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Investigating the development of clouds within marine cold-air outbreaks

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Figure S1 shows the cloud-top humidity as a function of the time since the air parcel has left the ice edge for both strong and weak MCAO events. The cloud top is taken at 800 hPa, which is typically above the average cloud embedded in these events (e.g. Figure 7, main text). Clouds in stronger outbreaks typically experience much drier conditions than clouds in weak outbreaks, which enhances entrainment drying. The data comes from the ERA5 reanalysis dataset.

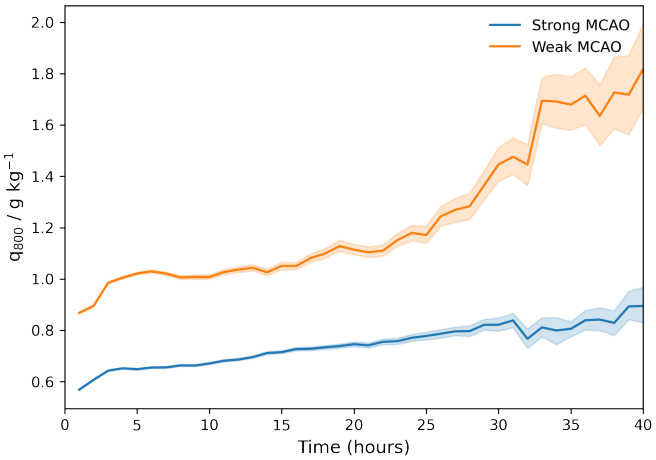

Figure S1. The specific humidity at 800 hPa for strong (M > 3.9 K, blue) and weak (0 K < M < 1.5 K, orange) outbreak events moving away from the ice edge.

Figure S2 shows how the fraction of cloud droplets which are below 15 μm changes with time from the ice edge for clouds embedded in strong and weak MCAO. These data are obtained from the MODIS satellite. Although Figure 6 shows that the average cloud droplet is below the commonly-used precipitation threshold of 15 μm (Rosenfeld and Gutman, 1994), there are still a significant proportion of precipitation-sized droplets in these events, which contributes to the decline in N_d and LWP described in the main text.

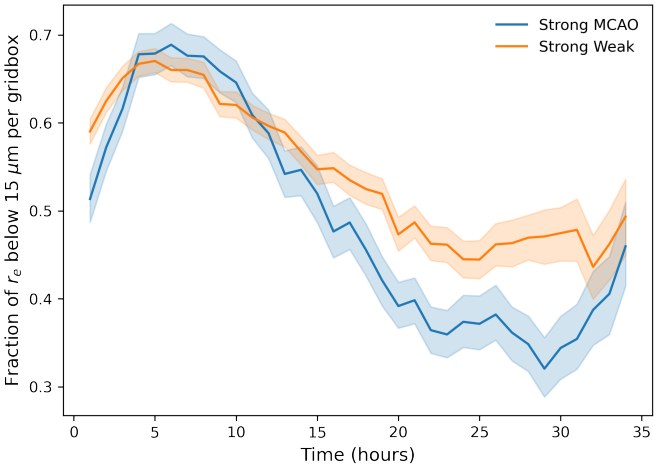

Figure S2. Fraction of 1 km pixels for each 25 km x 25 km which have retrieved droplet effective radius below the precipitation threshold (15 μm).

References

Rosenfeld, D. and Gutman, G.: Retrieving microphysical properties near the tops of potential rain clouds by multispectral analysis of AVHRR data, Atmospheric Research, 34, 259–283, https://doi.org/https://doi.org/10.1016/0169-8095(94)90096-5, 11th conference on clouds and precipitation, 1994.