Figure S1: Example of a back-tracked parcel starting at the location of the HALO aircraft during flight AC18. This parcel started at 2014-09-28 20:34:53 UTC and was traced back in time in one-hour steps up to 120 hours, as shown in the time color scale on the right. The solid gray line is the full flight AC18 track.

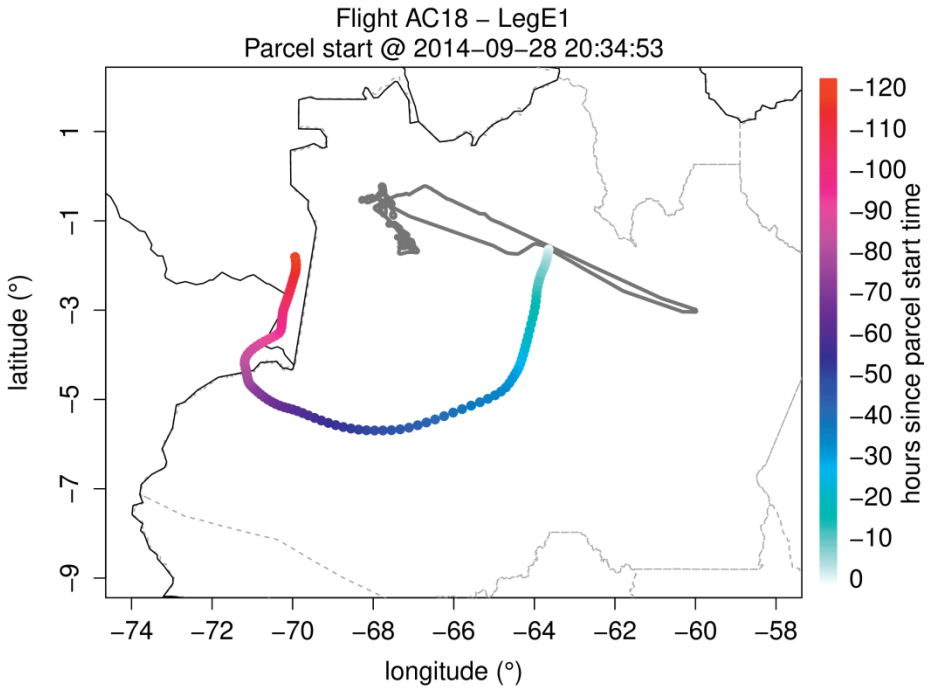

Figure S2: Examples of snapshots of the back-tracked parcel shown in Figure S1 matched in time to the closest GOES-13 infrared brightness temperature (T_b). Color dots are the same ones as in Figure S1, representing the position and backward time (in hours). Here the snapshots are zoomed in a 3ºx3º box centered at the parcel location at the time shown on the top the snapshots. Dashed boxes show the 1ºx1º box centered in the back-tracked parcel within which we looked up the minimum T_b. This value is shown at the left corner of each snapshot as well as the parcel altitude and GOES-13 infrared (IR) time.

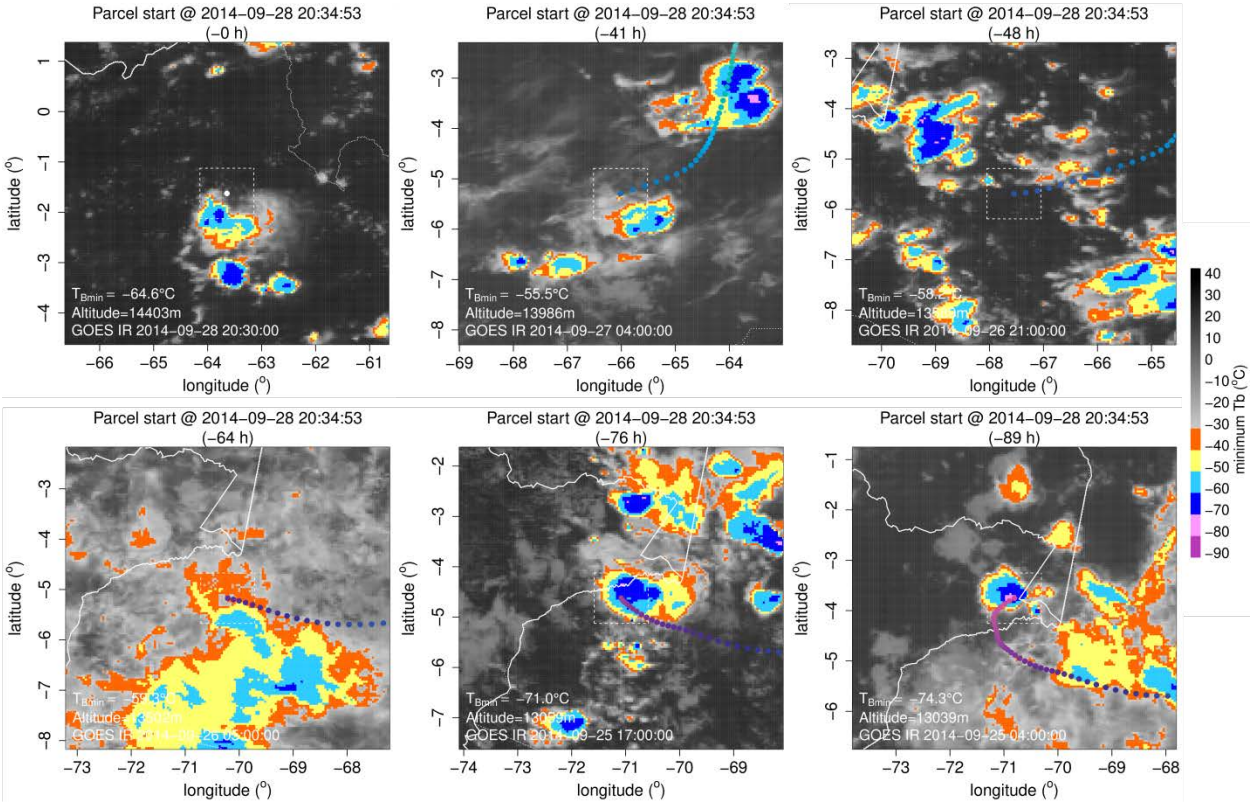

Figure S3: Summary of the back-tracked parcel positions (as in Fig. S1) with the minimum T_b tracked as shown in the snapshot examples of Figure S2. Here the back-track parcel position is colored with the value of minimum T_b found in the 1°x1° box.

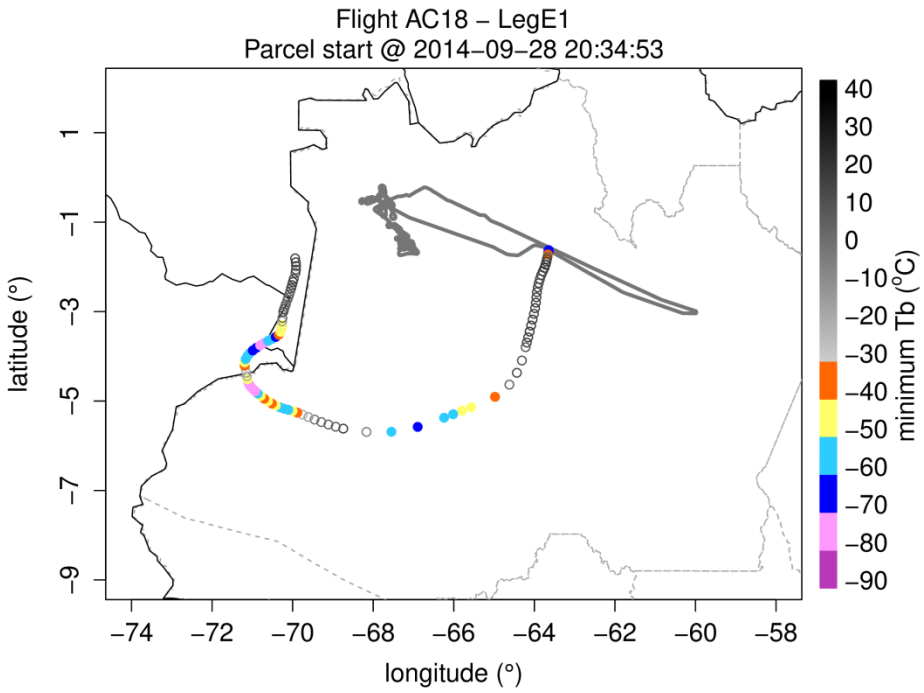

Figure S4. Mean vertical profiles of temperature, relative humidity and potential temperature (θ) from radiosoundings at Manacapuru.

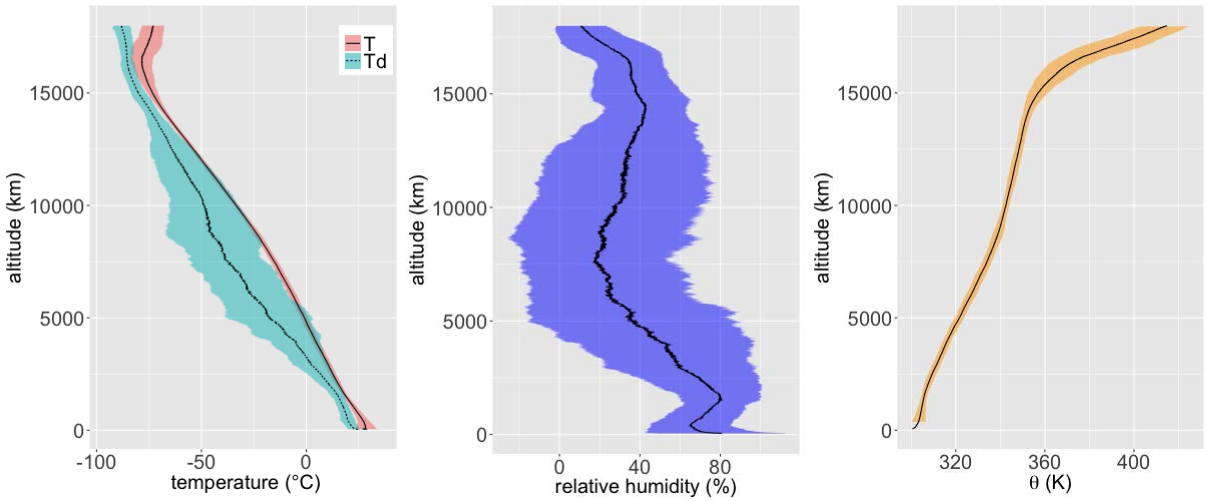

Figure S5: Trajectory statistics based on 120-hour backtrajectory calculations for September 2014, initialized at Manaus at an elevation of 10 km.

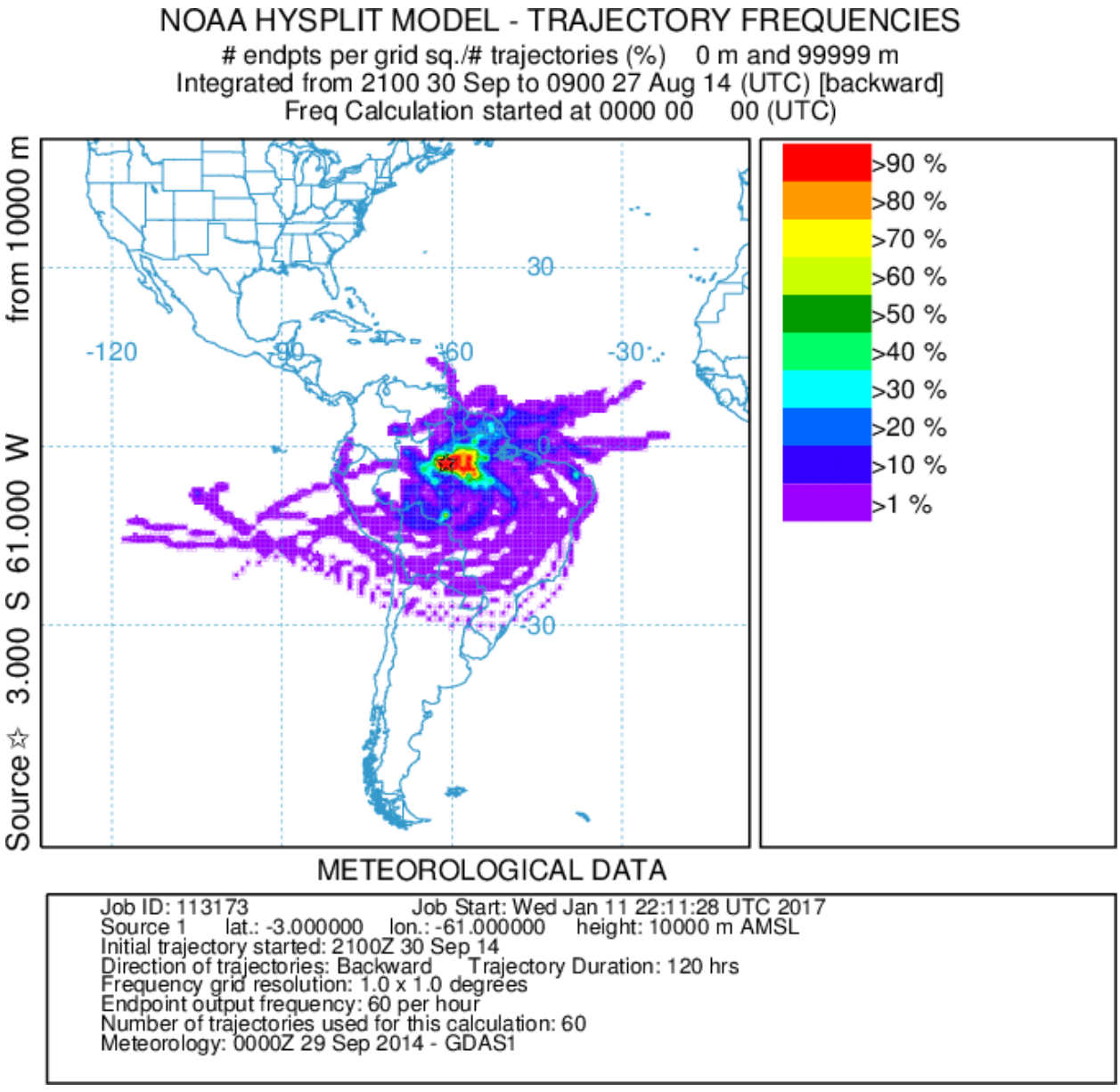

Figure S6: Trajectory statistics based on 120-hour backtrajectory calculations for September 2014, initialized at Manaus at an elevation of 14 km.