



Supplement of

Evidence of tropospheric uplift into the stratosphere via the tropical western Pacific cold trap

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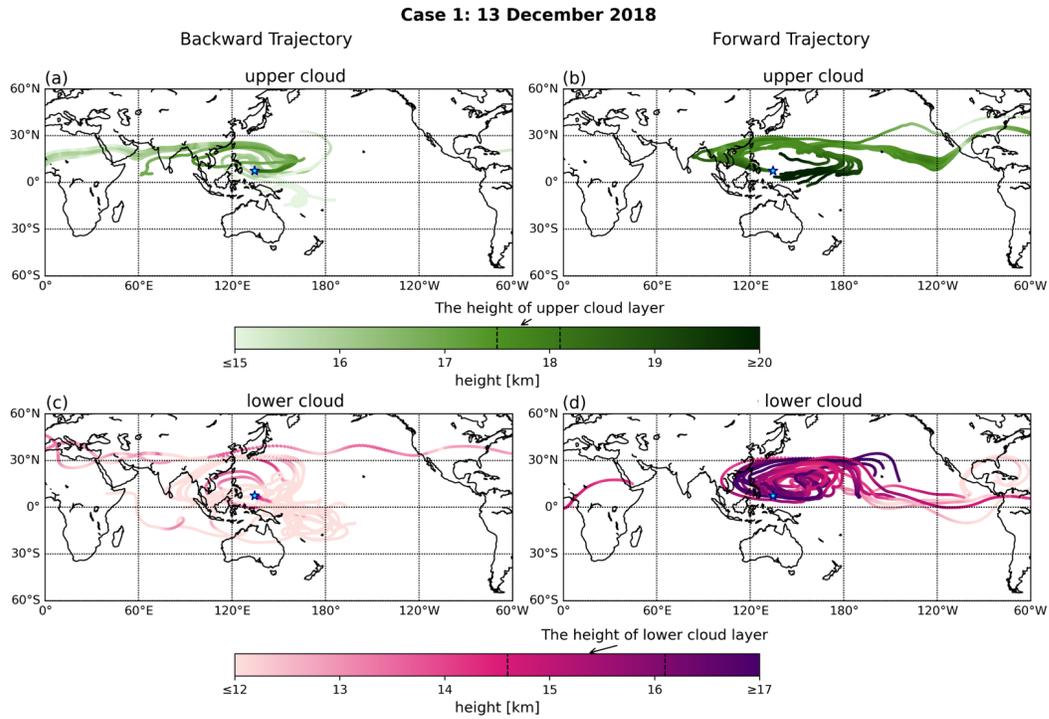


Fig. S1: 20-d trajectories of the upper cloud (a–b), and the lower cloud (c–d) in the winter case corresponding to Fig. 2 (the main manuscript). The left and right columns show the backward (a and c) and forward (b and d) trajectory points released from the cloud layers, respectively. The altitude of the upper cloud is 17.5–18.1 km, and 14.6–16.1 km for the lower cloud. The color scale of the trajectory point scatter depicts the height of the trajectory points. The starting point of the trajectory is marked by the blue star, at Palau. Trajectory points are output at hourly intervals but sparsified at intervals of 5 points for the clarity of display.

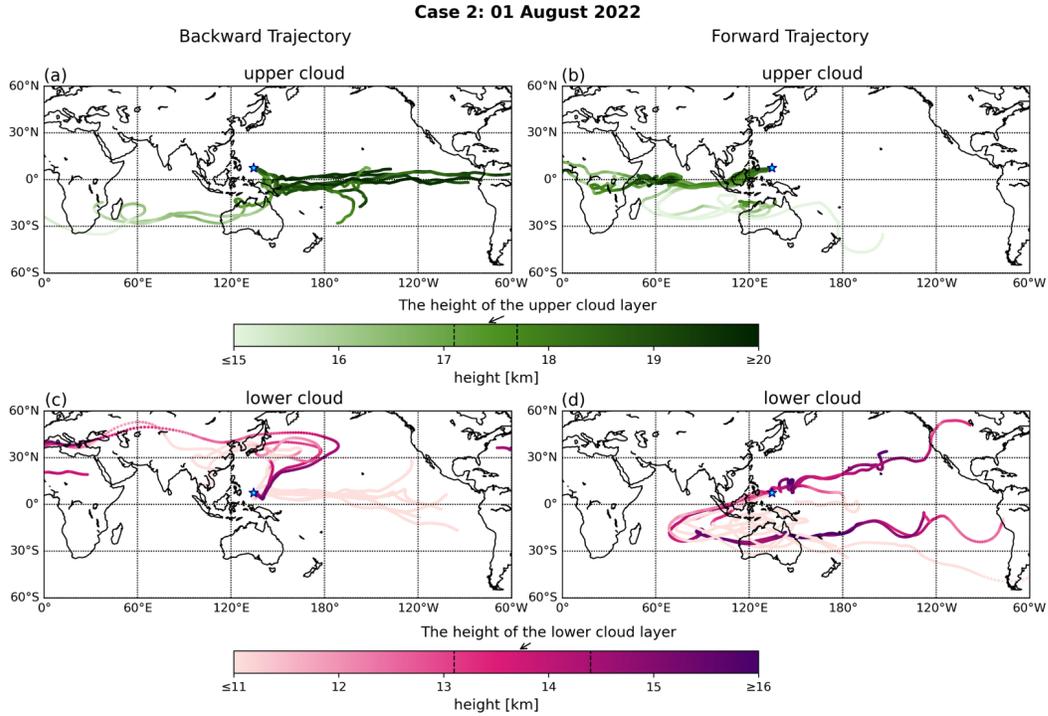


Fig. S2: As Fig.S1, but for Case 2 in summer corresponding to Fig. 4 (the main manuscript). The altitude of the upper cloud is 17.1–17.7 km, and 13.4–14.4 km for the lower cloud. The description of the plots is the same as in Fig. S1.

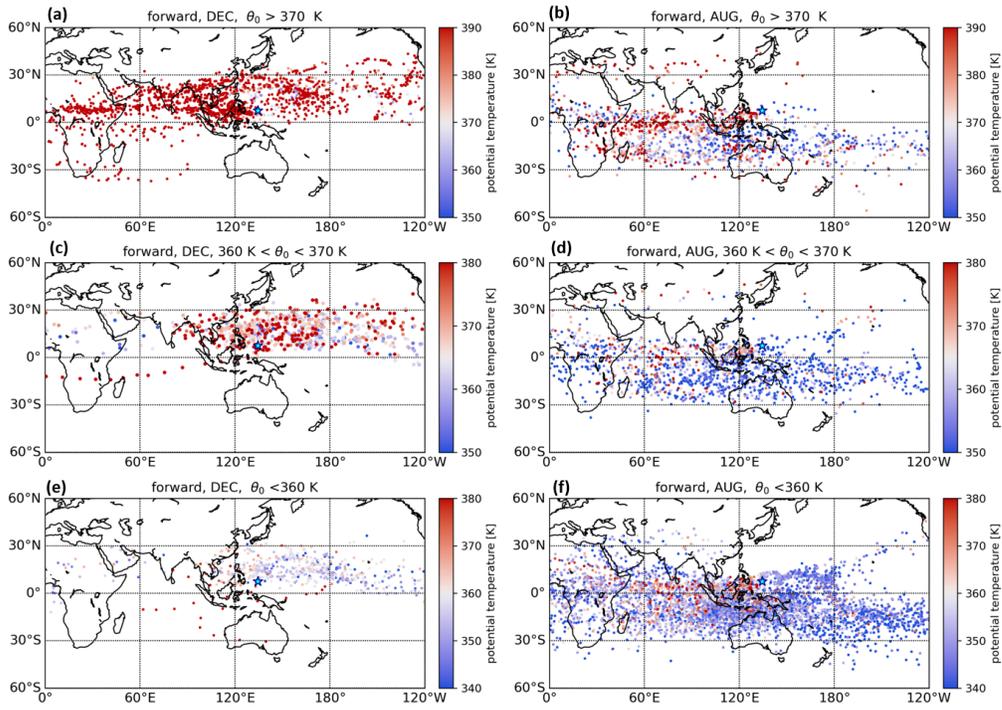


Fig. S3: As Fig. 6, but for 20-d forward trajectories.

Case 1: 13 December 2018 at 11 UTC

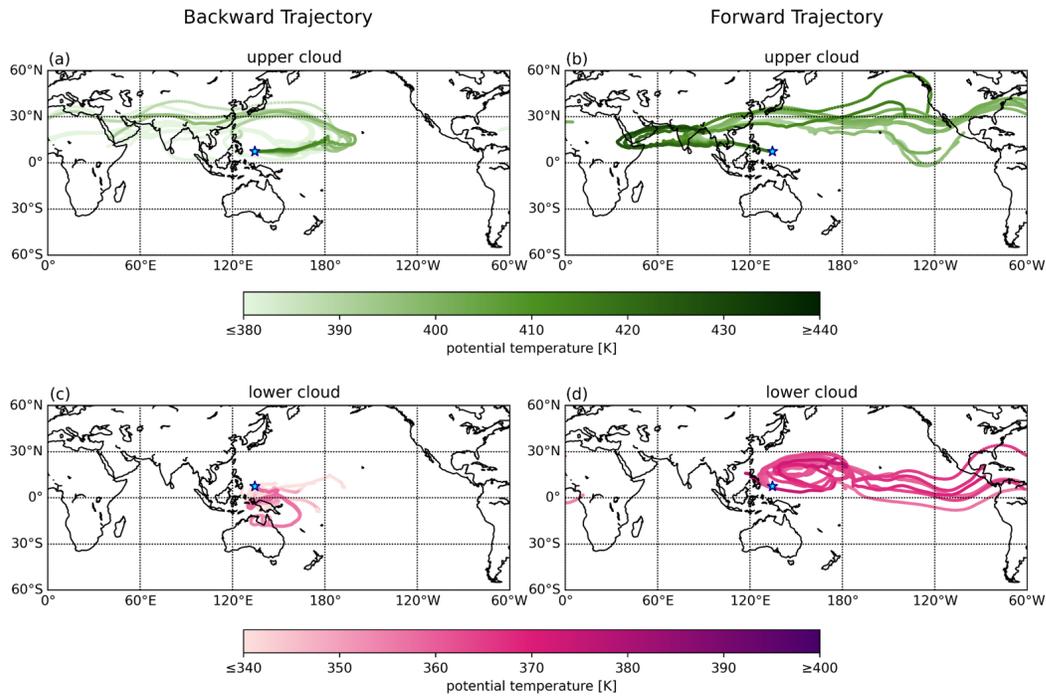


Fig. S4: 20-d trajectories of the upper cloud (a and b, upper row), and the lower cloud (c and d, lower row) at 11 UTC for the winter case 1 (13 December) by ATLAS. The left column (a and c) shows backward trajectories and the right column (b and d) shows forward trajectories.

Case 1: 13 December 2018 at 12 UTC

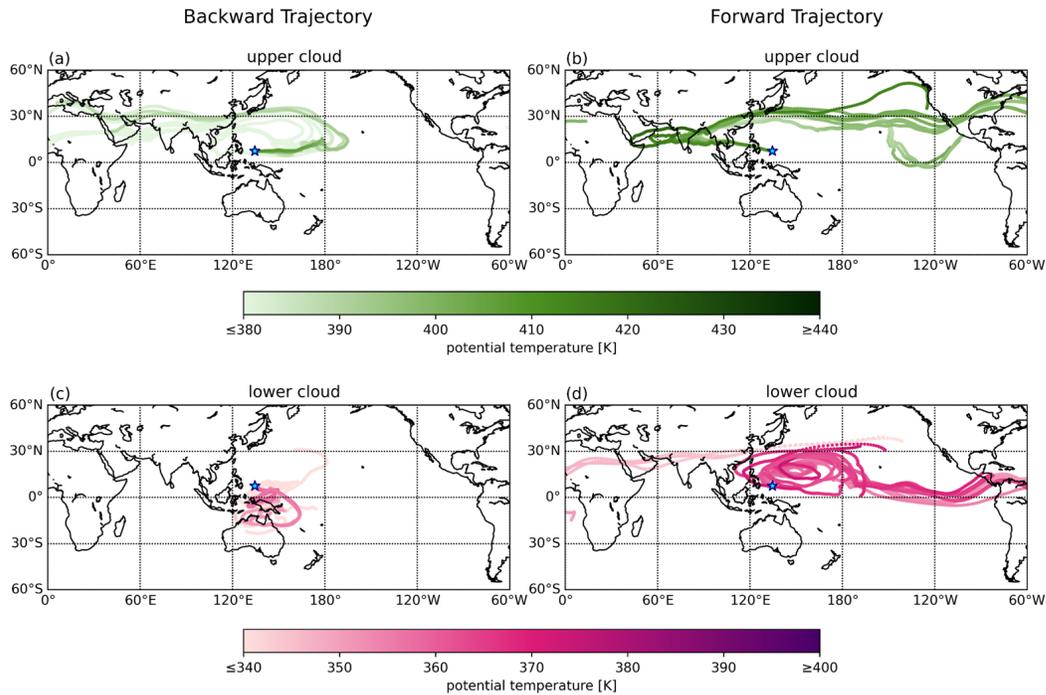


Fig. S5: As Fig. S4, but for 12 UTC.

Case 1: 13 December 2018 at 13 UTC

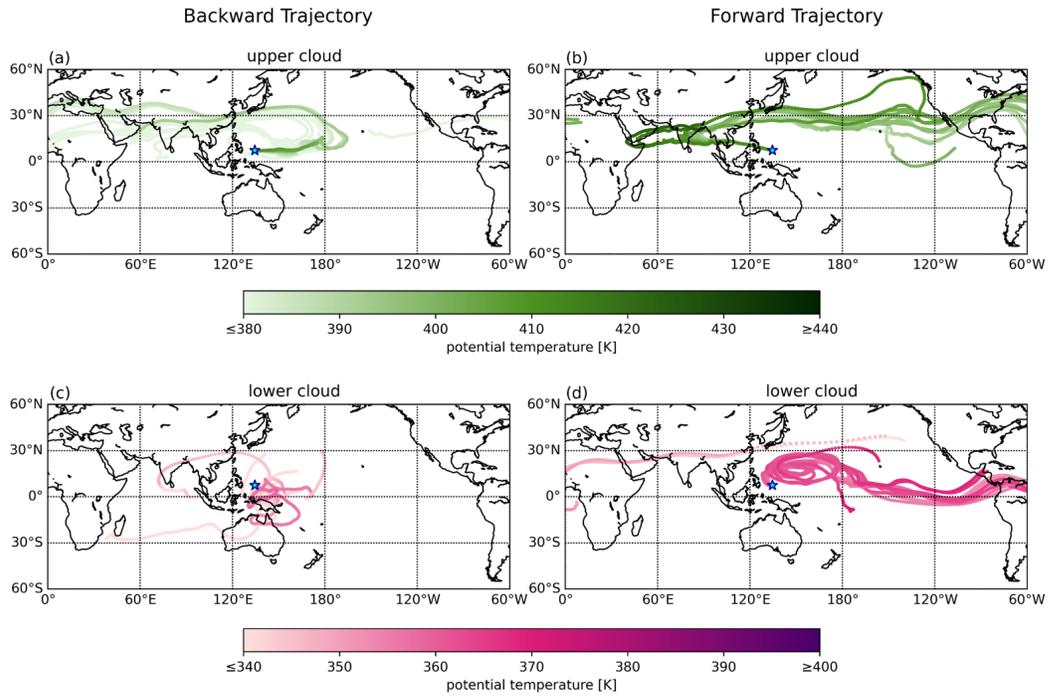


Fig. S6: As Fig. S4, but for 13 UTC.

Case 1: 13 December 2018 at 11 UTC

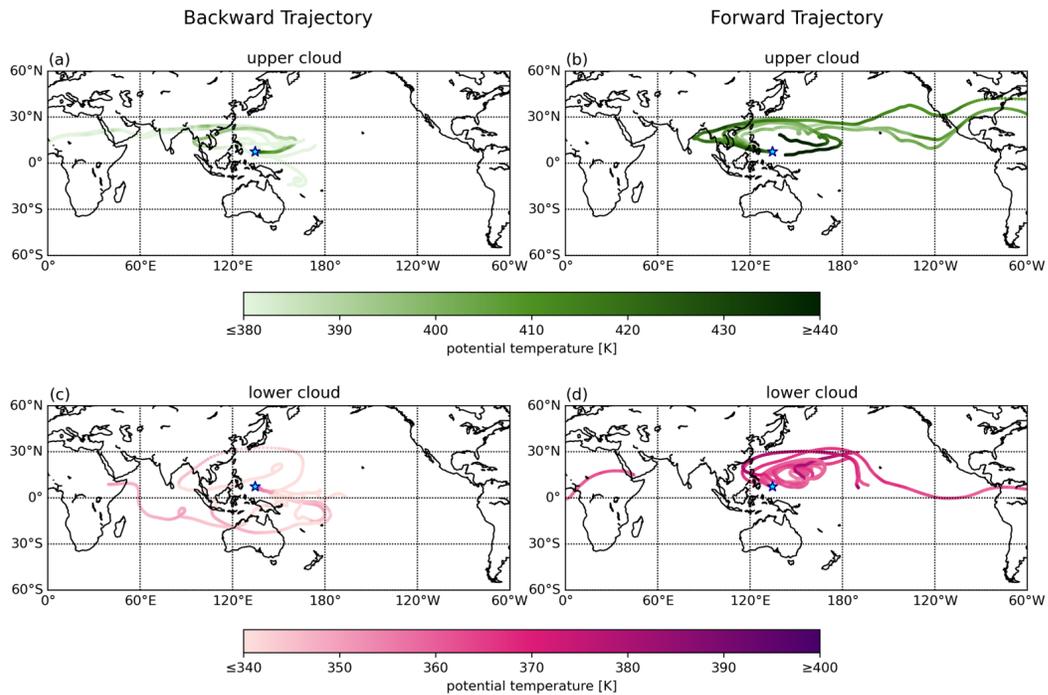


Fig. S7: As Fig. S4, but for HYSPLIT.

Case 1: 13 December 2018 at 12 UTC

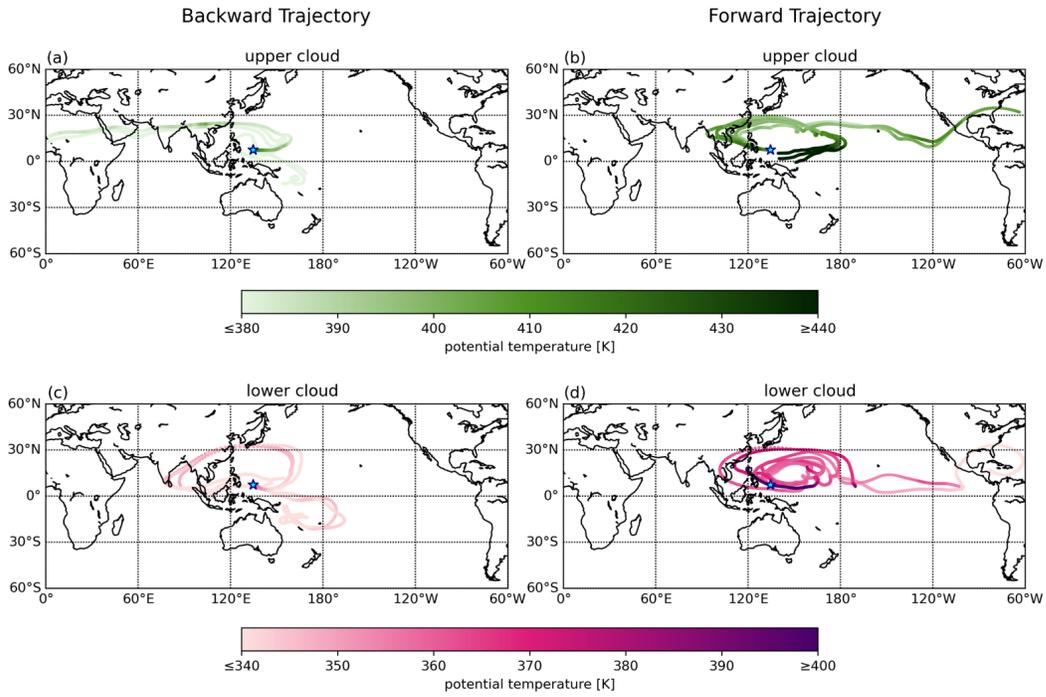


Fig. S8: As Fig. S7, but for 12 UTC.

Case 1: 13 December 2018 at 13 UTC

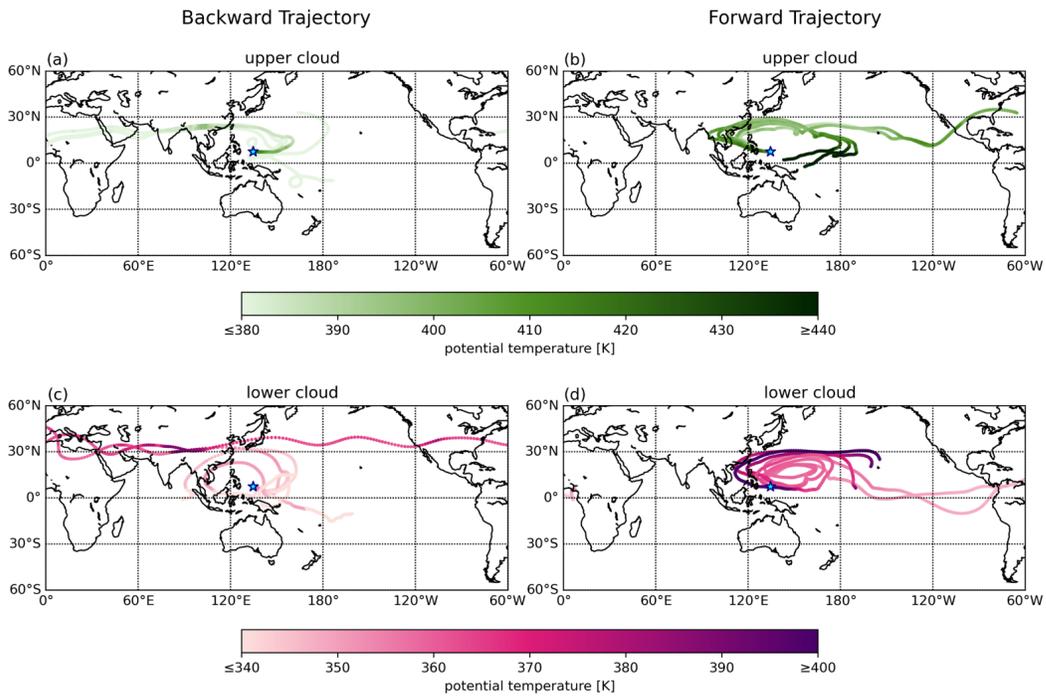


Fig. S9: As Fig. S7, but for 13 UTC.

Case 2: 01 August 2022 at 13 UTC

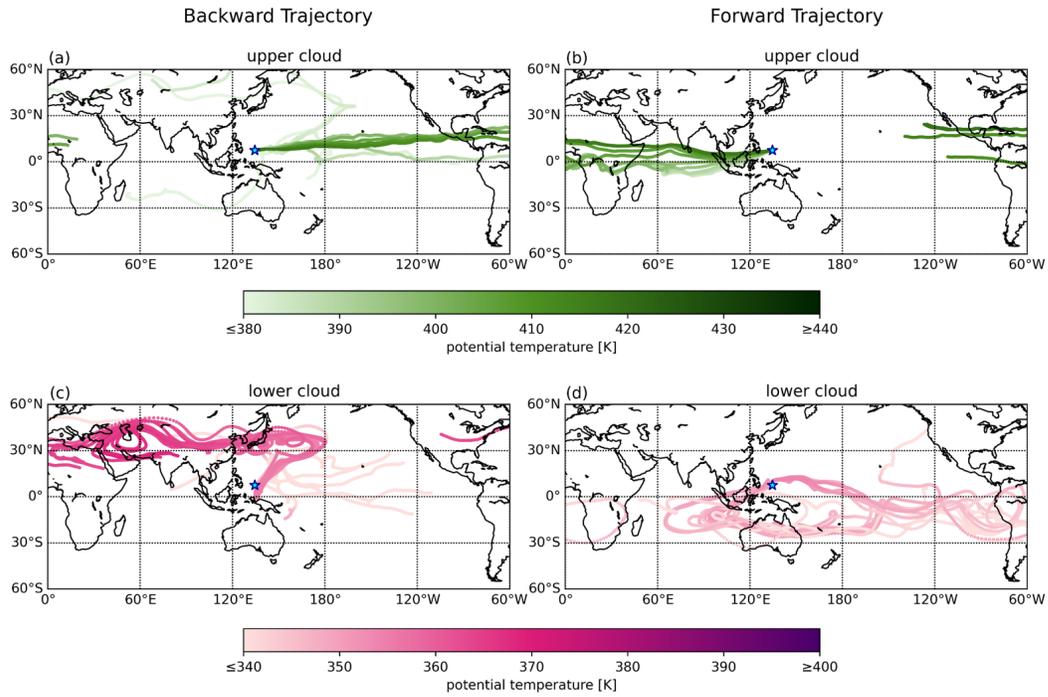


Fig. S10: As Fig. S4, but for the summer case 2, at 12 UTC on 1 August.

Case 2: 01 August 2022 at 13 UTC

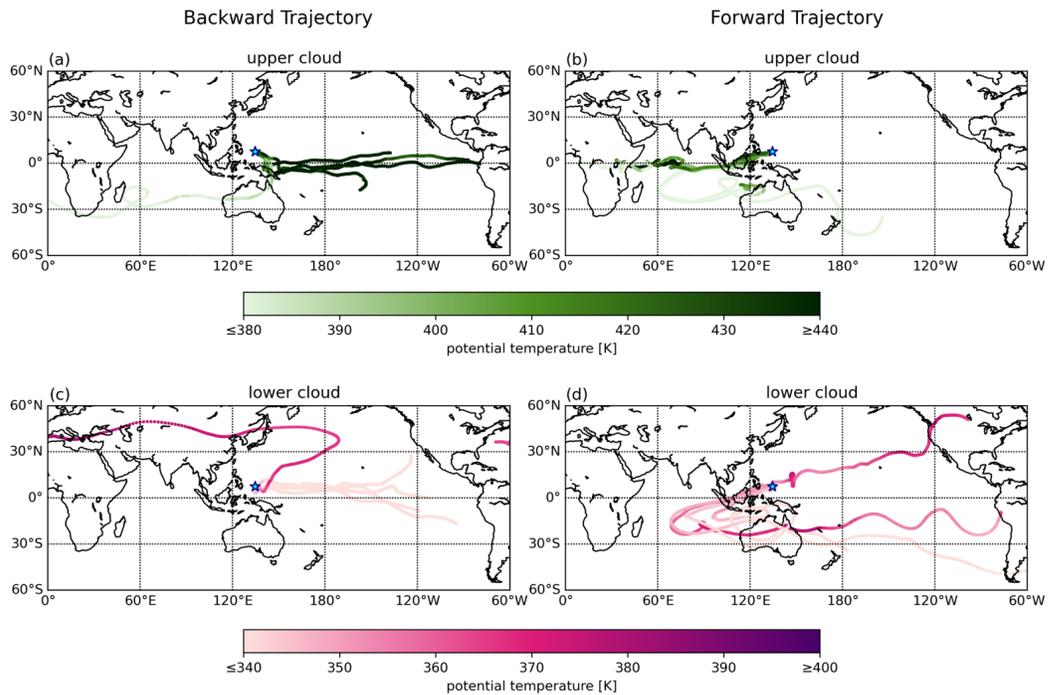


Fig. S11: As Fig. S10, but for the HYSPLIT.