S1 FLUXES

S1.1 Sorø

S1.1.1 Graphical analysis daily data Sorø

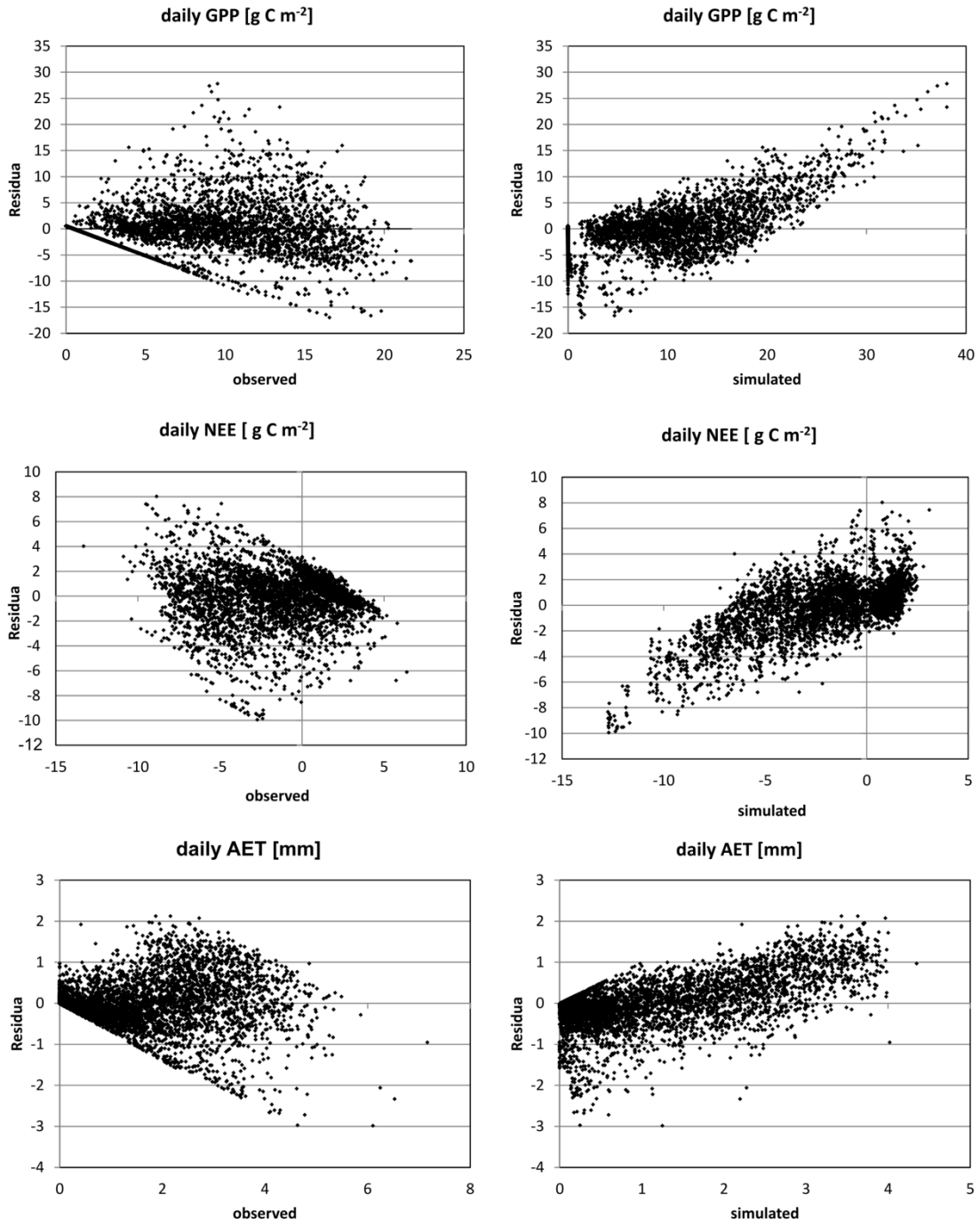

Figure S1 Residual plots of GPP, NEE and AET for Sorø; 1996-2012

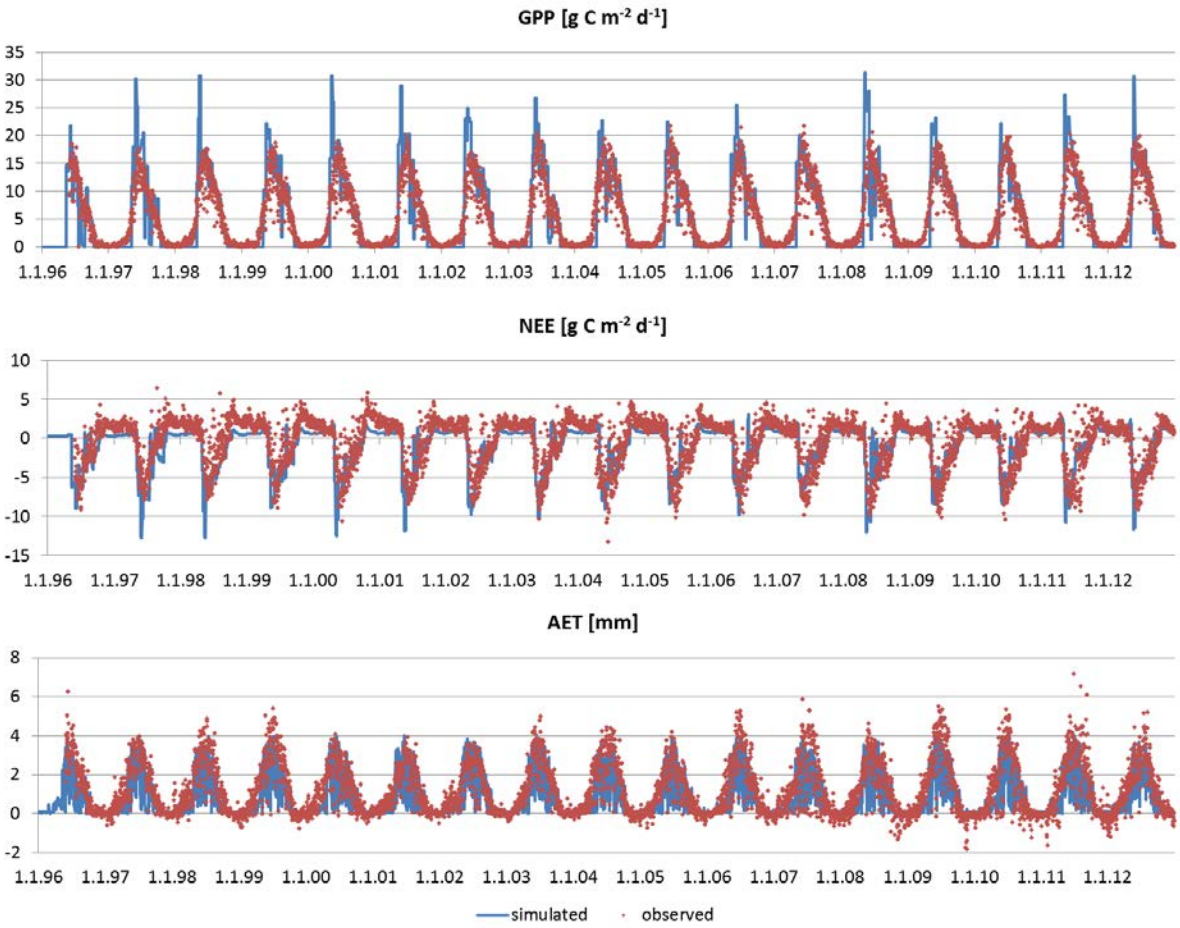

Figure S2 Time series of GPP, NEE, and AET for Sorø; 1996-2012

S1.1.2 Graphical analysis monthly data Sorø

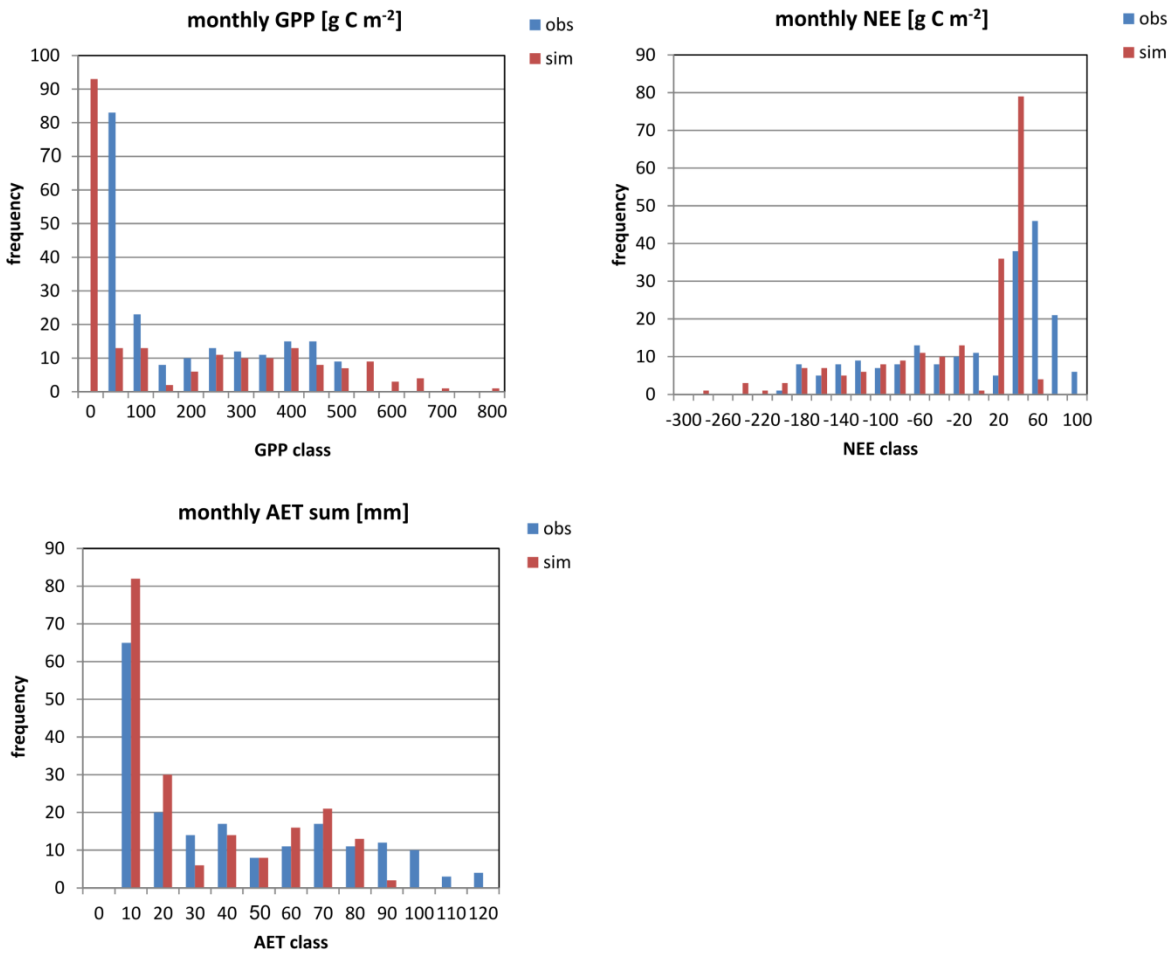

Figure S3 Frequency plots of monthly data of GPP, NEE and AET for Sorø; 1996-2012

S1.2 Hyytiälä

S1.2.1 Graphical analysis daily data Hyytiälä

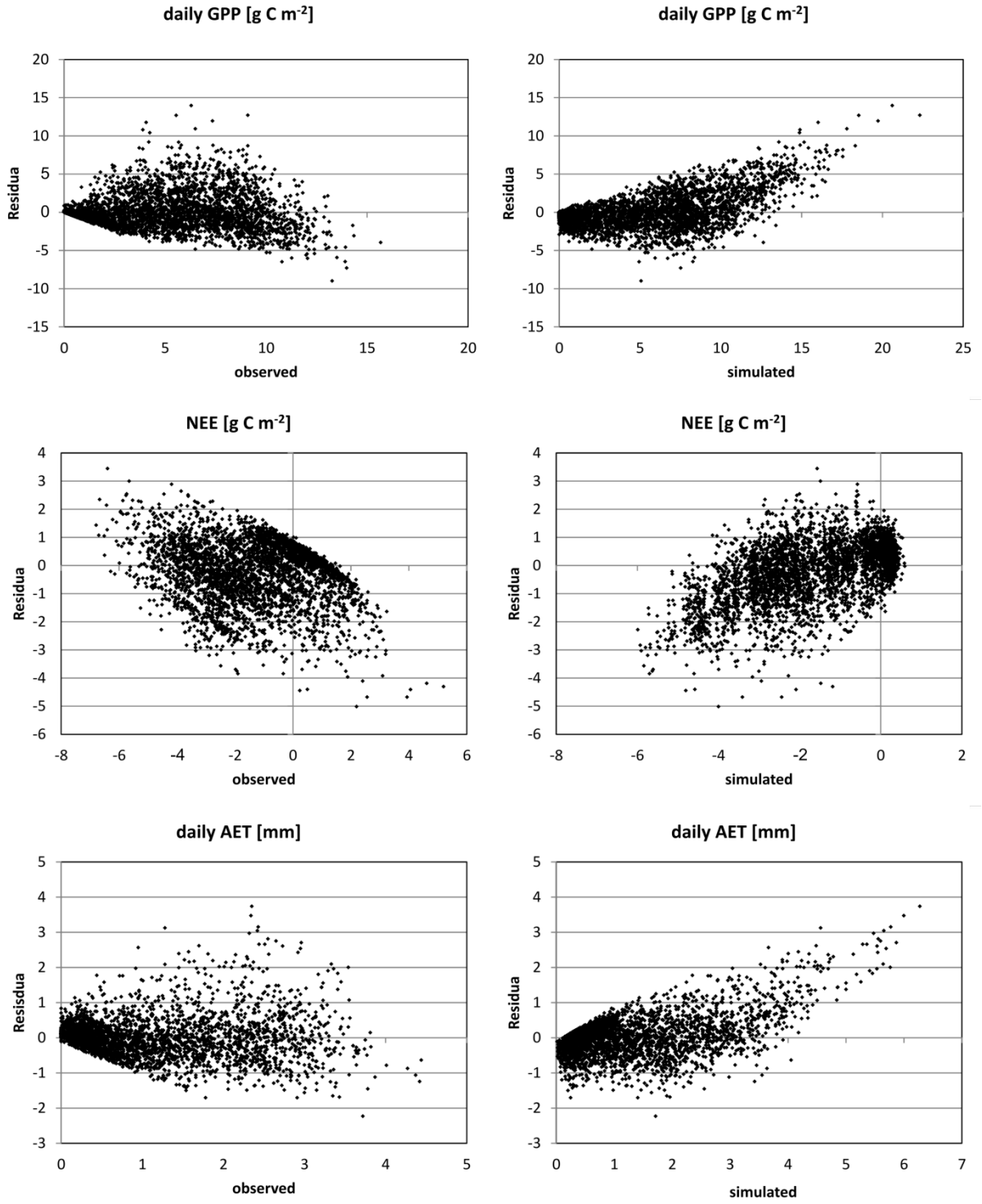

Figure S4 Residual plots of GPP, NEE and AET for Hyytiälä; 1996-2014

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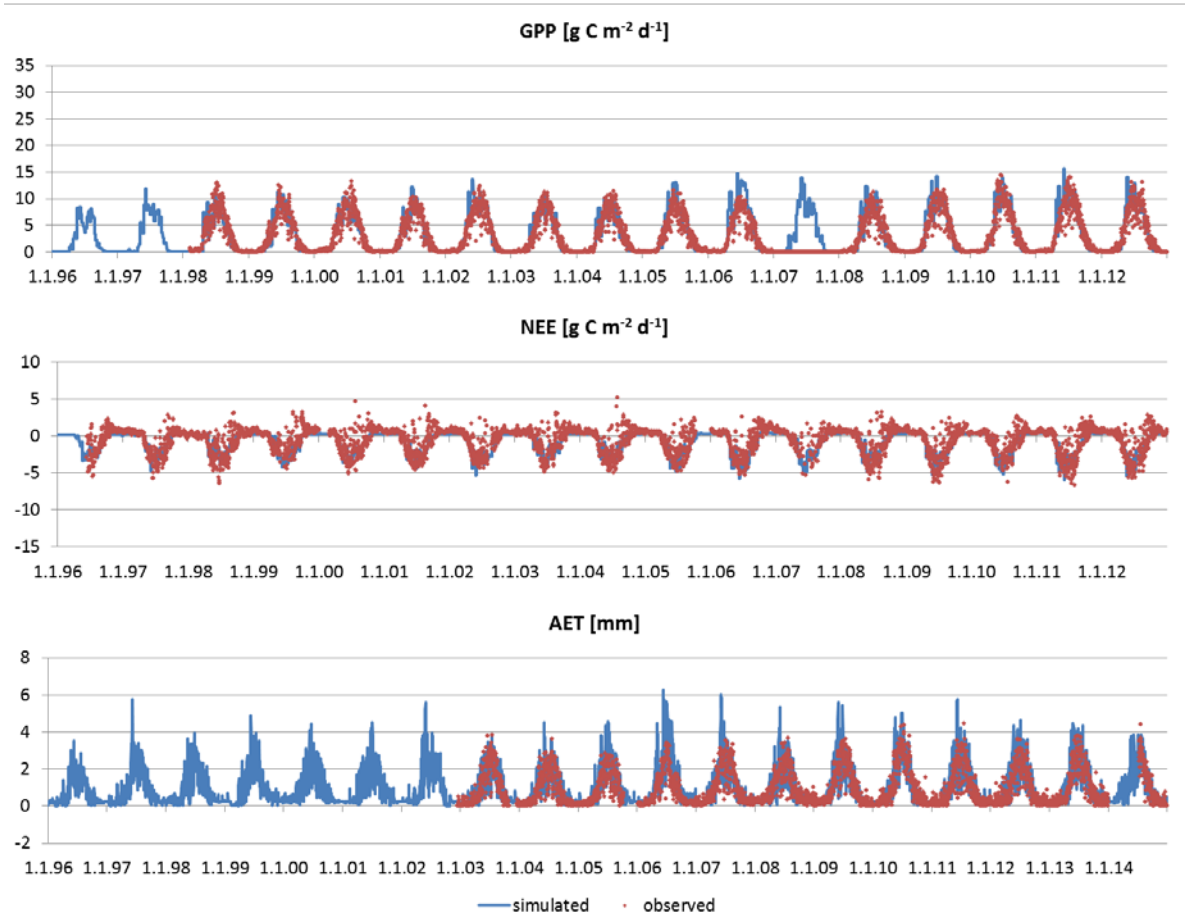

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19 **Figure S5 Time series of GPP, NEE, and AET for Hyytiälä; 1996-2014**

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S1.2.2 Graphical analysis monthly data Hyytiälä

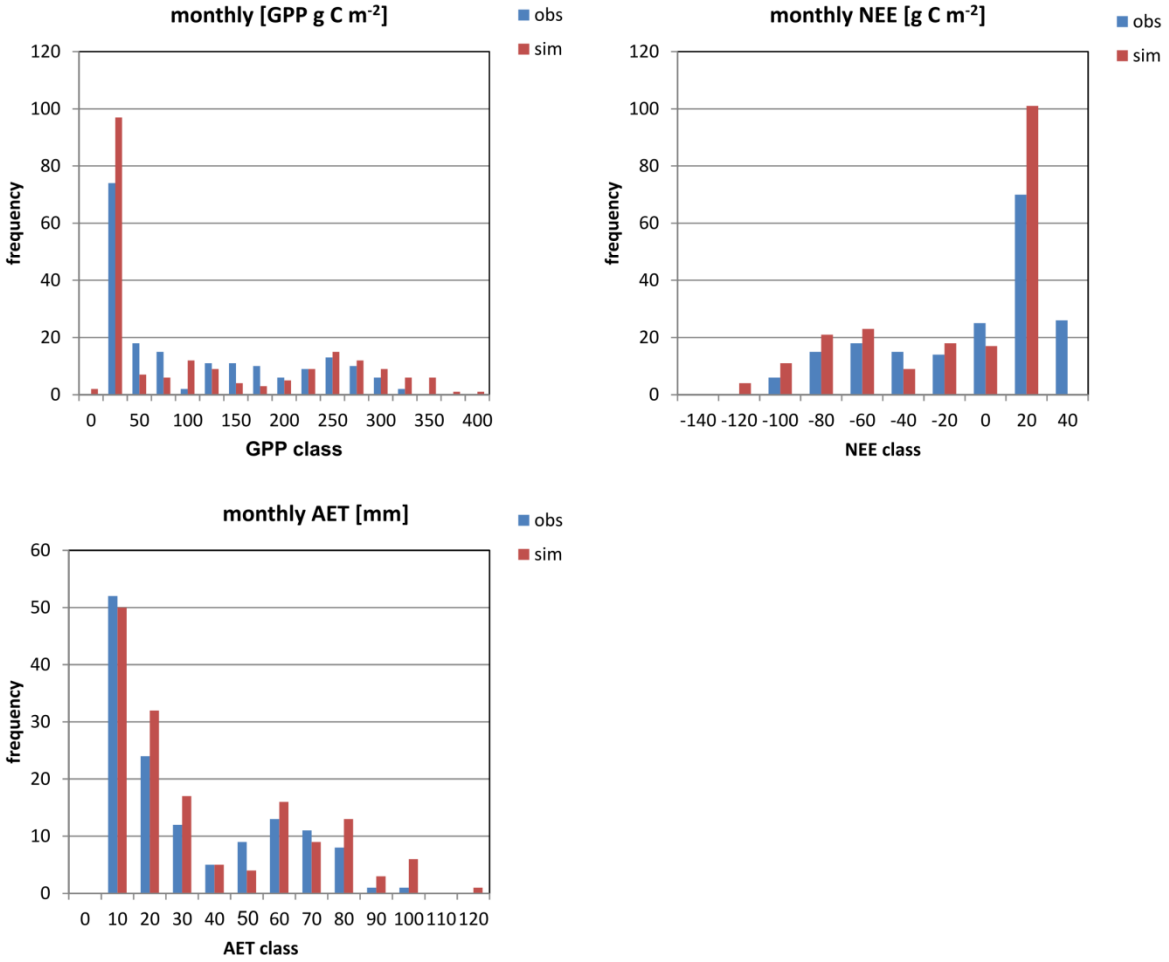

Figure S6 Frequency plots of monthly GPP, NEE, and AET for Hyytiälä; 1996-2014

S2 ADDITIONAL DATA

Table S1 Characteristics of the soil profiles of Peitz, Solling, Hyytiälä, and Sorø

	Soil layers												
	Upper depth [cm]	**Lower depth**	**Clay**	**Silt** [mass%]	**Sand**	**Stone content**	**Pore volume**	**Field capacity** [vol%]	**Wilting point**	**Bulk density** [g cm^{-3}]	**pH**	**C/N**	**C-content** [mass%]
Peitz	6.0	0.0	0.00	0.00	0.00	0.00	81.52	30.00	12.00	0.26	2.89	22.60	42.25
	0.0	5.0	7.00	6.00	87.00	0.00	44.00	26.00	7.50	1.12	2.88	33.57	2.60
	5.0	10.0	7.00	6.00	87.00	0.00	44.00	26.00	7.50	1.39	3.33	46.39	0.90
	10.0	20.0	7.00	2.00	91.00	0.00	44.00	26.00	7.50	1.30	3.72	41.95	0.78
	20.0	30.0	7.00	2.00	91.00	0.00	44.00	26.00	7.50	1.40	4.10	44.45	0.45
	30.0	40.0	7.00	2.00	91.00	0.00	44.00	26.00	7.50	1.37	4.16	58.47	0.18
	40.0	60.0	7.00	2.00	91.00	0.00	44.00	26.00	7.50	1.60	4.20	23.33	0.07
	60.0	130.0	0.70	1.30	98.00	0.00	52.00	25.00	9.00	1.60	4.20	25.00	0.05
	130.0	200.0	3.00	1.00	96.00	0.00	52.00	25.00	9.00	1.60	4.20	0.00	0.00
Solling	5.8	0.0	0.00	0.00	0.00	0.00	89.80	34.00	7.00	0.14	2.88	25.52	49.69
	0.0	5.0	19.67	71.07	9.27	0.83	60.99	47.94	13.74	0.82	2.83	18.57	5.29
	5.0	10.0	19.67	71.07	9.27	5.00	60.99	47.94	13.74	1.02	3.21	17.39	2.94
	10.0	20.0	19.67	71.07	9.27	4.67	60.99	47.94	13.74	1.05	3.69	16.18	2.06
	20.0	40.0	19.50	71.20	9.30	3.83	59.20	48.93	13.72	1.11	4.11	13.01	1.22
	40.0	80.0	23.80	61.13	15.07	20.00	40.61	35.58	18.88	1.37	3.99	6.69	0.31

	Soil layers												
	Upper depth [cm]	**Lower depth**	**Clay**	**Silt** [mass%]	**Sand**	**Stone content**	**Pore volume**	**Field capacity** [vol%]	**Wilting point**	**Bulk density** [g cm^{-3}]	**pH**	**C/N**	**C-content** [mass%]
	80.0	100.0	31.80	46.60	21.60	23.00	37.32	36.40	24.48	1.56	3.84	2.73	0.10
	100.0	150.0	31.80	46.60	21.60	96.00	35.50	30.60	26.50	2.10	4.50	0.00	0.00
Hyytiälä	6.0	0.0	0.00	0.00	0.00	0.00	85.71	70.00	12.00	0.20	3.25	28.60	36.95
	0.0	5.5	6.34	14.18	79.48	26.17	48.93	30.38	8.52	0.74	3.41	33.49	3.89
	5.5	22.5	5.72	12.90	81.38	28.65	50.77	28.33	11.61	0.73	4.30	26.28	2.71
	22.5	56.0	6.77	15.02	78.21	29.64	37.84	29.07	10.06	1.27	4.35	46.50	0.37
	56.0	89.0	7.88	10.89	81.23	43.50	28.26	22.21	12.09	1.45	4.54	27.60	0.14
	89.0	10.0	7.88	10.89	81.23	43.50	28.00	22.00	10.00	1.50	4.60	0.00	0.00
Sorø	6.0	0.0	0.00	0.00	0.00	0.00	92.86	26.40	13.10	0.10	4.66	15.86	12.70
	0.0	11.0	10.10	31.00	58.90	0.00	42.00	18.90	8.70	1.29	3.33	14.62	3.23
	11.0	33.0	12.70	27.40	59.90	0.00	42.00	15.40	6.40	1.61	3.92	14.51	0.74
	33.0	50.0	24.40	18.30	57.30	0.00	43.00	24.20	14.80	1.45	5.13	9.44	0.68
	50.0	77.0	13.90	15.10	71.00	0.00	42.00	19.00	9.10	1.46	7.04	25.37	1.04
	77.0	100.0	13.90	15.10	71.00	0.00	42.00	19.00	9.10	1.88	1.32	25.00	1.21
	100.0	150.0	13.90	15.10	71.00	0.00	42.00	19.00	9.10	1.88	1.32	0.00	0.00

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29 **Table S2 Available time series of observed data, partially with gaps**

Observed data	**Peitz**	**Solling**	**Hyytiälä**	**Sorø**
Annual data				
Medium height of dominant trees (HO)	1966-2010	-	-	-
Mean height of all trees (MH)	-	1967-2010	1995-2011	
Diameter at breast height (DBH)		1967-2010	1995-2011	-
Geometric mean diameter (DG)	1966-2010	-	-	-
Stem biomass (STBIOM)	-	1967-2010	1995-2011	-
Stem volume (STVOL)	1966-2010	-	-	-
Number of trees	1966-2010	1967-2010	1995-2011	-
Net ecosystem production (NEP)	-	-	1995-2014	1997-2012
Gross primary productivity (GPP)	-	-	1995-2014	1997-2012
Actual evapotranspiration (AET)	-	-	1995-2013	1997-2012
Daily data				
Net ecosystem exchange (NEE)	-		1996-2014	1996-2012
Total ecosystem respiration (TER)	-		1998-2014	1996-2012
Gross primary productivity (GPP)	-		1998-2014	1996-2012
Actual evapotranspiration (AET)	-		2003-2014	1996-2012
Soil temperature organic layer	-		1996-2014	-
Soil temperature 2 cm	-		-	1996-2012
Soil temperature 5 cm (0 – 10 cm)	-		1996-2014	1996-2012
Soil temperature 18 cm (10 – 25 cm)	-		1997-2014	-
Soil temperature 50 cm (40 – 60 cm)	-		1997-2014	-

Observed data	**Peitz**	**Solling**	**Hyytiälä**	**Sorø**
Water content organic layer	-		1997-2014	-
Water content 5 cm (0 – 10 cm)	-		1997-2014	-
Water content 8 cm (0-16 cm)	-		-	1996-2012
Water content 18 cm (10 – 25 cm)	-		1997-2014	-
Water content 50 cm (40 – 60 cm)	-		1997-2014	-

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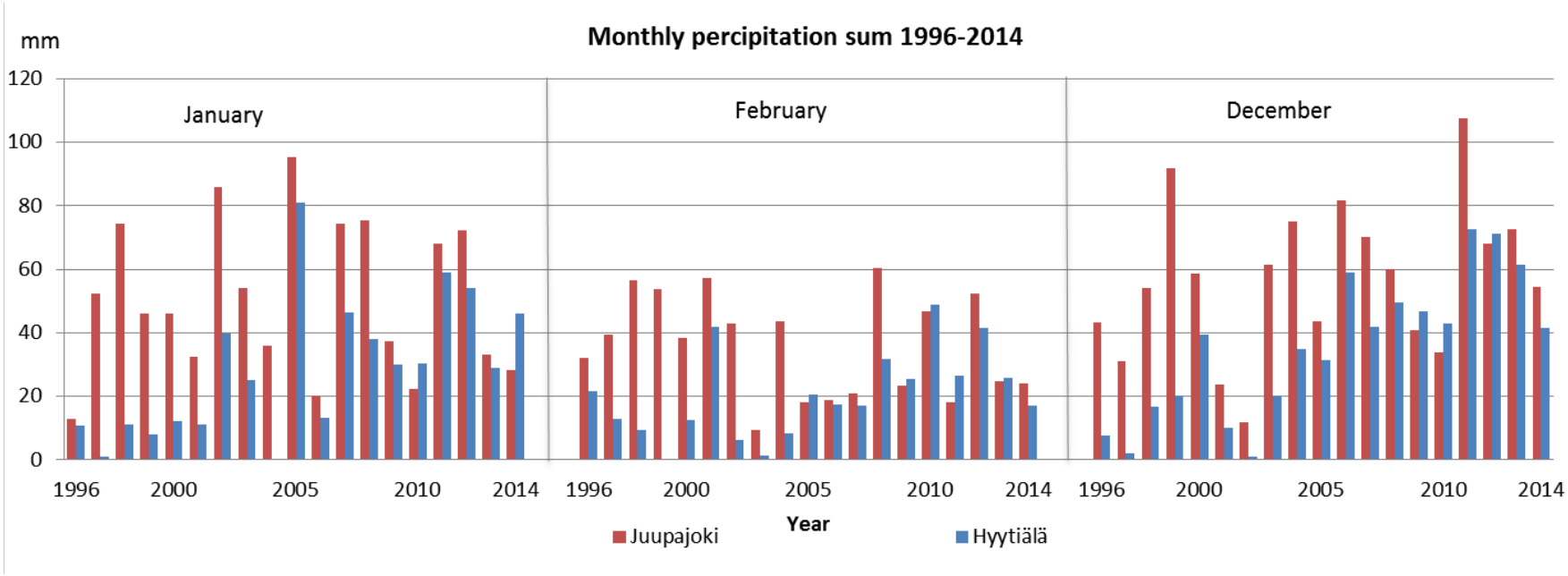

Figure S7 Monthly precipitation sum of the winter month 1996-2014. Comparison of the data from the observation station Hyytiälä and the nearby weather station of the Finnish Meteorological Institute Juupajoki (https://en.ilmatieteenlaitos.fi/download-observations#!/, download 23.02.2018). The distance between the two stations is about 300 m.