# S1 Fluxes

## S1.1 Sorø

### S1.1.1 Graphical analysis daily data Sorø

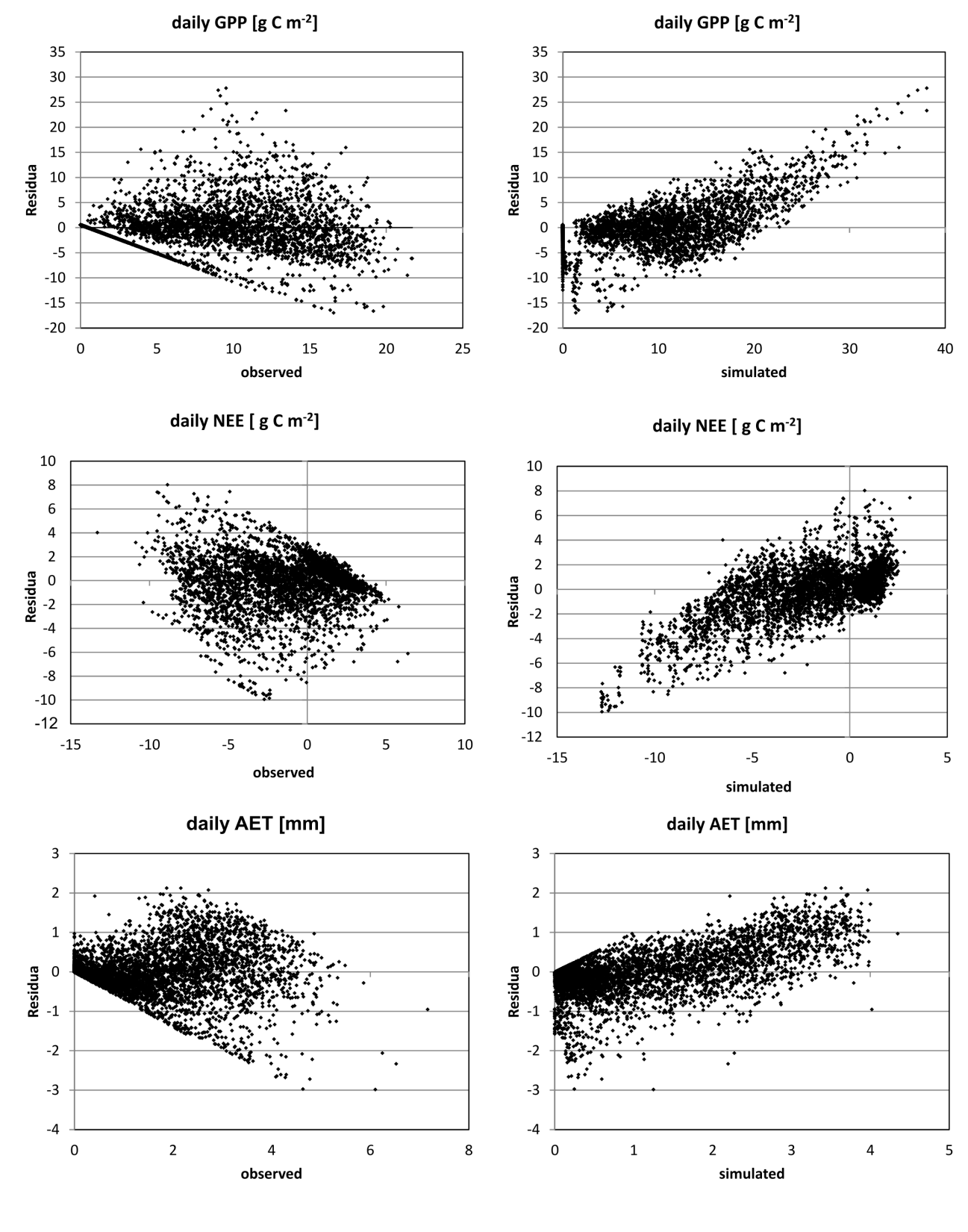


Figure S1 Residual plots of GPP, NEE and AET for Sorø; 1996‑2012

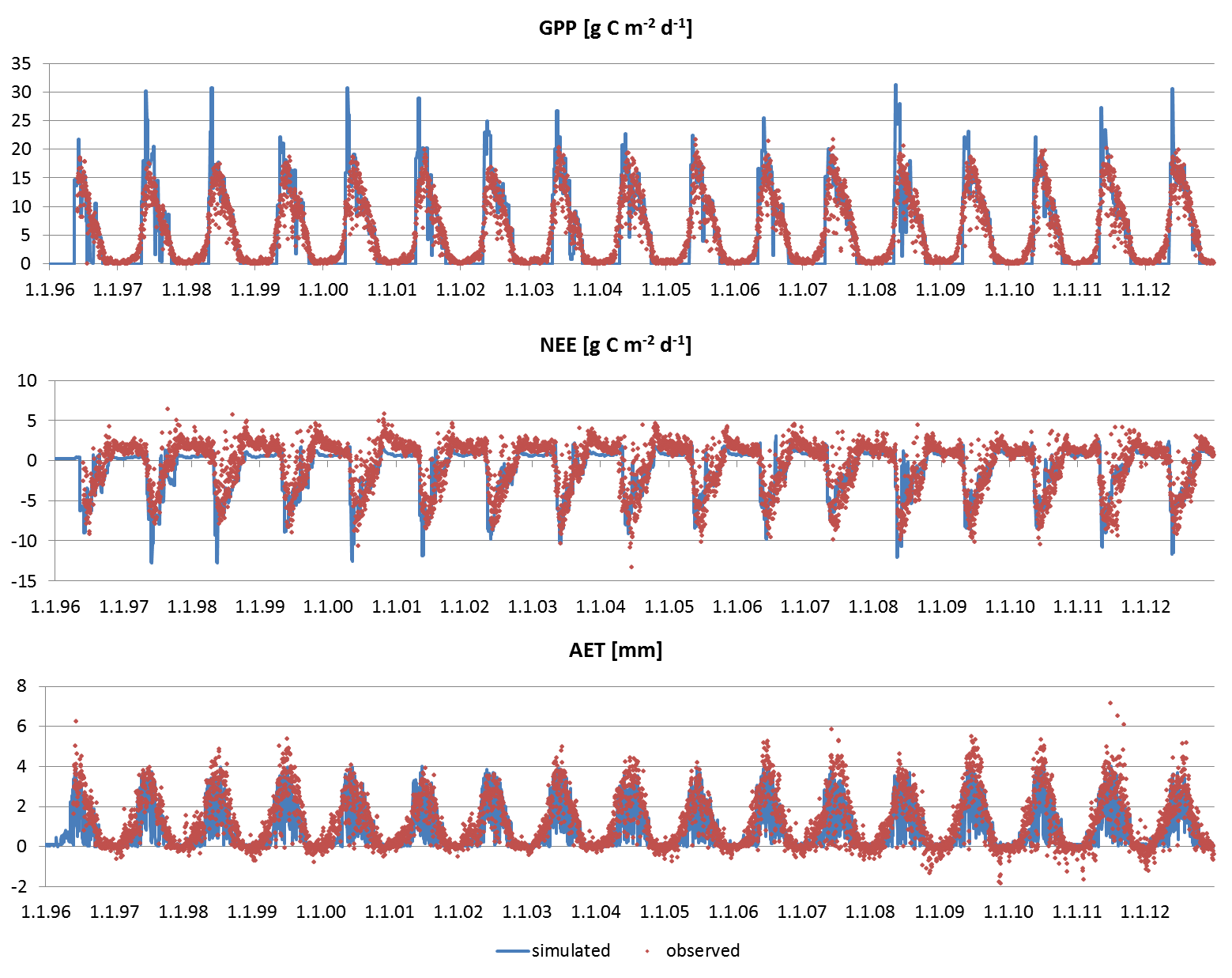


Figure S2 Time series of GPP, NEE, and AET [mm] for Sorø; 1996‑2012

### S1.1.2 Graphical analysis monthly data Sorø

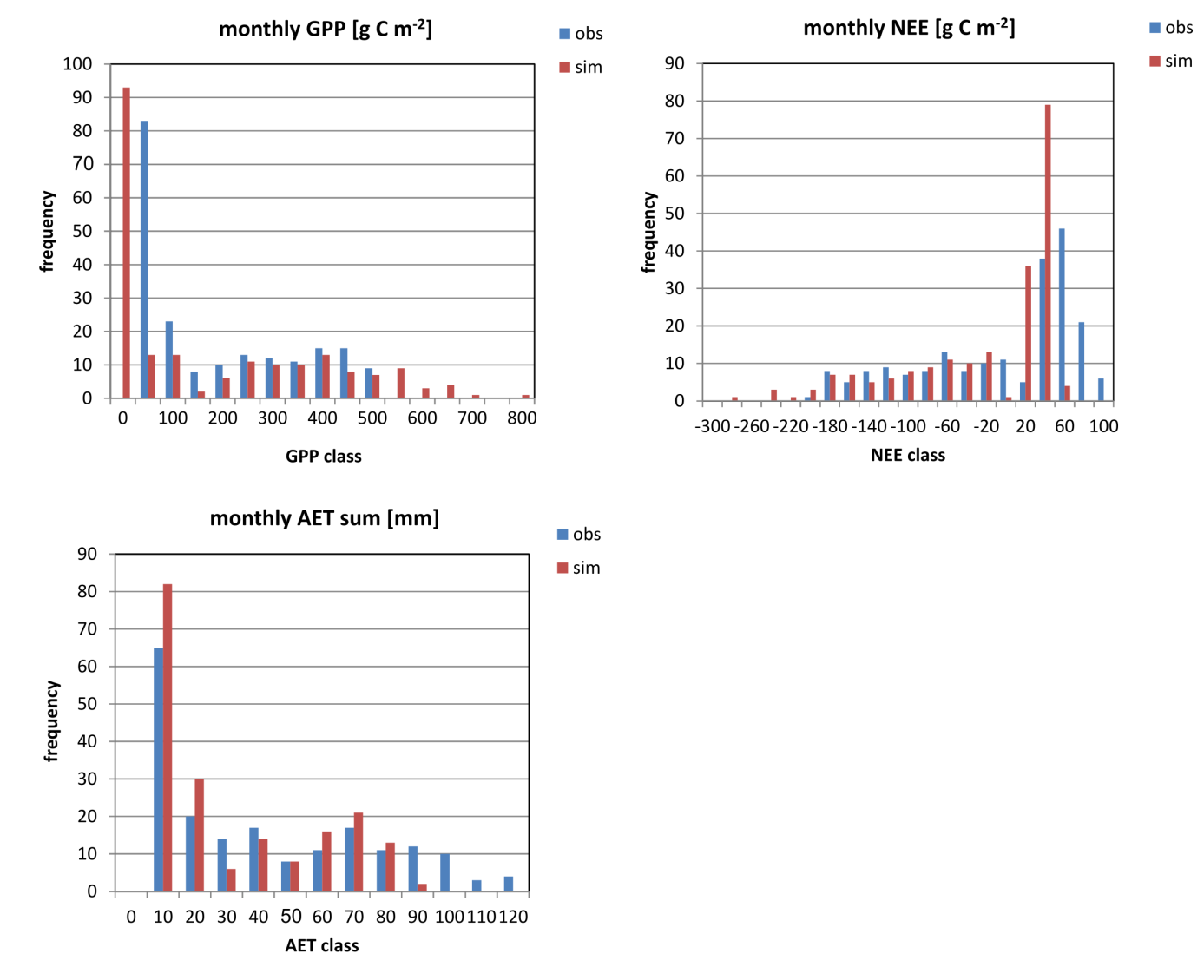


Figure S3 Frequency plots of monthly data of GPP, NEE and AET for Sorø; 1996‑2012

## S1.2 Hyytiälä

### S1.2.1 Graphical analysis daily data Hyytiälä

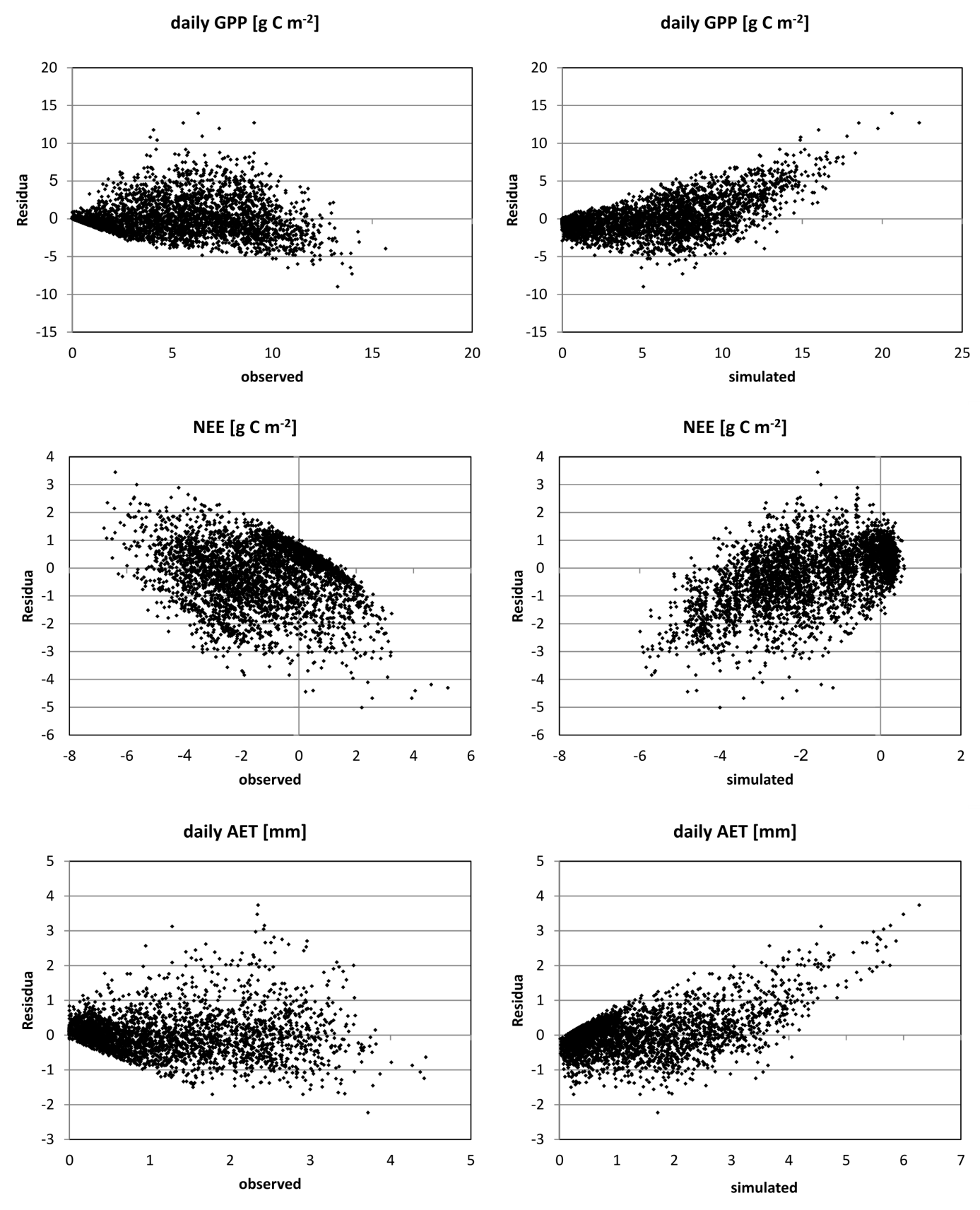


Figure S4 Residual plots of GPP, NEE and AET for Hyytiälä; 1996‑2014

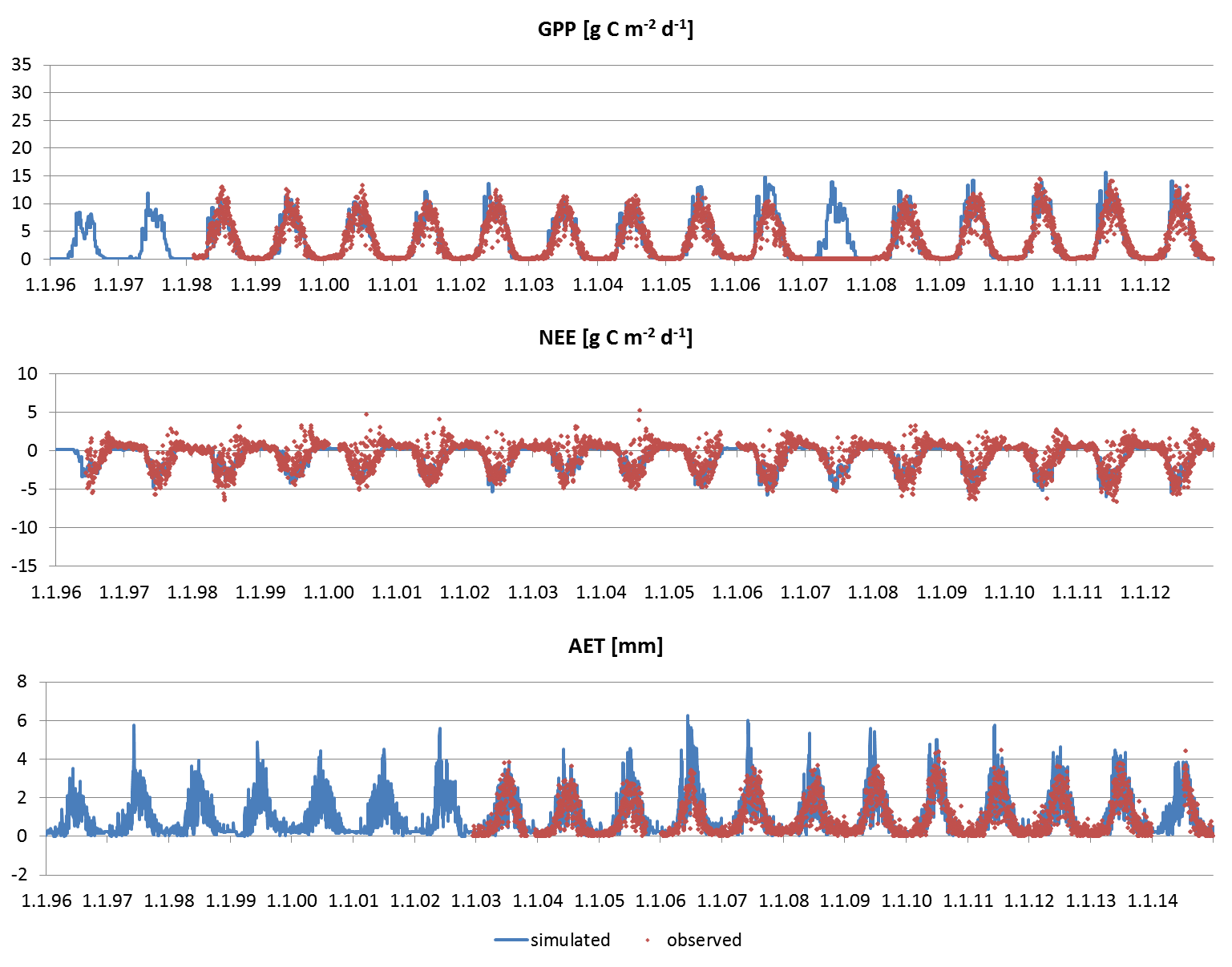


Figure S5 Time series of GPP [g C m-2 d-1], NEE [g C m-2 d-1], AET [mm] for Hyytiälä; 1996‑2014

### S1.2.2 Graphical analysis monthly data Hyytiälä

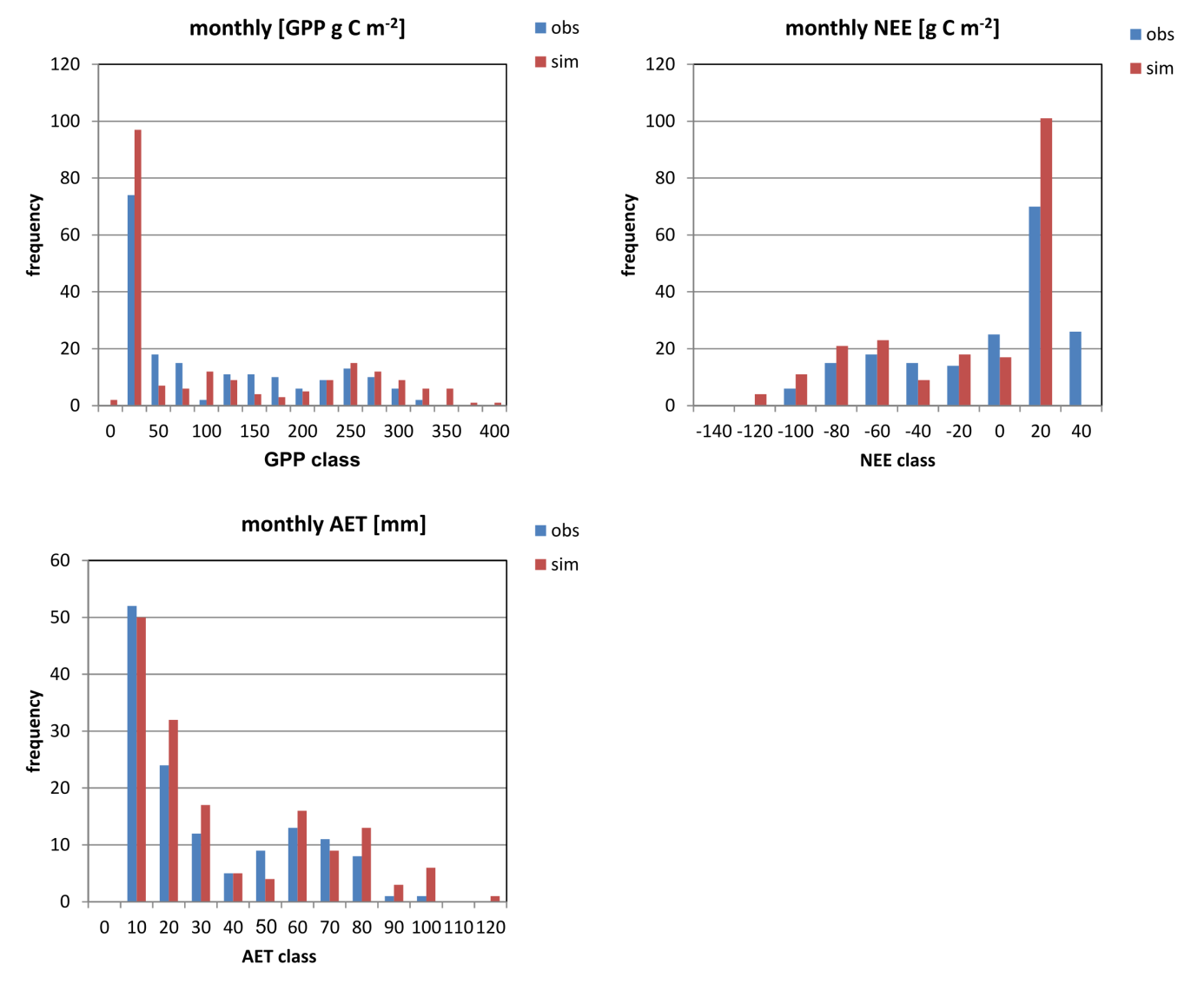


Figure S6 Frequency plots of monthly GPP, NEE, and AET for Hyytiälä; 1996‑2014

# S2 Additional data

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

|  | **Soil layers** | |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Upper depth** | **Lower depth** | **Clay** | **Silt** | **Sand** | **Stone content** | **Pore volume** | **Field capacity** | **Wilting point** | **Bulk density** | **pH** | **C/N** | **C-content** |
|  | [cm] | | [mass%] | | | |  | [vol%] |  | [g cm-3] |  |  | [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 |
| 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 |

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 | - |
| 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 | - |

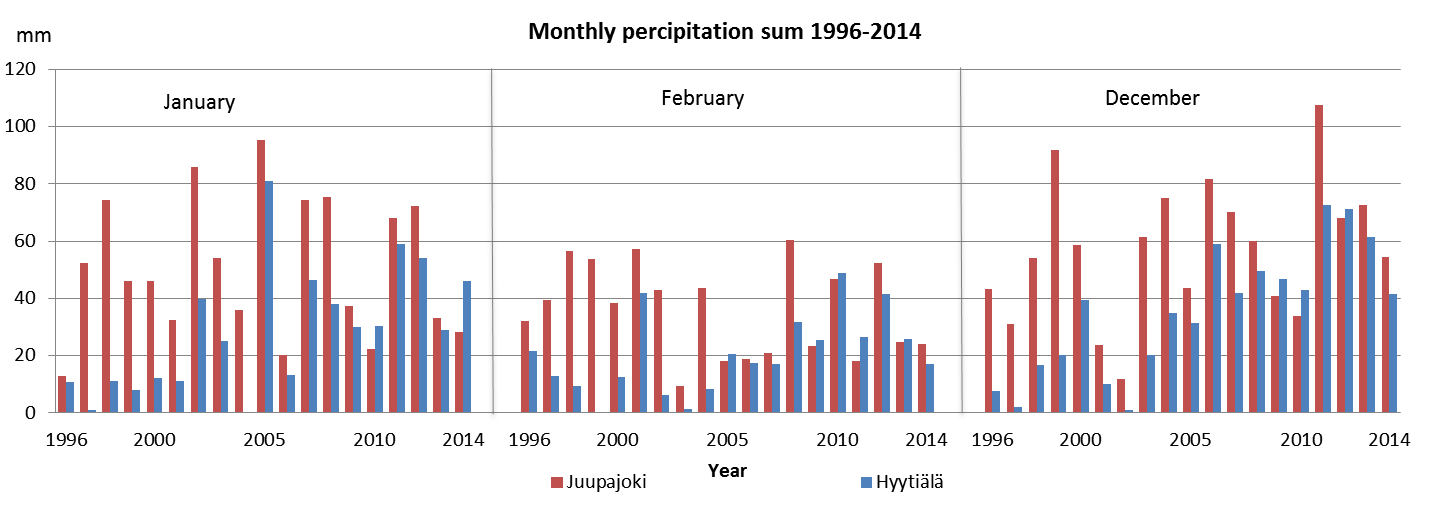


Figure S7 Monthly precipitation sum of the winter month 1996‑2014. Comparison of the data from the observation station Hyytiälä and the nearby weather station of the Finnish Meteorological Institute Juupajoki (<https://en.ilmatieteenlaitos.fi/download-observations#!/>, download 23.02.2018). The distance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