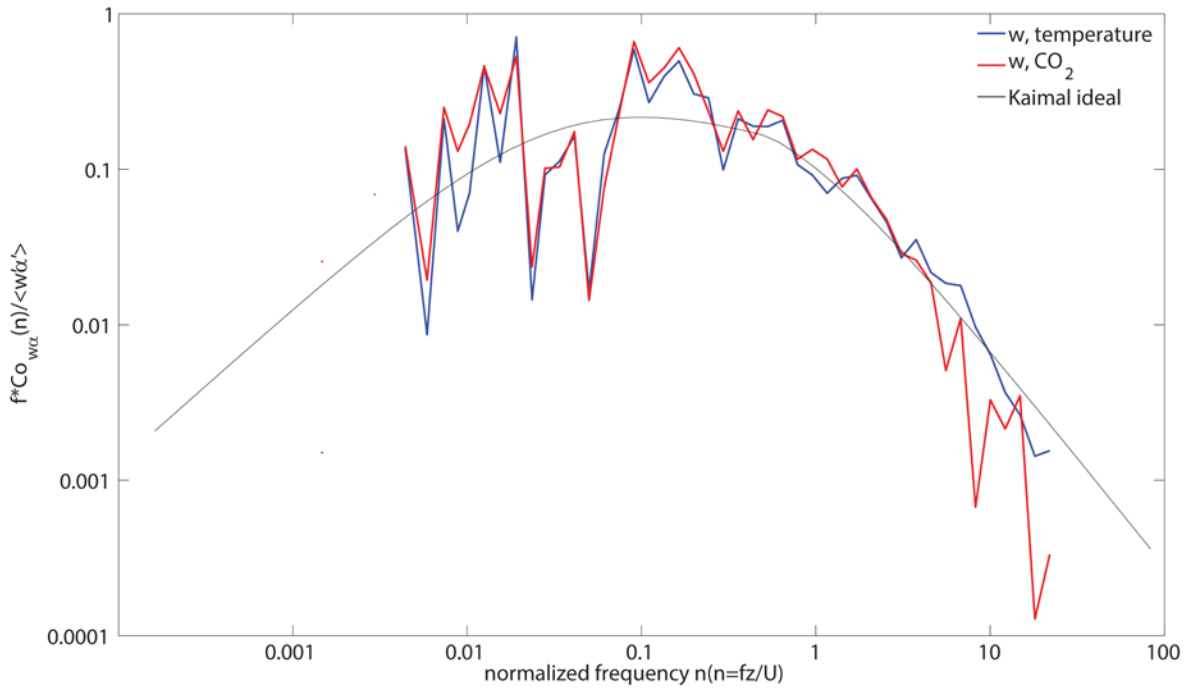
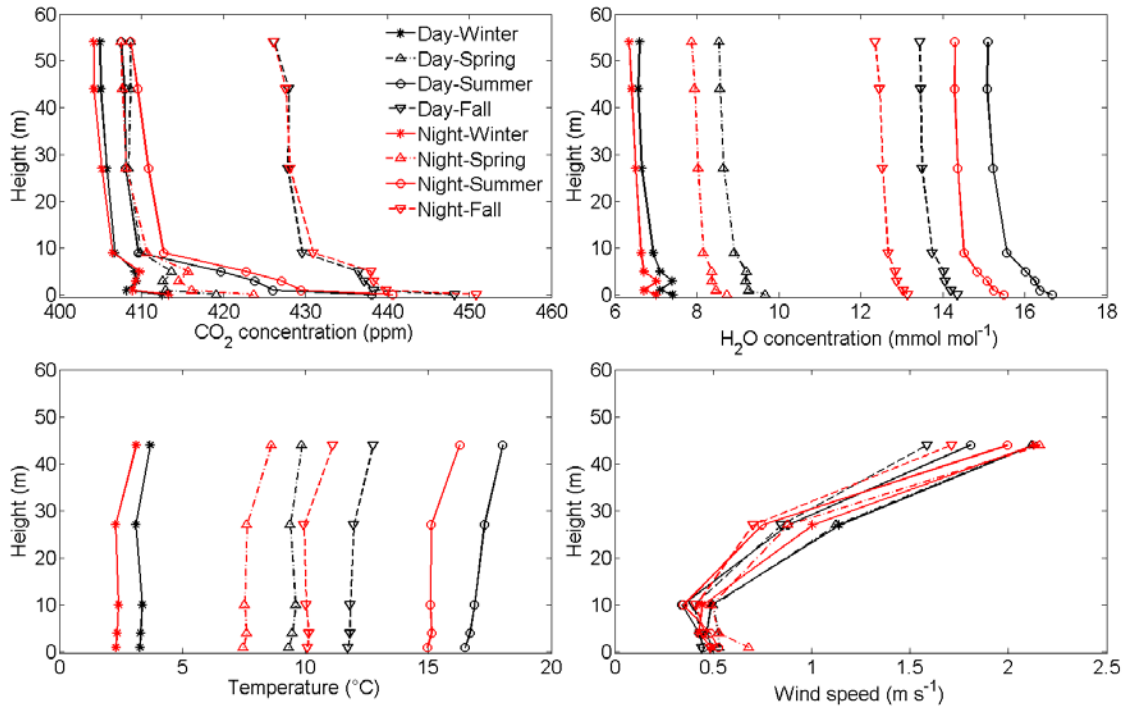


1
2 **Supplementary Material**

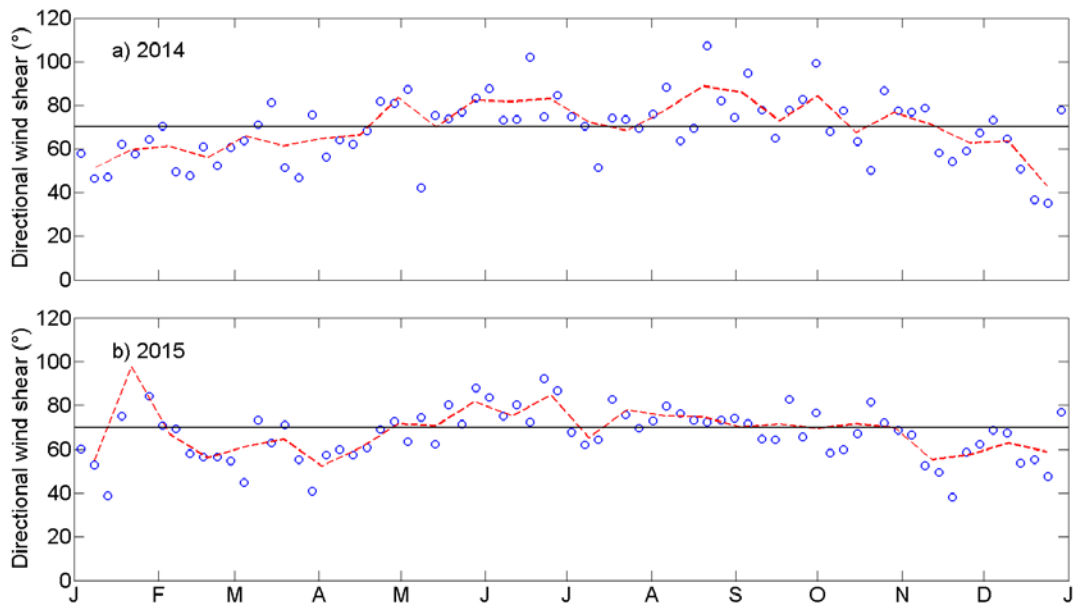


3
4 **Figure S 1:** Typical below-canopy cospectra of vertical wind and temperature (blue line) and vertical wind and CO₂
5 (red line). The black line represents the ideal cospectra from Kaimal et al. (1972).
6

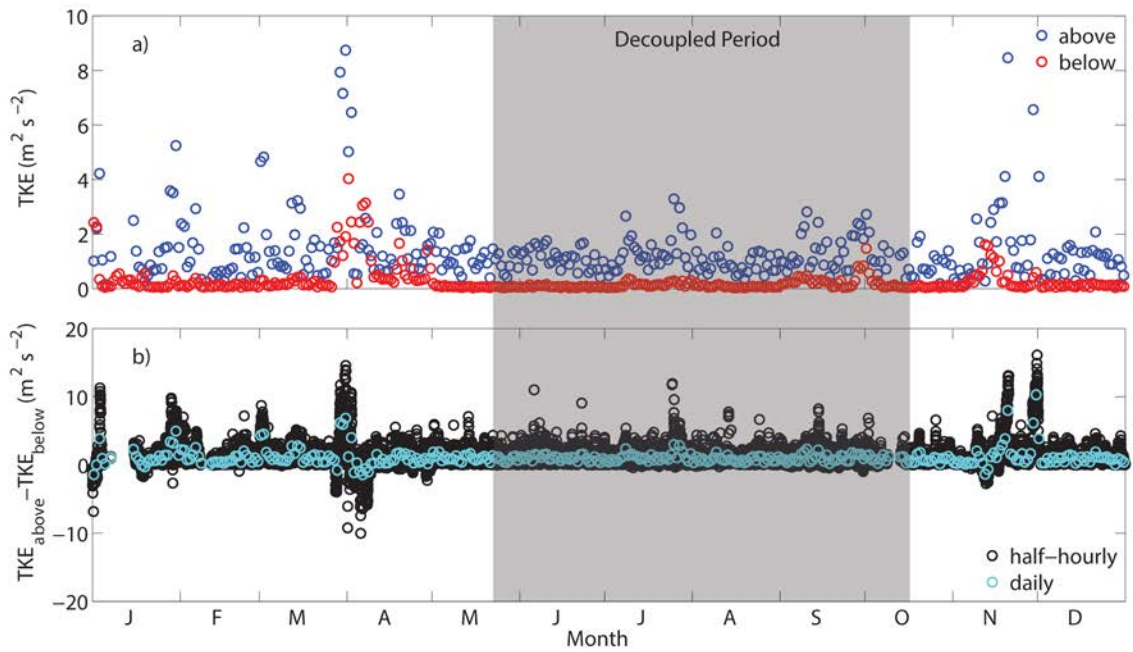


7

8 **Figure S 2:** Seasonal profiles of mean daytime (black) and nighttime (red) a) CO₂ concentration, b) H₂O vapor
 9 concentration, c) temperature and d) wind speed within the canopy at Lägeren in 2014. Seasons are defined based on
 10 the meteorological definition for winter (DJF), spring (MAM), summer (JJA) and fall (SON). The average tree
 11 canopy height is 30 m, with the average tree canopy crown extending from 25 to 35 m.
 12

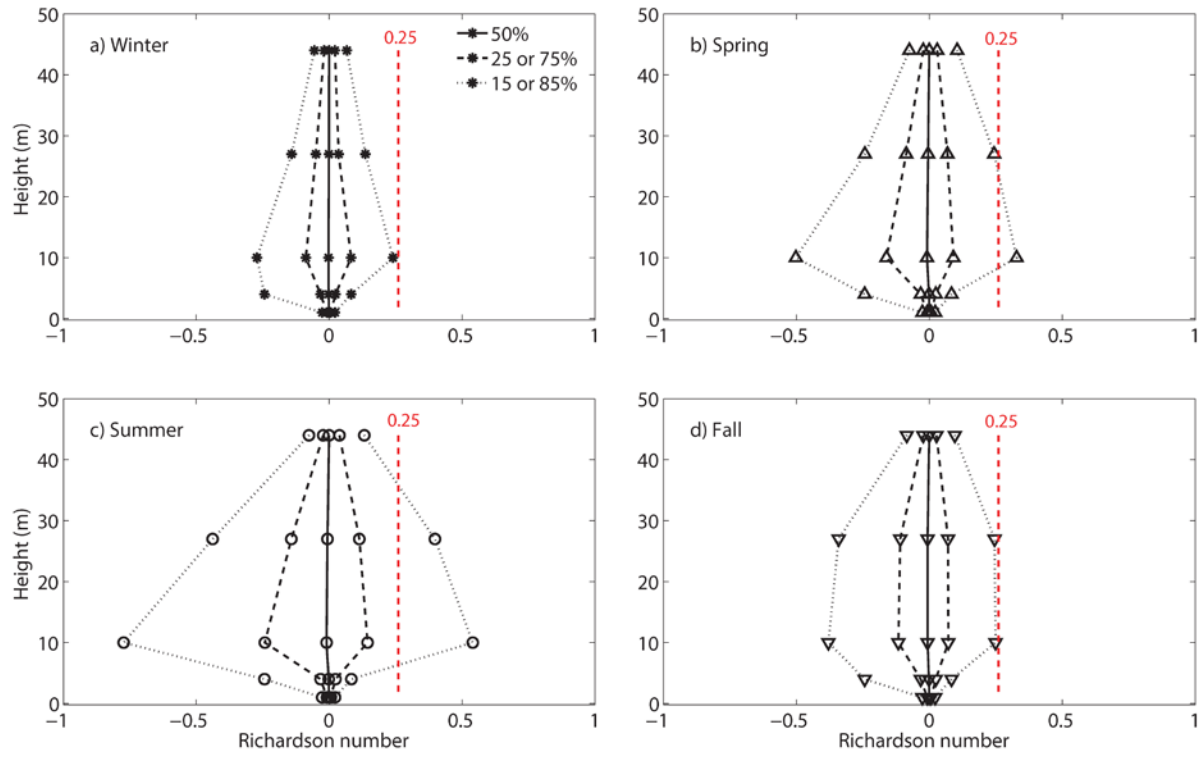


13
 14 **Figure S 3:** Directional wind shear at the Lägeren site in a) 2014 and b) 2015. The blue circles represent 5-day
 15 averages and the red lines represent 14-day averages. The black line at 70° shows that wind shear during decoupled
 16 periods tend to be greater than 70 degrees, although this is not consistent.
 17



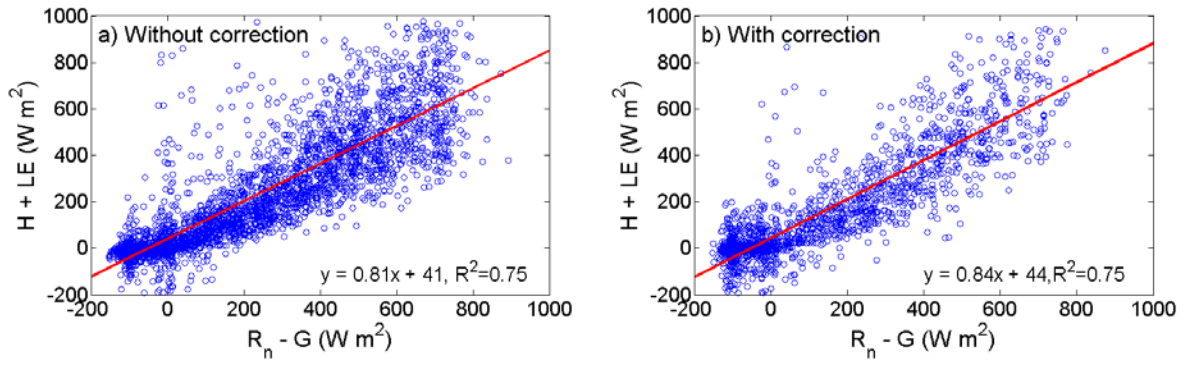
18
 19
 20
 21
 22
 23

Figure S 4: Turbulent kinetic energy (TKE) a) above (blue) and below (red) the canopy, and b) difference in TKE above and below canopy in 2015. The circles in panel a) represent daily averages. The black circles in panel b) represent the half-hourly data while the cyan circles represent daily averages. The shaded area represents the decoupled period.



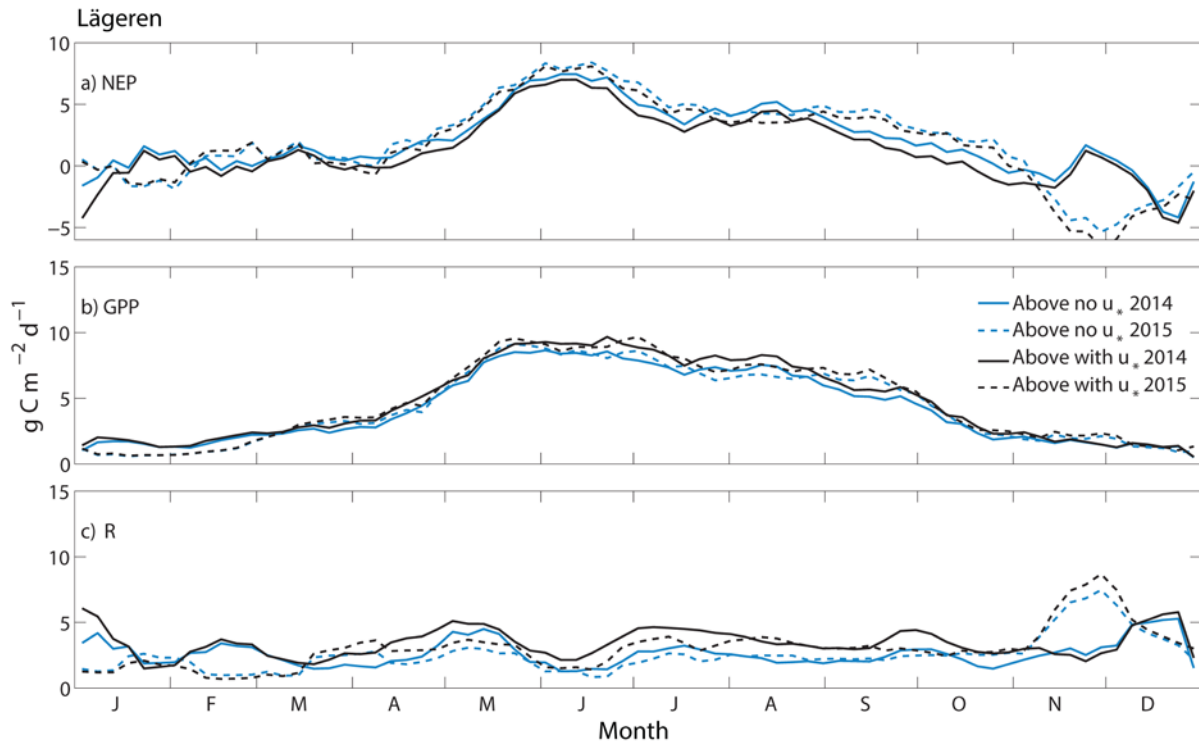
24

25 **Figure S 5:** Richardson numbers in a) winter, b) spring, c) summer, and d) fall. The red line at 0.25 shows the
 26 critical Richardson number. The filled line shows the mark for 50% of the data, the dashed line for 25% and 75% of
 27 the data, and the dotted line for 15 and 85% of the data.
 28



29
30
31
32

Figure S 6: Energy balance closure a) without the decoupling correction and b) with the decoupling correction during the decoupled period in 2014.



33
 34 **Figure S 7:** Net ecosystem production (NEP), gross primary production (GPP) and respiration (R) above the canopy
 35 without (blue lines) and with (black lines) the u_* filtering in 2014 and 2015. All lines are 5-day averages.

36

37