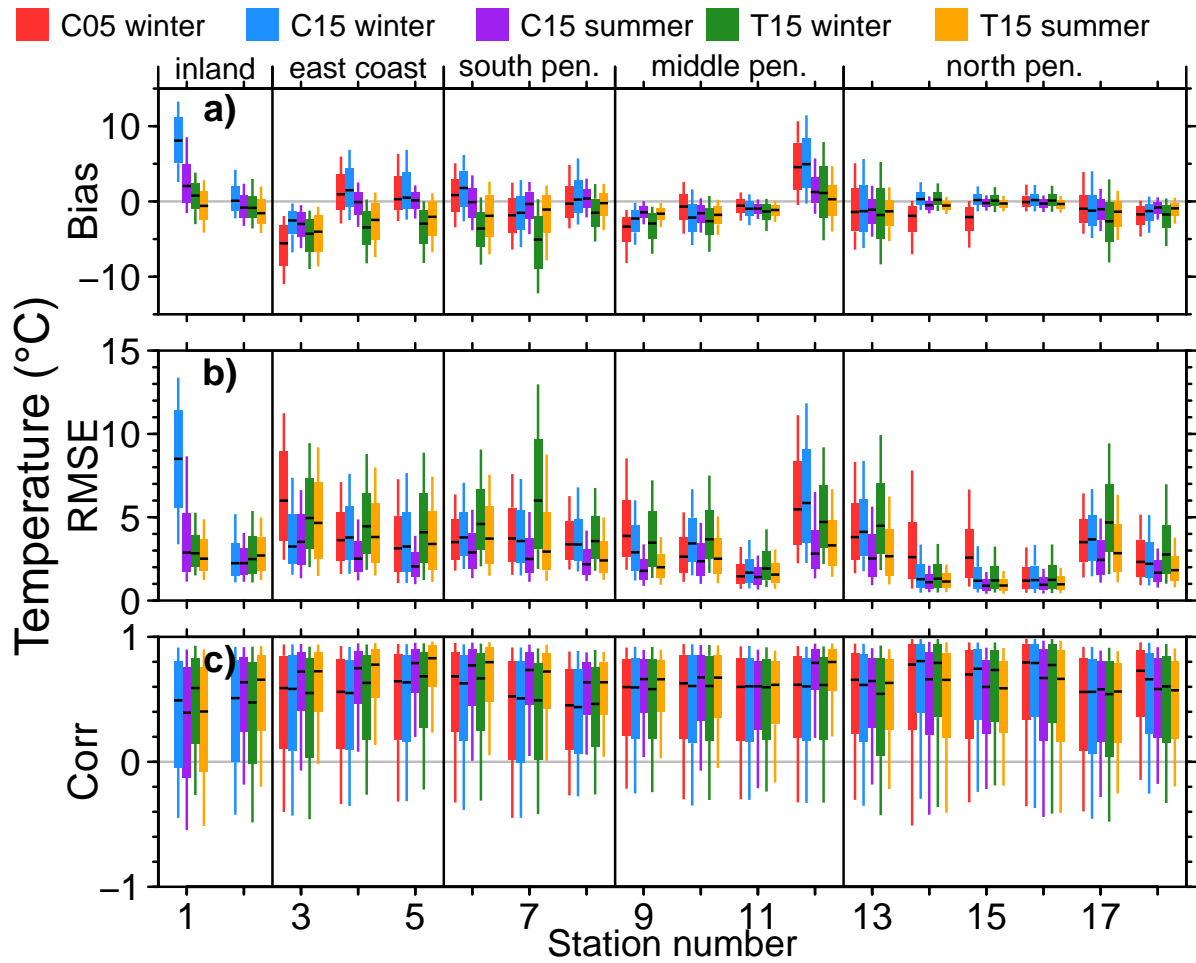
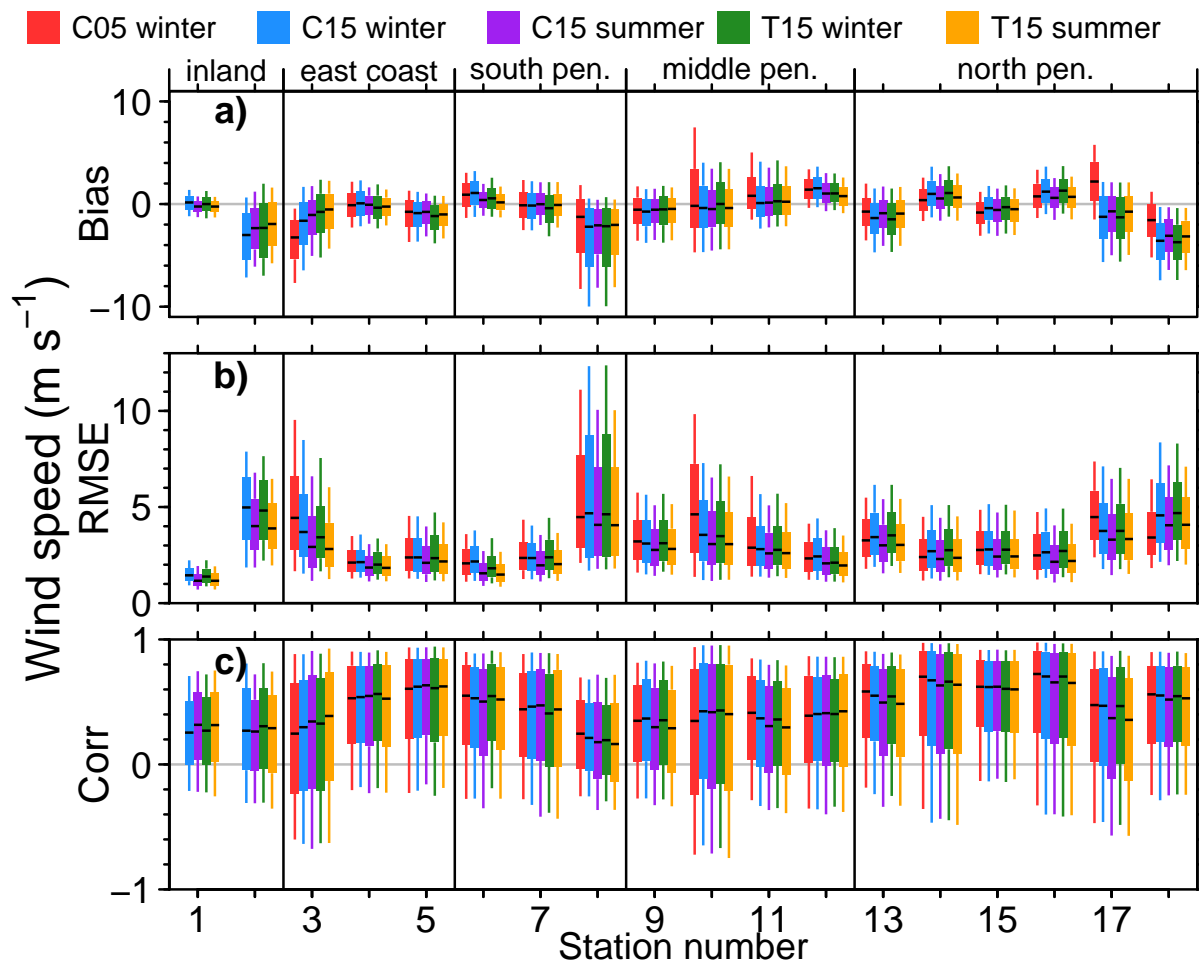
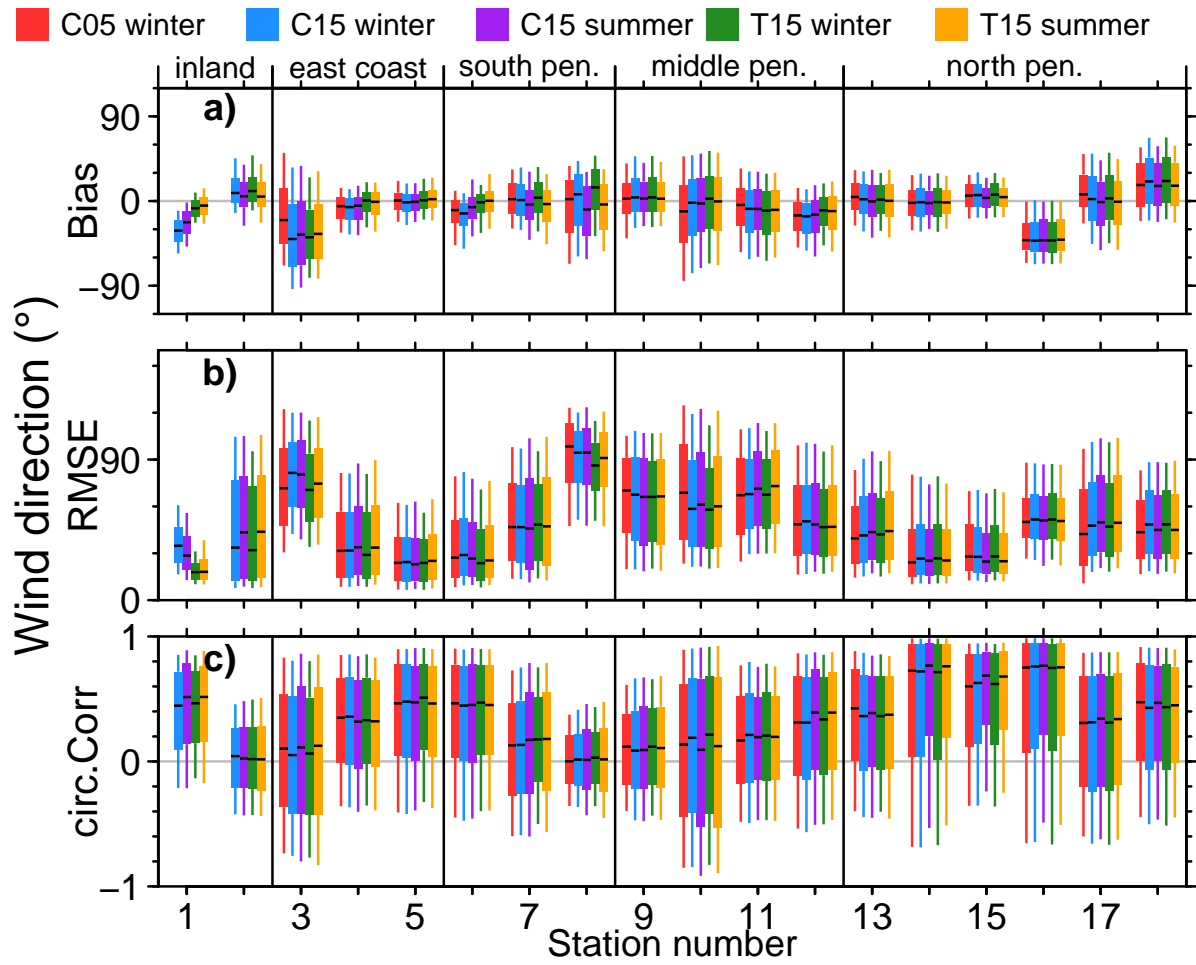
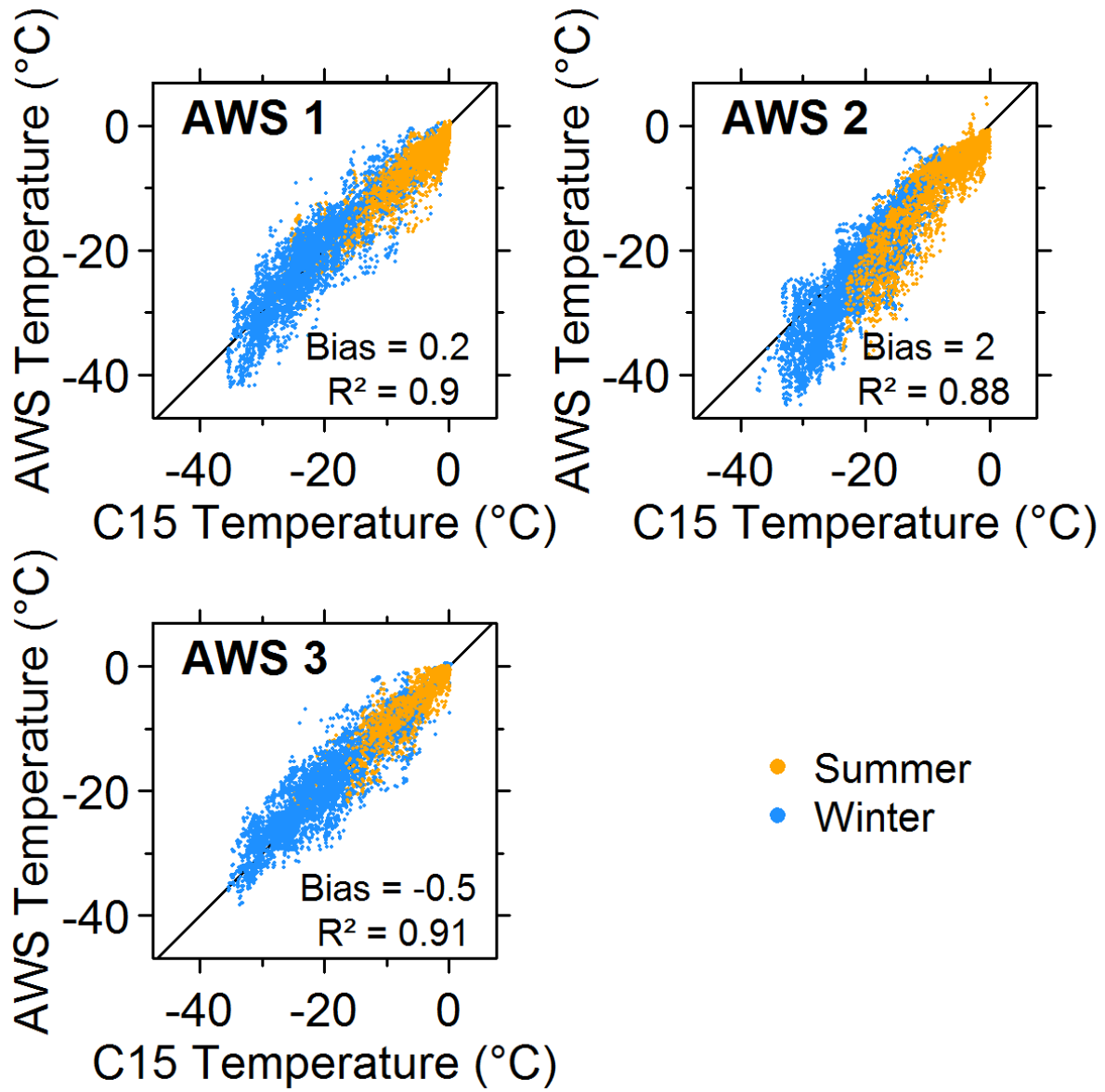
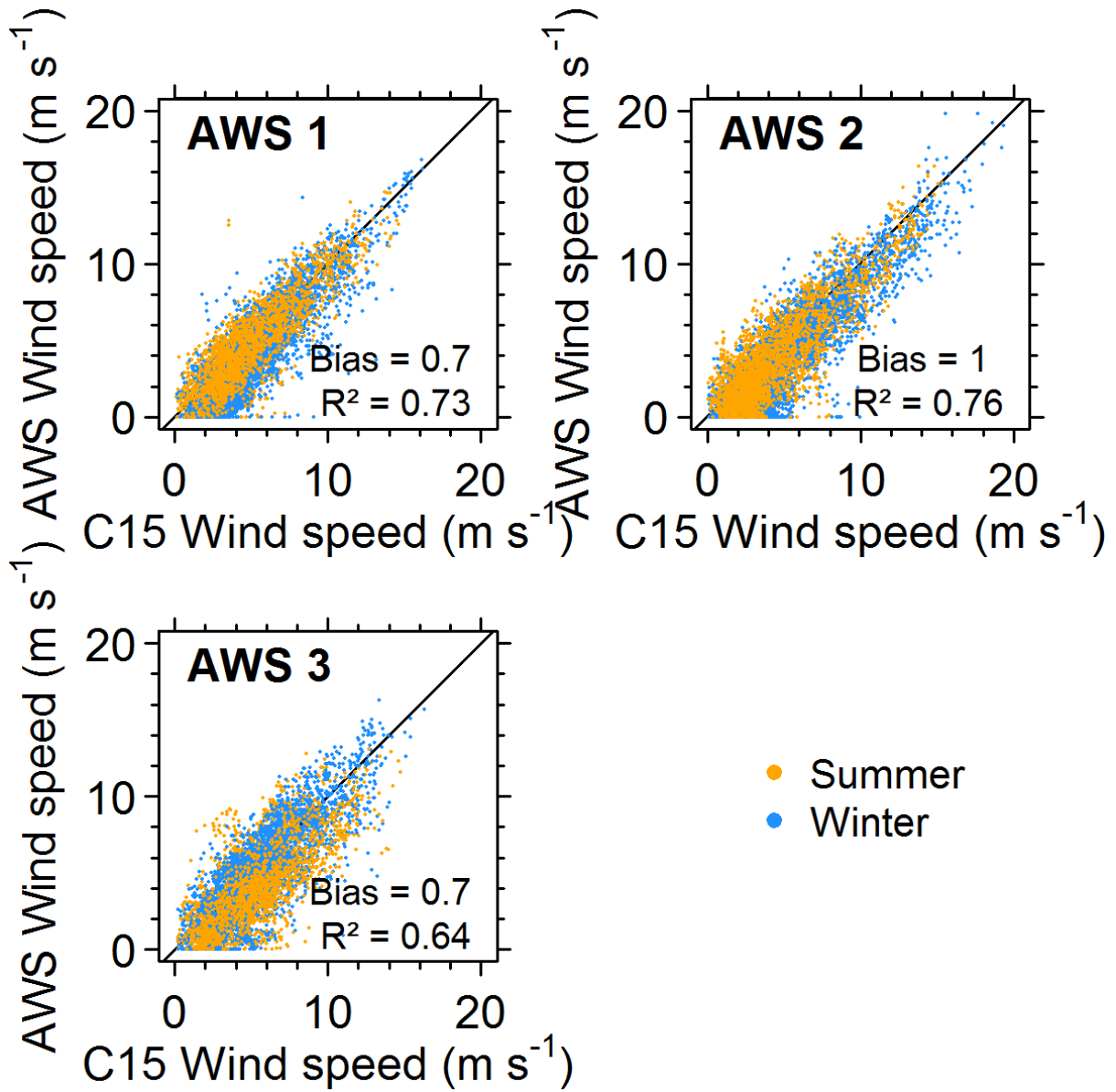
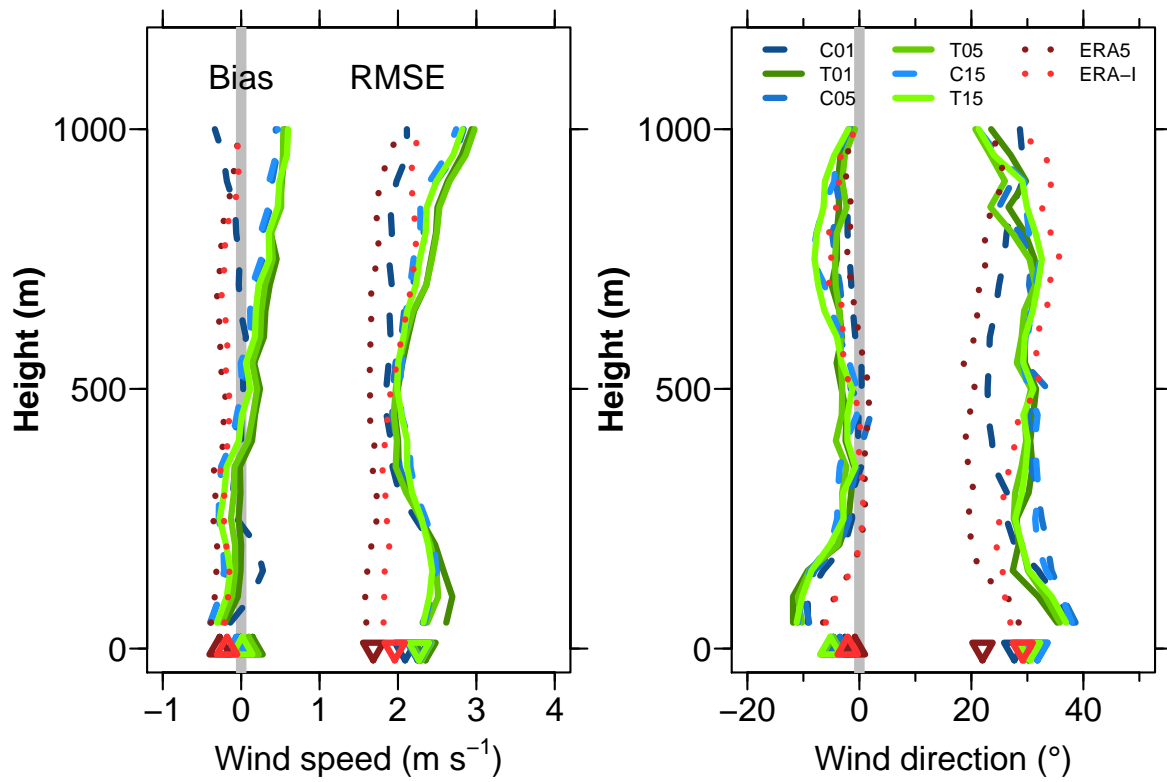
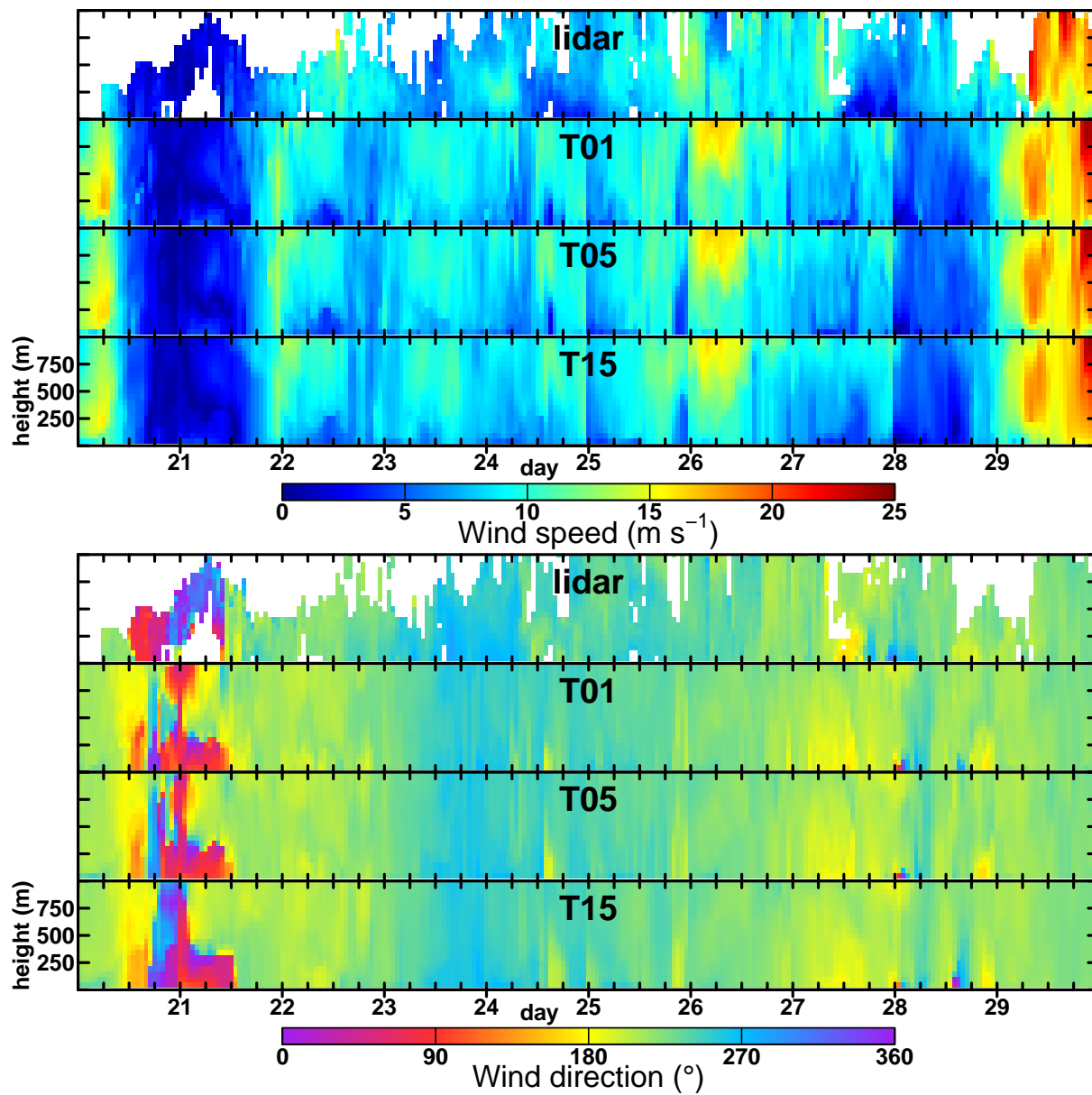
S 1: 2 m wind speed bias of T15 compared to AMPS, ERA5 and ERA-Interim for the years 2014-2015 and to ERA-Interim for the year 2002-2016. Summer (ONDJFM, top) and winter (AMJJAS, bottom) are shown separately. The gray area is outside the AMPS-domain

S 2: CCLM 2 m temperature bias (a), RMSE (b) and correlation (c) for C05, C15 and T15 for different surface stations. Boxes indicate the 25/75% and whiskers the 10/90% quantile; the median is indicated by a black line inside the box. Statistics (bias, RMSE and correlation) are calculated for every day.

S 3: As Fig. S2 but for 10 m wind speed.

S 4: As Fig. S2 but for 10 m wind direction.

S 5: Temperature of C15 (x-axis) vs Temperature of AWS (y-axis). Values for Summer in orange and for Winter in blue.

S 6: Like Fig. S5 but for wind speed.

S 7: Bias and RMSE for wind speed (left) and wind direction (right) for CCLM and ERA compared to lidar measurements. Triangles at the bottom indicate the overall bias and RMSE.

S 8: Time-height cross-sections for wind speed (top) and direction (bottom) for 20 Jan. 0000UTC to 30 Jan. 0000UTC.