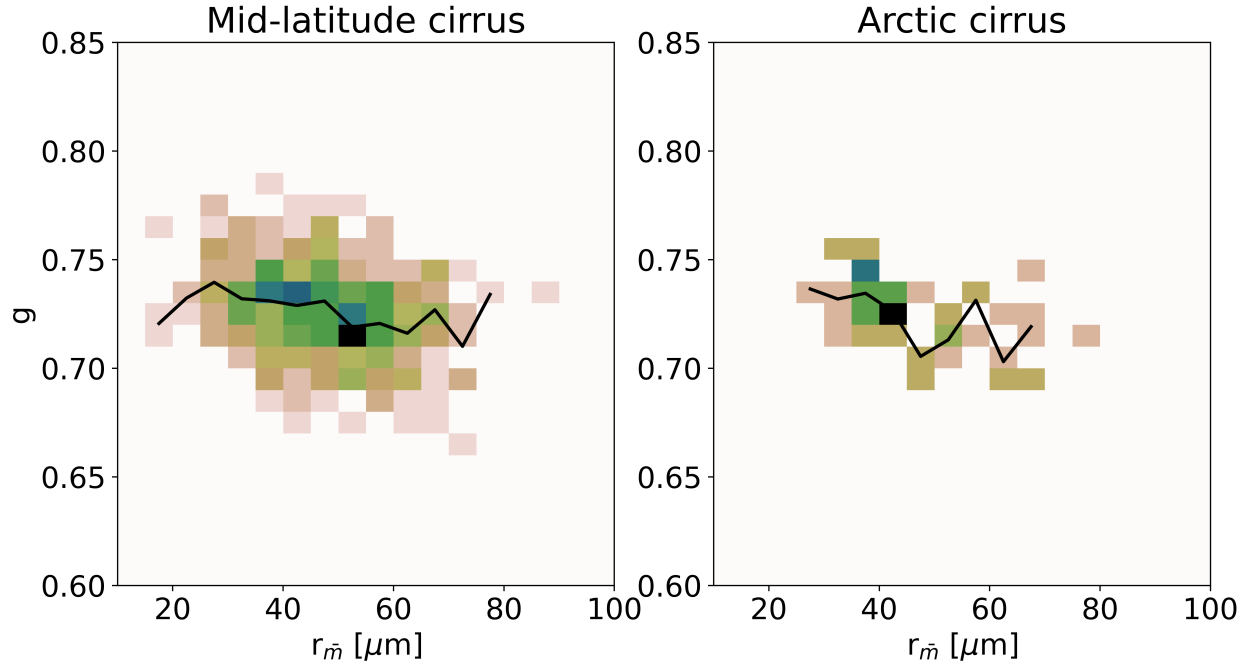Figure S10: Stereo-image examples of ice crystals classified as aggregates.

Figure S11: Frequency distribution of asymmetry parameter (g) observations as a function of the mass-equivalent spherical radius ($r_{\bar{m}}$). Both the asymmetry parameter and $r_{\bar{m}}$ are retrieved only for particles with stereo-microscopic image that were not classified as shattering. The black line indicated the median value for the effective radius bins with a bin width of 5 μm.