

Supplementary Materials

Evaluation of Vertical Profiles and Atmospheric Boundary Layer Structure Using the Regional Climate Model CCLM during MOSAiC

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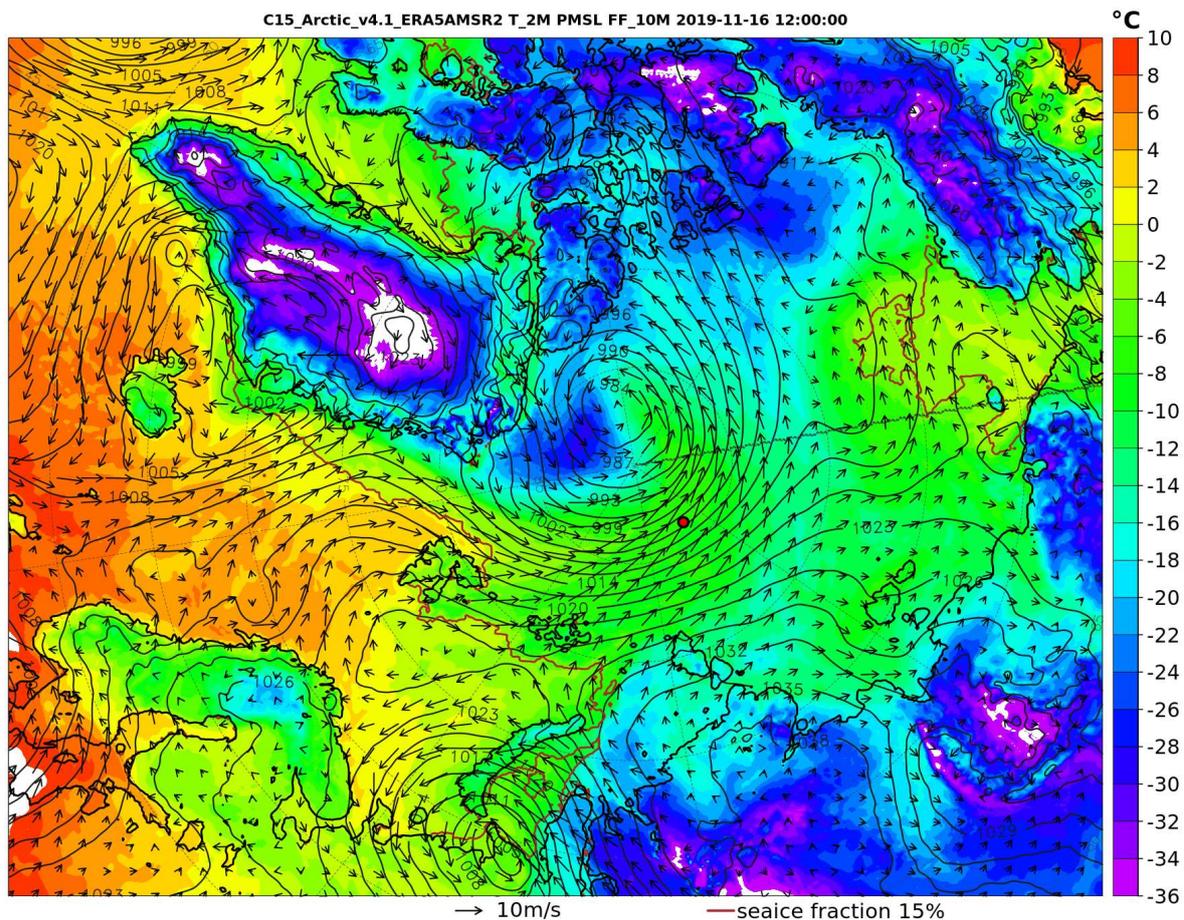


Figure S1. Fields of CCLM-simulated MSLP, 10m-wind and 2m-temperature at 1200 UTC for 16 November 2019. The ship position is marked with a red dot.

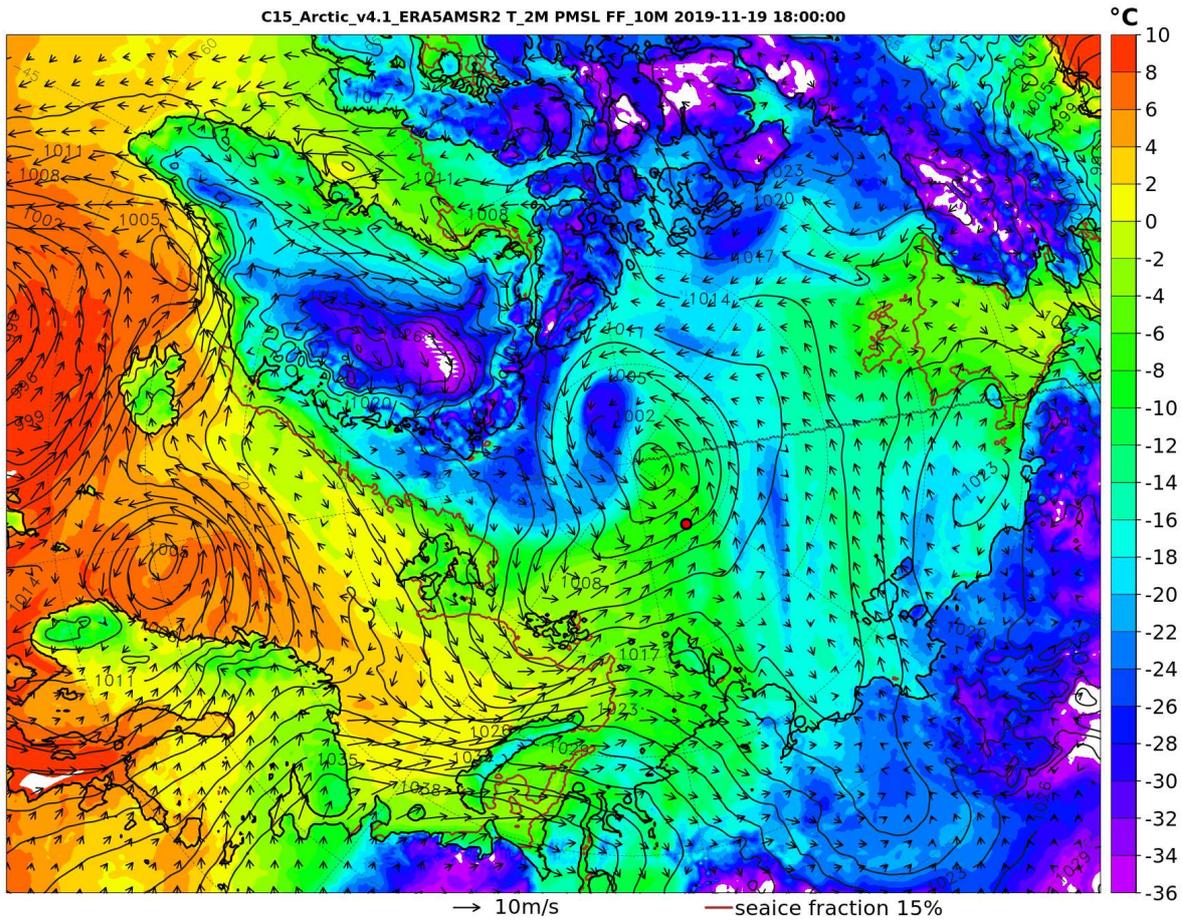


Figure S2. Fields of CCLM-simulated MSLP, 10m-wind and 2m-temperature at 1800 UTC for 19 November 2019. The ship position is marked with a red dot.

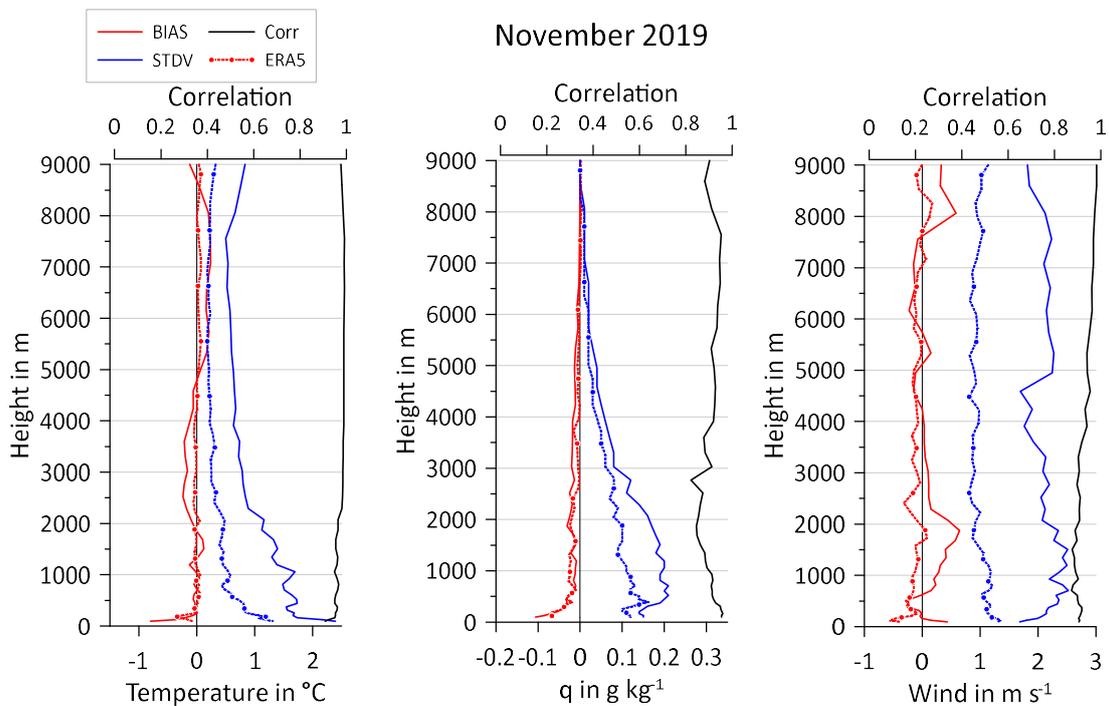


Figure S3. Profiles of bias, STDV and correlation for the comparison of C15MOD0 simulations with radiosondes for temperature (left), specific humidity (middle) and wind speed (right) for November 2019. Bias and STDV for the comparison of ERA5 with radiosonde data are shown as dotted lines.

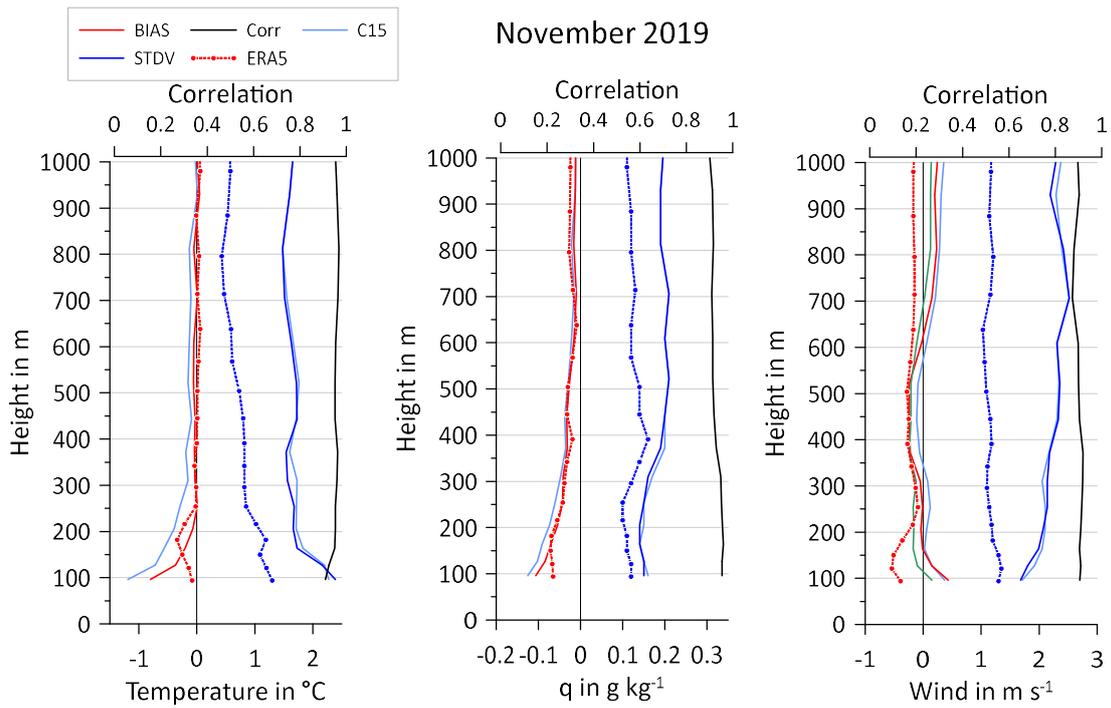


Figure S4. AS Figure S3, but only for the lowest 1000m. C15 simulations are shown in addition.

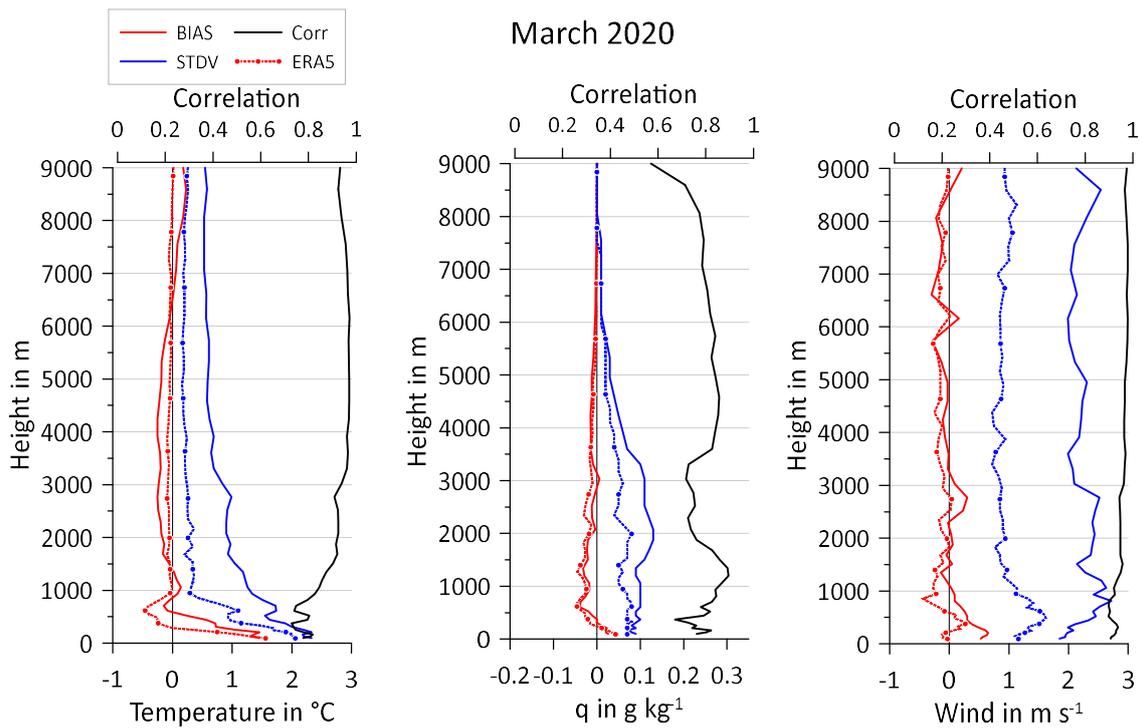


Figure S5. As Figure S3, but for March 2020.

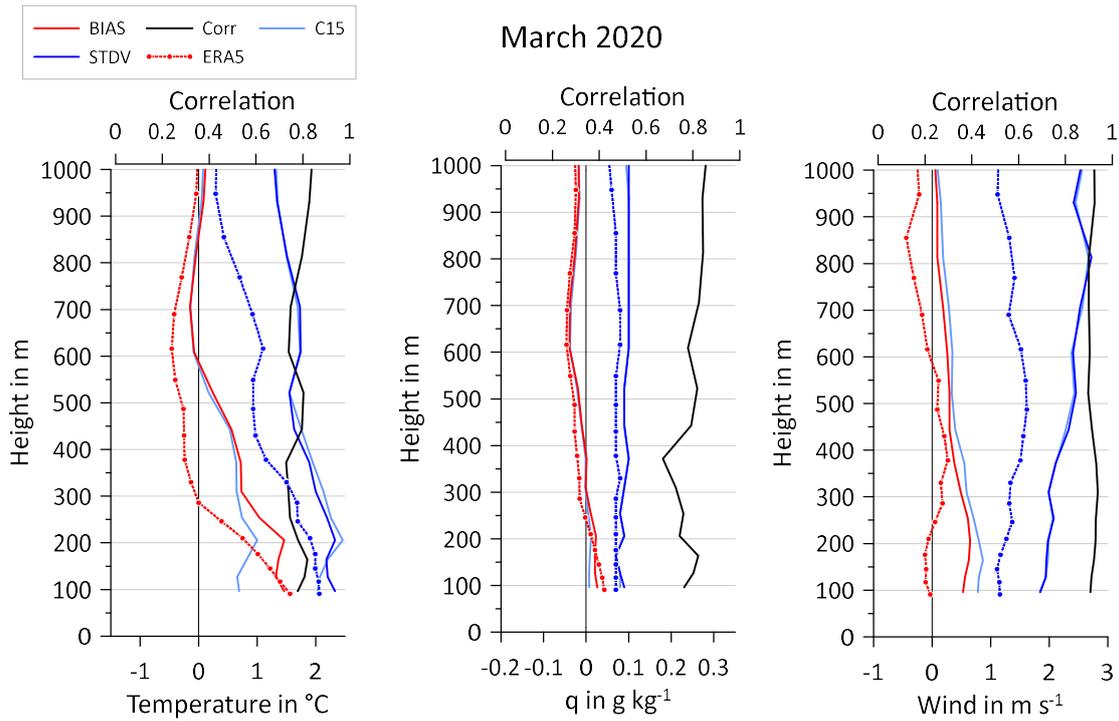


Figure S6. As Figure S4, but for March 2020.

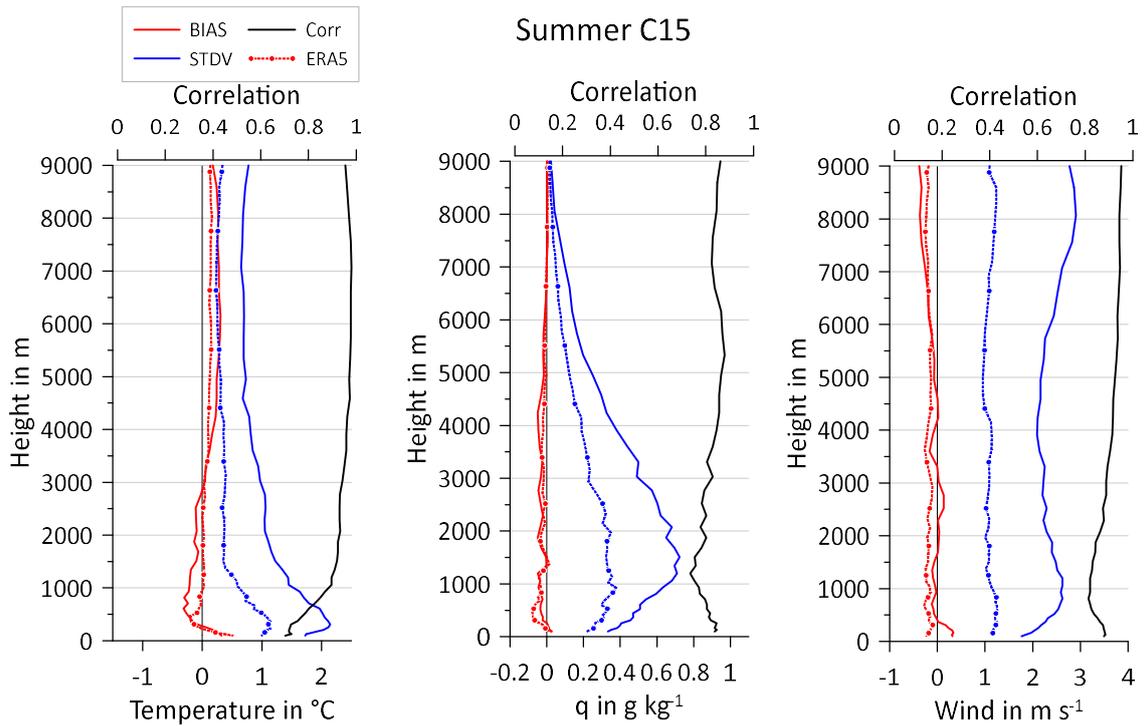


Figure S7. Profiles of bias, STDV and correlation for the comparison of C15 simulations with radiosondes for temperature (left), specific humidity (middle) and wind speed (right) for May–September 2020 (631 profiles). Bias and STDV for the comparison of ERA5 with radiosonde data are shown as dotted lines.

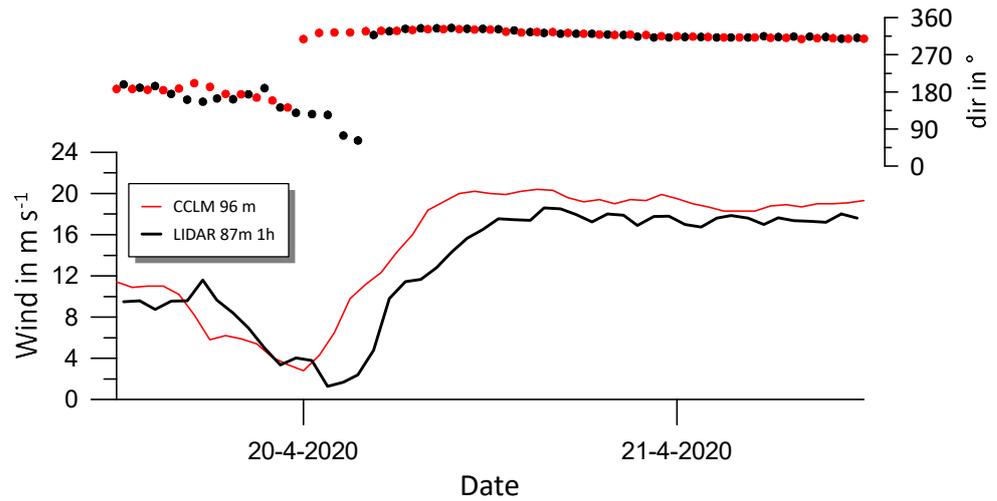


Figure S8. Hourly mean values of the wind speed (**lower panel**) and wind direction (**upper panel**) for 19–21 April 2020 for lidar measurements at 87 m height (black) and C15MOD0 simulations at 96 m height (red).

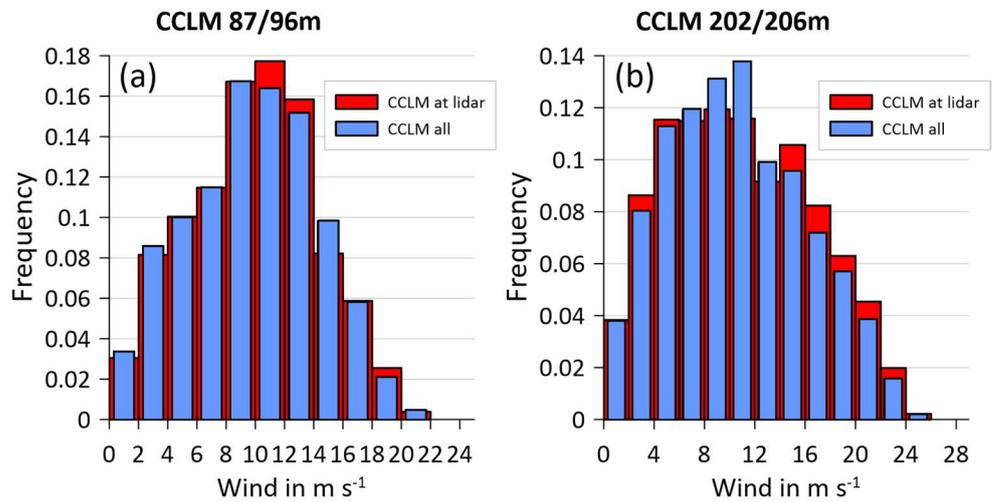


Figure S9. Frequency distributions of C15MOD0 simulated wind speed (1h values) at about 90 m (a) and 200 m (b) for CCLM data at the times of available lidar data and for all CCLM data.

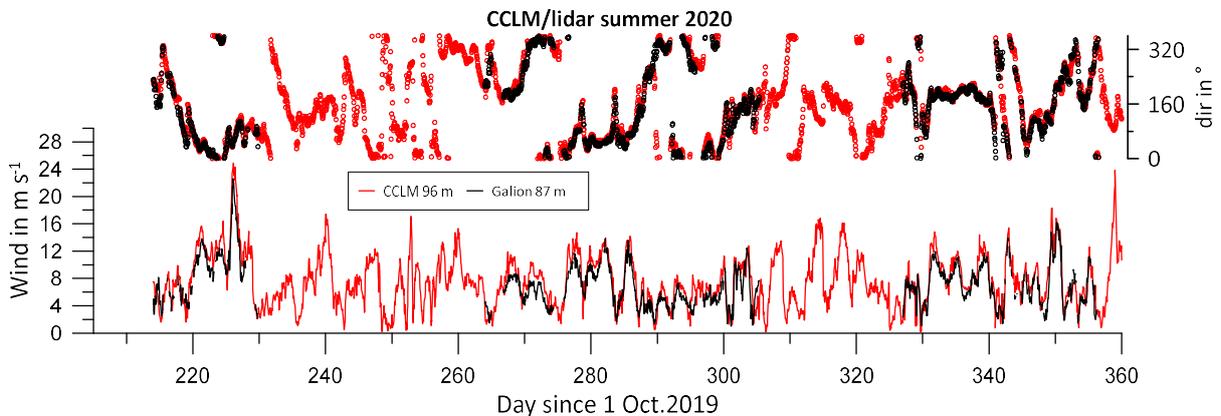


Figure S10. Hourly mean values of the wind speed (**lower panel**) and wind direction (**upper panel**) for 1 May–30 September 2020 for lidar measurements at 87 m height (black) and C15 simulations at 96 m height (red). Galion lidar data are not available for days 229–264 and days 305–327, when the ship was not drifting.

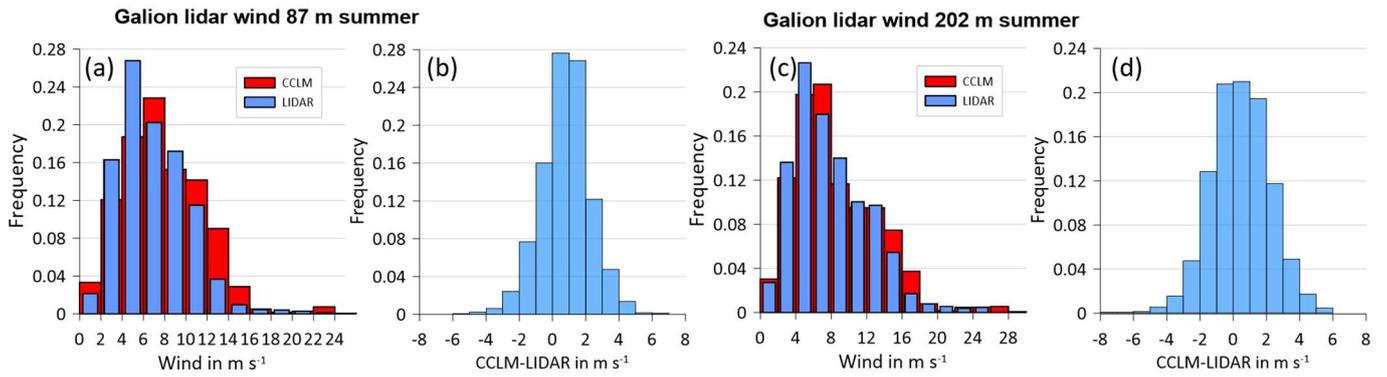


Figure S11. Frequency distributions of the Galion lidar measurements and C15 simulated wind speed (1h values) at 87 m (a) and 202 m (c) and their differences 87 m (b) and 202 m (d) for the whole summer (May–September).

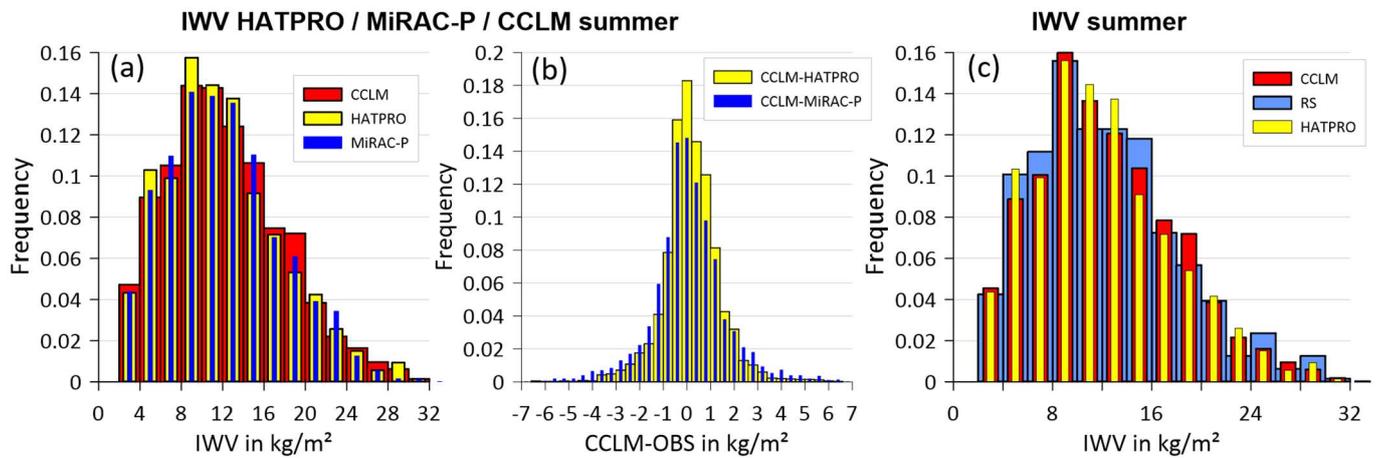


Figure S12. (a) Frequency distributions of IWV measurements (HATPRO yellow, MiRAC-P dark blue) and C15 simulations (red) for the summer period (1h values); (b) frequency distributions of the differences; (c) frequency distributions of IWV from radiosondes (RS light blue), HATPRO (yellow) and C15 simulations (red).