Long-term climate for selected ”ICP Forests Level II” plots in Sweden.

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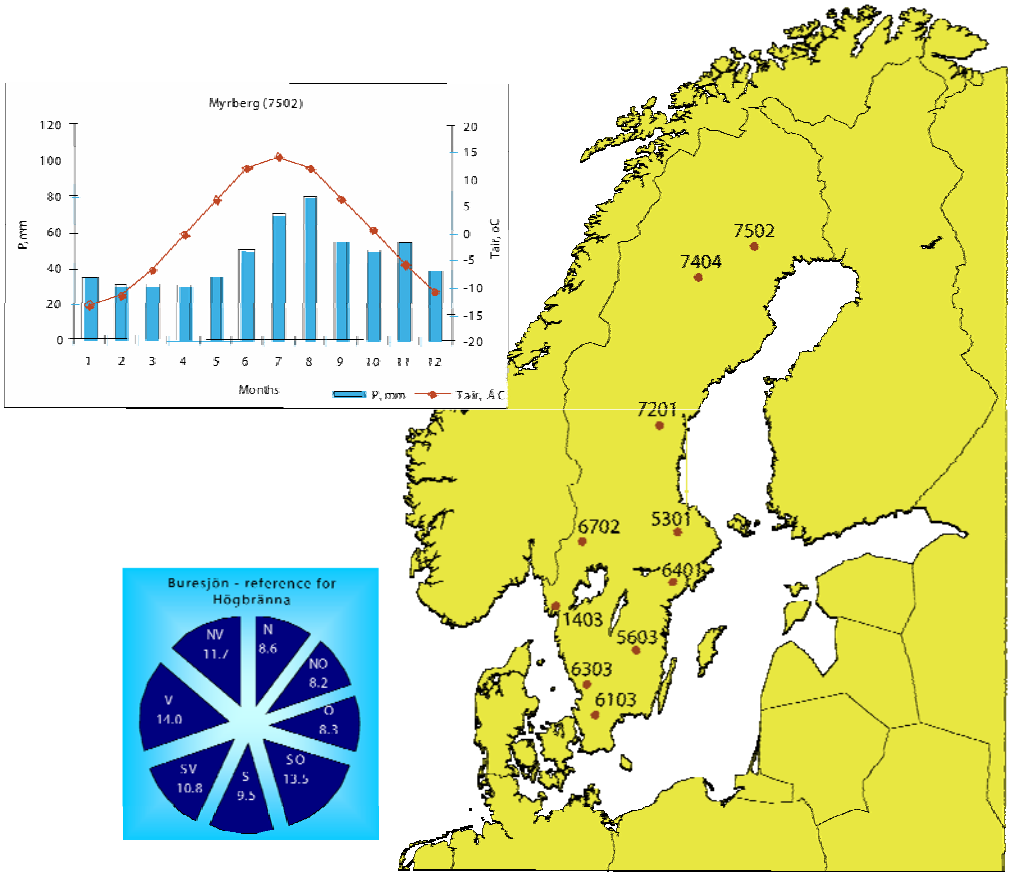

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Preface

This climate report for ICP Forests Level II plots is related to the International Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) within the Working Group on Effects in the Convention on Long-Range Transboundary Air Pollution (CLRTAP) for the UN ECE region. The report is produced on behalf of the Swedish Forest Agency and the monitoring and funding relate to the EC Forest monitoring programme “Forest Focus” (Regulation 2152/2003). Most of the data are from the Swedish Meteorological and Hydrological Institute (SMHI).

Content

Summary

Forest conditions in Europe are monitored for the UN ECE region in an international co-operative programme on Assessment and Monitoring of Air Pollution Effects on Forests – ”ICP Forests” of the ”Convention on Long-Range Transboundary Air Pollution” (CLRTAP). Primarily, it was in the start directed on air pollution effects on the forests. Other pressures developing, such as climate change, furnish extended use of the observations. Air pollution deposition is one part of the conditions giving impacts on forests. Other conditions are related to abiotic conditions like climate being characterised by temperature, precipitation, solar radiation, air humidity and wind. Measurements of these meteorological variables are needed to get information on relevant conditions for monitoring sites.

On some sites, such determinations were made in the Swedish forest monitoring network included in the ICP Forests network. These sites are related to the Level II plots but most of these do not measure climatic variables on site. Instead representative national stations in the Swedish Meteorological and Hydrological Institute (SMHI) station network were used to give meteorological information. Such measurements over long-time periods (30 years) furnish climatic information. In this report long-time values are presented mainly for the period 1961-1990.

In Sweden, ten sites were selected as core sites for which climatic information is provided. These sites are located from the very north part of Sweden with Myrberg and Högbränna in Lappland to south Sweden with Fagerhult, Timrilt and Västra Torup. Current reporting of annual data relates to selected SMHI stations but not all of these have been running for 30 years and therefore new stations on a somewhat longer distances had to be selected for the climate characterisation. However, these stations could be considered to be reasonable representative. Different stations had to be used to give values on all variables for one Level II site due to not complete measurements at all SMHI stations. Distances between station and Level II site should be short. Mainly 28 SMHI stations were used for the 10 Level II sites.

Data provided have been quality controlled by the SMHI. However, calculations to complete total 30 year records were made but results in reasonable good characterisation of the sites.

In a larger geographical comparison the conditions for Sweden were fairly similar over the country but with a latitudinal distribution and for precipitation also higher values in the West and on higher altitudes. Regionally, there were differences. Solar radiation was besides latitude also dependent on cloudiness and highest values were found for south-west central Sweden. The geographical distribution showed higher humidity in south-west Sweden and lower in the central North. Wind speed at the Level II sites showed on average higher values in south Sweden and lower in the northern parts. The prevailing wind direction was from south-west but also easterly and northerly directions occurred fairly frequently.

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Introduction

Within the International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests – ”ICP Forests” (ICP Forests web) of the ”Convention on Long-Range Transboundary Air Pollution” (CLRTAP; Sliggers and Kakebeeke, 2004) monitoring of forests in the UN ECE region is carried out. Sweden is included in this programme and forest conditions together with abiotic conditions are collected from a number of sites distributed over the country. Part of these observations relates to current meteorology and climate. In this report long-term (30 years) climatic conditions are presented for ten of the Level II plots. The variables include air temperature, precipitation, air humidity, solar radiation, wind speed and direction. Often these observations are not carried out at the sites but have to be collected from the Swedish national survey of climate carried out under the auspices of the Swedish Meteorological and Hydrological Institute (SMHI).

There are spatial geographic variations in climate as well as current meteorology and this furnish uncertainties regarding information at the Level II sites. Data from the national inventory at SMHI should however be considered reliable and fairly well represent the conditions at the sites at least in the time scale of months. At a few sites, there are also *in situ* measurements. This gives possibilities for such sites to use actual measured values and also to validate the long-term data. However, the long-term data has to be gathered from the SMHI since the Level II sites have not been running for 30 years. Here the attempt is to give regional representative climate information valid for selected sites. In a previous report (Lundin, 2006) geographical locations of the sites have been presented. It showed the distribution from north Sweden to the very south (Table 1).

Level II sites

The sites being a selection of 10 sites from the c. 100 ICP Forests Level II sites in Sweden are distributed all over Sweden but with a slightly denser network in the South (Figure 1). Västra Torup, in Scania is the southernmost while the northernmost is Myrberg in central Lappland. Hensbacka is located in the West in the county Bohuslän and in the East there is either Myrberg i east Lappland but also Högskogen in Uppland c. 30 km west of Uppsala (Tabell 1).

Table 1.*Geographic location of the Swedish Level II sites where climate conditions are presented.*

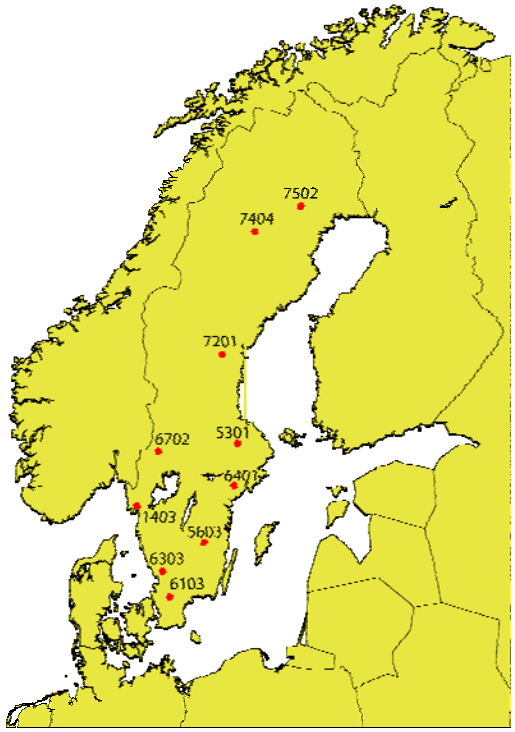
No	Level II site	Distances to cities or towns and the county designation	Latitude	Longitude
7502	Myrberg	60 km VNV Boden, BD	660400	203743
7404	Högbränna	35 km SO Sorsele, AC	652423	180624
7201	Storulvsjön	55 km SV Sundsvall, Y	621650	162027
6702	Blåbärskullen	25 km V Sunne, S	594918	125435
5301	Högskogen	32 km NV Uppsala, C	600142	171140
5401	Edeby	22 km N Nyköping, D	585708	165902
1403	Hensbacka	5 km SO Munkedal, O	582615	114418
5603	Fagerhult	17 km ONO Vetlanda, F	573042	152045
6303	Timrilt	24 km NO Halmstad, N	564637	130843
6103	Västra Torup	17 km V Hässleholm, M	560802	133034

Geographical location of Level II plots and SMHI stations

Climate data for the long-term periods was gathered from SMHI stations located at various distances from the Level II plots. Different SMHI stations have been used for the variables included. There are 10 Level II plots included and for these 28 SMHI stations were used to get data for all variables. Precipitation and temperature are measured at fairly many stations while wind, solar radiation and humidity at a smaller number. This means shorter distances between plots and stations regarding precipitation and temperature while stations for the other variables could be longer. Often also the density of station network is higher in south Sweden compared to the north part making distances in south shorter as compared to the North.

The longest distances between Level II plots and national SMHI stations concerned solar radiation with 50 km for Västra Torup in south Sweden and 180 km for Högbränna in north Sweden. For temperature, wind and air humidity the distances were shorter with 13 km at Blåbärskullen up to 50 km for the plot Hensbacka (Table 2). On average, the distances for precipitation were 13 km, temperature, wind and humidity 29 km and for solar radiation 103 km.

The distance from the Level II plot Timrilt to the SMHI station Havraryd is 3 km while the north plot Myrberg is on a distance of 25 km from the SMHI station Övre Svartlå (Table 2). The selection of stations for precipitation was earlier made based on correlation analysis and presented in the report Kvarnäs and Lundin (2003).



Figur 1. *Nordic-Baltic region with the geographical locations of the Level II plots with station numbers.*

Table 2. *Included SMHI-stations with distances to the Level II plot in km. AT - airtemperature, RH – relative air humidity, WD – wind direction and WS wind speed.*

Obsytelokal	Nederbörd		Solstrålning		AT, RH. WD och WS	
Myrberg	Övre Svartlå	25	Luleå SOL	110	Vidsel Mo	27
Högbränna	Slagsnäs	21	Luleå SOL	180	Buresjön	25
Storulvsjön	Ulvsjön	5	Frösön SOL	140	Torpshammar	25
Blåbärskullen	Sunne A	13	Karlstad SOL	100	Sunne A	13
Högskogen	Harbo	12	Stockholm SOL	100	Uppsala	30
Edeby	Frändesta	9	Norrköping SOL	65	Floda	35
Hensbacka	Uddevalla	14	Göteborg SOL	93	Kroppefjäll-Granan	50
Fagerhult	Karlstorp	10	Växjö SOL	75	Målilla	30
Timrilt	Havraryd	3	Växjö	120	Torup	22
Västra Torup	Sösdala	16	Lund	50	Hörby	33

Long-term climate

Precipitation

Precipitation values for Sweden ranges mainly from 400 mm up to 2000 mm and would on average reach c. 700 mm. High values are found in the west part of the country and especially in the high altitude regions. Low amounts would be more common in the east part, especially the southeast regions. But, low values could also be found in the very north areas east of the mountain ridge.

For the Level II plots, the average long-term precipitation was 718 mm with the highest value on 1100 mm in southwest Sweden and the lowest on 555 mm in east central Sweden and in the middle north (Table 3).

Table 3. *Long-term (1961-1990) monthly and annual precipitation (mm) at the Swedish Level II sites. Data from SMHI.*

Station	Months												Year
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Myrberg	35	30	30	30	35	50	70	80	55	50	55	40	560
Högbränna	35	25	30	30	35	50	90	65	60	50	50	35	555
Storulvsjön	45	30	40	40	40	60	80	80	70	55	60	55	655
Blåbärskullen	60	40	40	50	50	70	80	90	90	90	80	60	800
Högskogen	45	30	30	35	35	45	70	75	65	50	55	45	580
Edeby	40	30	30	30	35	45	65	60	60	50	60	50	555
Hensbacka	80	55	60	50	55	70	80	90	100	110	110	85	945
Fagerhult	45	30	35	35	45	55	65	65	65	55	55	45	595
Timrilt	90	60	70	60	60	80	110	110	120	110	120	110	1100
Västra Torup	70	45	55	50	50	70	85	75	80	80	90	85	835

Distributions of precipitation during the year showed often low values in early months, February – April with often 30-40 mm. Higher values occurred in the remaining part of the year and especially July and August furnish high values often on 70-90 mm. Slightly other distribution could be observed at Hensbacka, Timrilt and Västra Torup where comparably high precipitation occurred during most of the autumn. However, on a world wide scale, the precipitation was fairly evenly distributed over the whole year (Figure 2).

Temperature

The temperature amplitude over Sweden was from –3 ^{o}C in the North to +8 ^{o}C in the very south for the long-term period 1961-1990. The range for the Level II sites ranged from slightly below zero up to almost seven degrees. On average the temperature was 4.2 ^{o}C (Table 4). The distribution over the year showed the usual low temperatures in winter (January) with c. -2 ^{o}C in south Sweden and almost -14 ^{o}C in the North (Figure 2). High temperatures were recorded during the summer month July with a rather even distribution over the country with +13.3 °C in central north Sweden and the highest value in east central south Sweden with +16 °C. The southernmost locations did not reach the very highest summer temperatures partly because of more rainy weather but mainly because of closeness to the see.

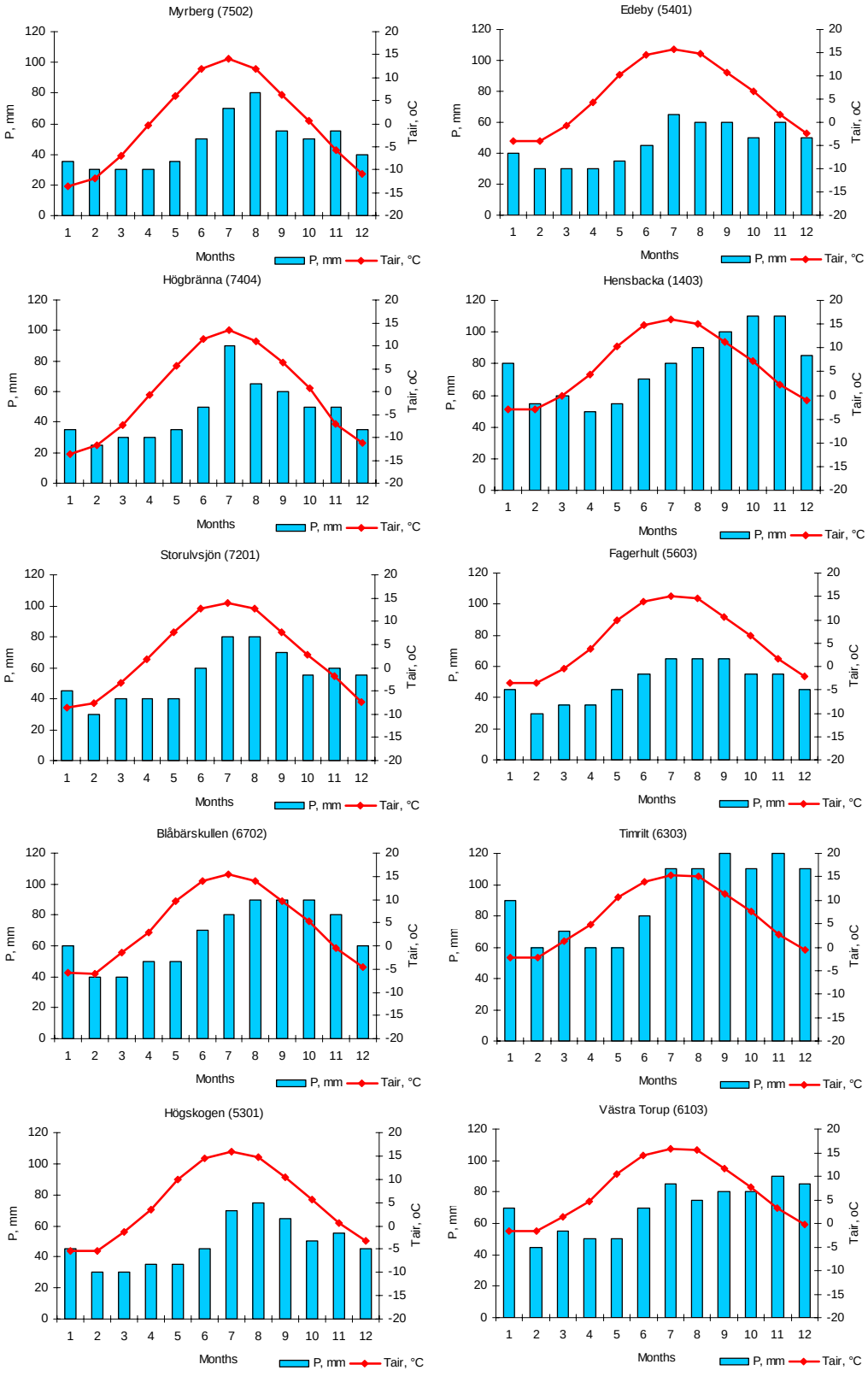


Figure 2*. Monthly mean precipitation (mm) and temperature (°C) at the Swedish Level II sites for the long-term period 1961-1990. Data from SMHI.*

Table 4. *Long-term mean monthly and annual air temperature (°C) for the 10 Level II sites in Sweden. Data from SMHI.*

Station	Months												Year
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Myrberg	-13.7	-12.0	-7.0	-0.3	6.0	12.0	14.0	12.0	6.3	0.7	-5.7	-11.0	0.1
Högbränna	-13.7	-11.7	-7.3	-0.7	5.7	11.5	13.3	11.0	6.3	0.7	-7.0	-11.3	-0.3
Storulvsjön	-8.7	-7.7	-3.3	1.7	7.7	12.7	14.0	12.7	7.7	2.7	-1.7	-7.5	2.5
Blåbärskullen	-5.7	-6.0	-1.5	3.0	9.7	14.0	15.5	14.0	9.7	5.3	-0.5	-4.5	4.4
Högskogen	-5.3	-5.3	-1.3	3.5	10.0	14.5	16.0	14.7	10.5	5.7	0.5	-3.3	5.0
Edeby	-4.0	-4.0	-0.7	4.3	10.3	14.5	15.7	14.7	10.7	6.7	1.7	-2.3	5.6
Hensbacka	-3.0	-3.0	0.0	4.3	10.3	14.7	16.0	15.0	11.3	7.3	2.3	-1.0	6.2
Fagerhult	-3.5	-3.5	-0.5	3.7	10.0	14.0	15.0	14.5	10.5	6.5	1.7	-2.0	5.5
Timrilt	-2.3	-2.3	1.3	4.7	10.7	14.0	15.3	15.0	11.3	7.7	2.7	-0.5	6.5
Västra Torup	-1.7	-1.7	1.3	4.7	10.5	14.5	15.7	15.5	11.7	7.7	3.3	-0.3	6.8

Air humidity

Long-term measurements of air humidity were not carried out at all national SMHI stations used for reporting current air humidity values. However, data from these stations are anyhow included as comparison but for shorter measurement periods. For longer periods (c. 30 years) records from other relevant stations on somewhat more distant stations are presented (Table 5). For those national stations having sufficient time period, only the ordinary station is included.

Table 5. *Reference national SMHI stations for air humidity, with oedinary stations for often shorter periods and second reference from long-term monitored stations. Data from SMHI.*

Station	I reference		II reference	
	station	observation period, years	station	observation period, years
Myrberg	Vidsel Mo	1999-2005	Jokkmokk	1963-1998
Högbränna	Buresjön	1996-2005	Gunnarn	1961-2005
Storulvsjön	Torpshammar	1997-2005	Sudsvalls Flp.	1961-2005
Blåbärskullen	Sunne A	1996-2005	Karlstad Flp.	1961-2005
Högskogen	Uppsala Flp.	1961-1990		
Edeby	Floda	1996-2004	Västerås-Hässlö	1961-1997
Hensbacka	Kroppefjäll-Granan	1996-2005	Såtenäs	1963-2005
Fagerhult	Målilla	1967-2005		
Timrilt	Torup	1973-2004	Barkåkra	1961-2001
Västra Torup	Hörby	1996-2005	Barkåkra	1961-2001

Air humidity is presented as averages of observations four times every day, i.e. at each 6 hours. Calculations made from dry air temperature and deficit to moist air temperature. The humidity values are rather similar over the day but there are mainly higher values night-time compared to day time. Lowest humidity occurred on mid-day with c. 70% while the highest values on 85-90% on average were found at midnight (Figure 3). Daily averages ranged from 77% to 84% with highest values in south and south-west Sweden. Low humidity occurred mainly inland in middle north Sweden (Table 6).

Table 6. *Average air humidity for the national SMHI stations representing each Level II plot often at two stations with short or long-term periods. Data from SMHI.*

Station	Used periods from reference stations	Air humidity, %				
		observation time, h				daily
		00	06	12	18	
Myrberg	Jokkmokk(1963-1990)	-	82	71	75	78
	Vidsel Mo(1999-2005)	88	83	71	77	80
Högbränna	Gunnarn (1961-1990)	84	81	68	72	77
	Buresjön(1996-2005)	87	83	72	77	81
Storulvsjön	Sudsvalls Flp.(1961-1990)	84	81	68	72	77
	Torpshammar(1997-2005)	87	83	72	77	80
Blåbärskullen	Karlstad Flp.(1961-1990)	86	85	69	74	78
	Sunne A(1996-2005)	88	87	70	77	81
Högskogen	Uppsala Flp.(1961-1990)	87	86	71	77	80
Edeby	Västerås-Hässlö(1961-1990)	85	84	71	75	79
	Floda(1996-2004)	89	86	69	78	81
Hensbacka	Såtenäs(1963-1990)	87	87	75	78	82
	Kroppefjäll-Granan(1996-2005)	90	88	74	82	84
Fagerhult	Målilla(1967-1990)	-	87	67	76	80
Timrilt	Torup(1973-2000)	-	89	68	76	81
	Barkåkra (1961-1990)	88	87	76	80	83
Västra Torup	Hörby(1996-2005)	89	88	73	80	83
	Barkåkra (1961-1990)	88	87	76	80	83

Partly the North sites, e.g. Hensbacka, have a more even distribution of humidity over the day compared to sites like Fagerhult in the South where daily variation is larger. In the very South and South-West often humidity is higher, such as for Hensbacka, as compared to more Eastern sites like Edeby (Figure 3).

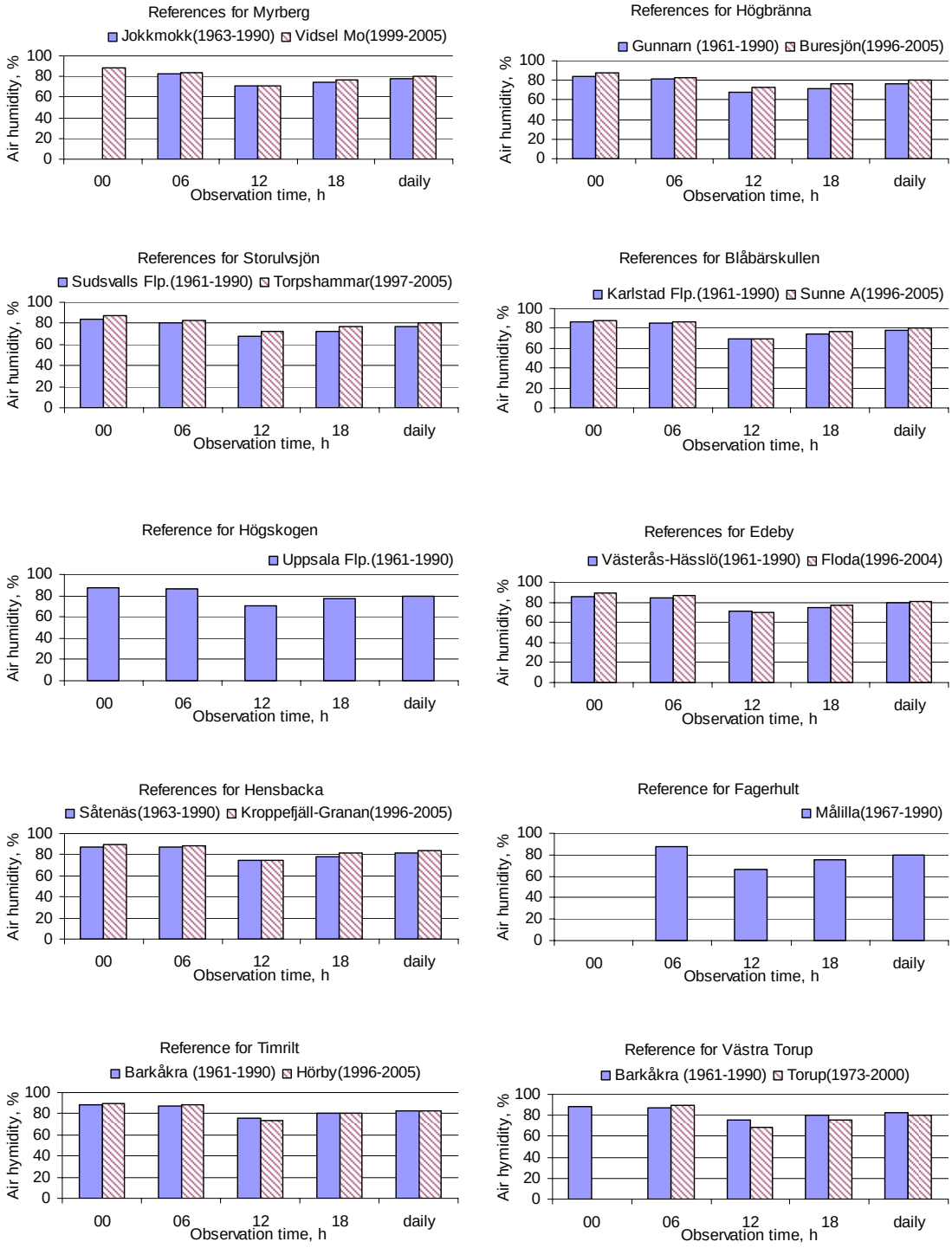


Figure 3. *Average air humidity at reference stations to the Level II plots with one shorter period from the station used for reporting current year data and one long-term period station for the climatic characteristics. At Högskogen and Fagerhult there is only one reference station because it ranges the whole long-time period. Data from SMHI.*

Solar radiation

Solar radiation is measured and reported as global radiation in W/m^2 and calculated for long-term period as kWh/m^2. The annual radiation depends on solar time, solar angel and cloudiness and could be expected to be highest in south Sweden but often more cloudy conditions prevails there compared to central east Sweden leaving the Level II site Edeby as highest on 970 kWh/m^2 on average. Especially, in summer the cloudiness is smaller in coastal areas compared to inland and this furnishes higher radiation by the coast. However, Hensbacka is found on slightly higher values even compared to Edeby (Table 7). Lower radiation conditions would be observed in the north sites and Högbränna only reaches 830 kWh/m^2 (Table 7 and Figure 4).

Table 7. *Solar radiation at Level II sites given by representative national SMHI stations and presented as annual averages over the period 1961-1990 in the national survey atlas of climate over Sweden (Raab & Wedin, 1995).*

Station code	Station	SR, kWh/m^2
7502	Myrberg	840
7404	Högbränna	830
7201	Storulvsjön	940
6702	Blåbärskullen	945
5301	Högskogen	961
5401	Edeby	970
1403	Hensbacka	975
5603	Fagerhult	930
6303	Timrilt	950
6103	Västra Torup	950

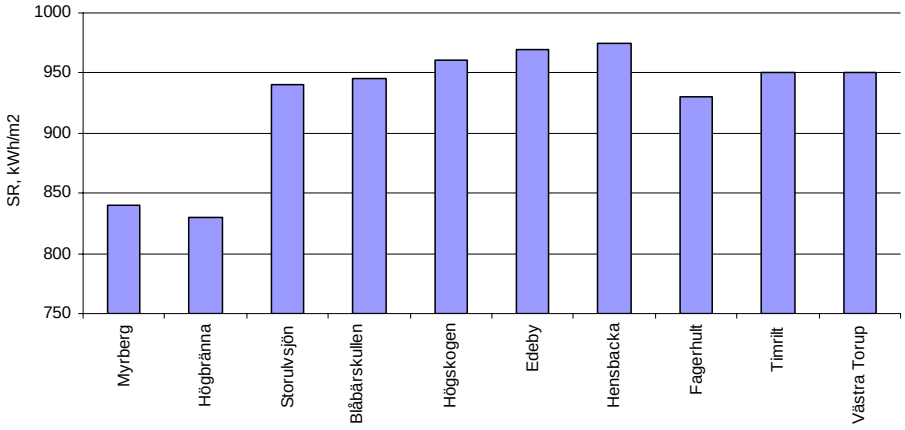


Figure 4. *Solar radiation (kWh/m^2) for the Level II sites from average values (Raab & Wedin, 1995).*

Wind speed

Wind speed was mainly measured at the national SMHI station on a height of 10 m and the long-term average based on daily measurements either eight times or if missing measurements, four times/day were used. To reach full time records in the event of temporary failure, correlations to near-by station were used. The period for the long-term data was 1961-1990 (Alexandersson, 2006).

Long-term average wind speed is often 2-4 m/s with higher speed values in coastal areas coming up to 6-8 m/s. Average monthly minimum wind speed could be 0.5-1 m/s and the maximum speed reaching often over 10 m/s. At the Level II sites, located inland in forest regions, wind speed is in a lower range compared to coastal zones and the average was at 2-4 m/s with low monthly averages down to 1 m/s and the highest reaching almost 5 m/s. On average, the Level II site having the lowest wind speed was Storulvsjön in middle north Sweden where the speed mainly was between 1 and 2 m/s. Also Blåbärskullen in central west Sweden was in the lower range. Higher wind speed was found for Timrilt in the South where monthly averages were between 4 and 5 m/s and also Fagerhult in south-east and Högskogen in east central Sweden showed fairly high values on 3-4 m/s (Figure 5 and Table 8). The distribution of wind over the year was mainly fairly even but two groups could be noticed. One with e.g. Fagerhult, Timrilt and Västra Torup showed lower speed in summer and higher in winter while opposite patterns were observed for e.g. Myrberg and Storulvsjön where summer winds were higher (Figure 5).

Wind direction

The prevailing wind direction in Sweden is from south to west, especially in a south-west direction. Often south-south-west and westerly winds make up c. 40% of the time. More or less northerly winds occur on 20-30% of the time. Also easterly winds prevail for periods of 20-25%. Calm periods extend over 1-20% of the time with short periods in south Sweden and the longer ones in the northern inlands.

For the Level II sites there could be observed some differences giving more south-westerly winds in the south-west of the country. At Timrilt easterly winds made up a relatively large part of the wind directions. North-westerly winds were more pronounced at Högbränna and Storulvsjön while Blåbärskullen and Högskogen in central Sweden showed a fairly large part of northerly and north-easterly winds (Figure 6 and Table 9).

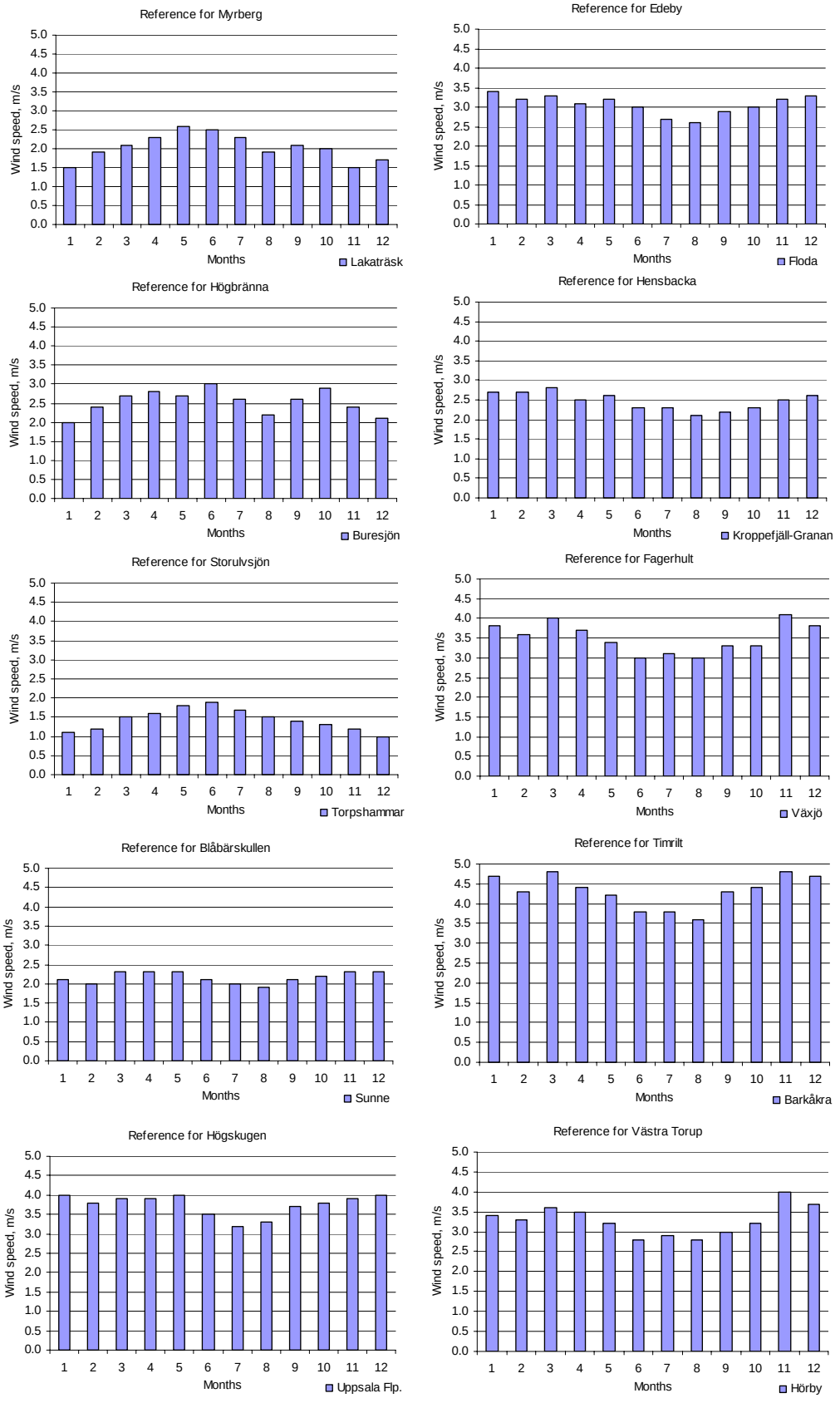


Figure 5. *Monthly long-term (1961-1990) average wind speed for the ten Level II sites. Data from SMHI.*

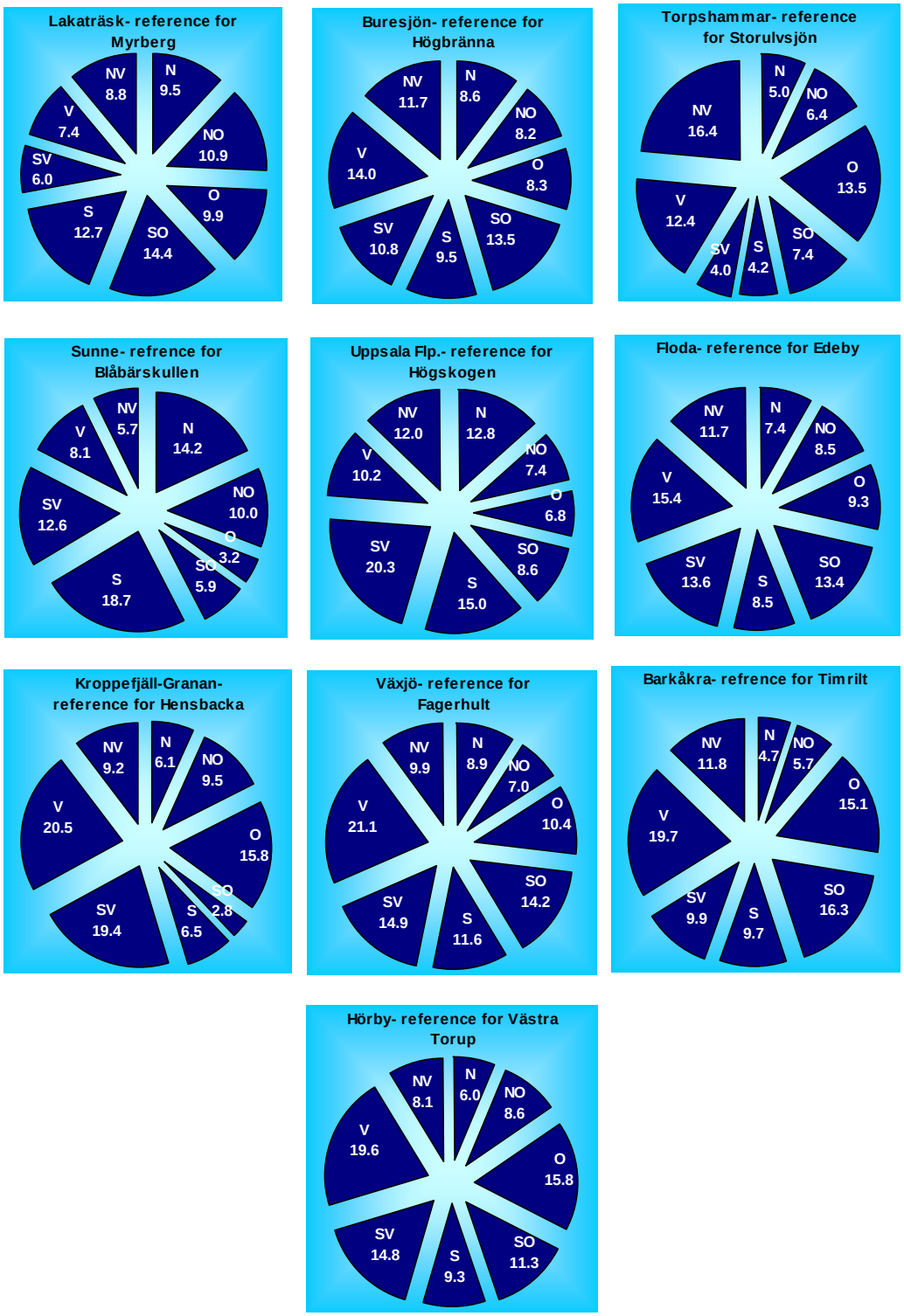


Figure 6. *Wind direction in % of time, including non-wind days (not shown in the graphs). Data from SMHI.*

Table 8. *Representative wind speed at the Level II sites presented by near-by national SMHI station for the long-term period 1961-1990. Data from SMHI.*

Station	Reference station	Months												Year
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Myrberg	Lakaträsk	1.5	1.9	2.1	2.3	2.6	2.5	2.3	1.9	2.1	2.0	1.5	1.7	2.1
Högbränna	Buresjön	2.0	2.4	2.7	2.8	2.7	3.0	2.6	2.2	2.6	2.9	2.4	2.1	2.5
Storulvsjön	Torpshammar	1.1	1.2	1.5	1.6	1.8	1.9	1.7	1.5	1.4	1.3	1.2	1.0	1.4
Blåbärskullen	Sunne	2.1	2.0	2.3	2.3	2.3	2.1	2.0	1.9	2.1	2.2	2.3	2.3	2.2
Högskogen	Uppsala Flp.	4.0	3.8	3.9	3.9	4.0	3.5	3.2	3.3	3.7	3.8	3.9	4.0	3.8
Edeby	Floda	3.4	3.2	3.3	3.1	3.2	3.0	2.7	2.6	2.9	3.0	3.2	3.3	3.1
Hensbacka	Kroppefjäll-Granan	2.7	2.7	2.8	2.5	2.6	2.3	2.3	2.1	2.2	2.3	2.5	2.6	2.5
Fagerhult	Växjö	3.8	3.6	4.0	3.7	3.4	3.0	3.1	3.0	3.3	3.3	4.1	3.8	3.5
Timrilt	Barkåkra	4.7	4.3	4.8	4.4	4.2	3.8	3.8	3.6	4.3	4.4	4.8	4.7	4.3
Västra Torup	Hörby	3.4	3.3	3.6	3.5	3.2	2.8	2.9	2.8	3.0	3.2	4.0	3.7	3.3

Table 9. *Representative wind directions, where "non" means no wind (calm) at the Level II sites presented by near-by national SMHI station for the long-term period 1961-1990. Data from SMHI.*

Station	Reference station	Wind direction, %								
		N	NO	O	SO	S	SV	V	NV	non
Myrberg	Lakaträsk	9.5	10.9	9.9	14.4	12.7	6.0	7.4	8.8	20.4
Högbränna	Buresjön	8.6	8.2	8.3	13.5	9.5	10.8	14.0	11.7	15.5
Storulvsjön	Torpshammar	5.0	6.4	13.5	7.4	4.2	4.0	12.4	16.4	30.8
Blåbärskullen	Sunne	14.2	10.0	3.2	5.9	18.7	12.6	8.1	5.7	21.7
Högskogen	Uppsala Flp.	12.8	7.4	6.8	8.6	15.0	20.3	10.2	12.0	7.0
Edeby	Floda	7.4	8.5	9.3	13.4	8.5	13.6	15.4	11.7	12.2
Hensbacka	Kroppefjäll-Granan	6.1	9.5	15.8	2.8	6.5	19.4	20.5	9.2	10.1
Fagerhult	Växjö	8.9	7.0	10.4	14.2	11.6	14.9	21.1	9.9	2.2
Timrilt	Barkåkra	4.7	5.7	15.1	16.3	9.7	9.9	19.7	11.8	7.2
Västra Torup	Hörby	6.0	8.6	15.8	11.3	9.3	14.8	19.6	8.1	6.5

Hydrological characterisation

The local area for the Level II site were described hydrologicaly with values on precipitation, evapotranspiration, runoff, snow cover and length of vegetation period with values from maps in the Swedish climate presentation (Raab och Wedin, 1995). Precipitation here was corrected for wind, evaporation and local conditions according to estimations of actual precipitation from the really measured values. This often gives somewhat higher precipitation the measured data. Snow cover period was given in days and length of vegetation period calculated on days with average temperature over five degrees (> +5^{o}C).

These values reflected the higher temperature and evapotranspiration in south and east Sweden resulting in low annual runoff from these sites. High precipitation in south-west Sweden provided possibilities for higher runoff there, in spite of fairly high evapotranspiration. In the northern part precipitation was not very high and following from this, the runoff did not show the high values expected from low evapotranspiration. However, the rate of runoff compared to precipitation reached fairly high ratios with 55% while the south-east parts showed ratios on 35%.

The snow covered period was longer in north Sweden with up to 200 days compared to 60-90 days in south Sweden. Vegetation period followed temperature pattern showing c. 200 days in the southern parts but only 130-160 days in the northern ones (Table 10).

Table 10. *The hydrological balance for the Level II site areas together with snow covered and vegetation periods. Precipitation (corrected) - P; Evapotranspiration – E; Runoff – R; Snow covered period – Snow; Vegetation period (> +5^{o}C) – Veg.per.*

Level II site	P, mm	E, mm	R, mm	Snow, days	Veg. per., days
7502 Myrberg	600	260	340	180	140
7404 Högbränna	630	300	350	200	130
7201 Storulvsjön	680	340	340	160	160
6702 Blåbärskullen	800	440	360	125	180
5301 Högskogen	630	410	220	100	185
5401 Edeby	630	420	210	100	190
1403 Hensbacka	950	450	500	60	200
5603 Fagerhult	640	440	200	90	190
6303 Timrilt	1150	550	600	75	200
6103 Västra Torup	850	480	370	60	210

Conclusions

Long-term climate conditions are important information to understand the site characteristics in evaluations of adherent forest conditions. For the Swedish Level II sites, precipitation, air temperature and humidity, solar radiation together with wind speed and direction gives valuable data in this characterisation. However, the exact conditions at sites were in this case not possible to determine as it then would have been necessary to have measurements from the actual site/plot. The forest Level II programme has not existed for as long as 30 years yet. Instead information from near-by national stations from the Swedish Meteorological and Hydrological Institute (SMHI) observation network were used and this gives deviations from actual conditions, especially for air humidity and wind speed, being the most site specific

variables. Data from the national network would not be totally complete either, but calculations have furnished a good dataset to determine 30-year values. These then provide the overall picture with fairly representative data.

Overall climatic conditions for the Swedish sites showed higher precipitation in the west part of Sweden, especially in the north high mountains. Temperature and solar radiation were dependent on latitude providing lower temperature and solar radiation in the north part of the country. Solar radiation was also dependent on cloudiness and highest values were found for south-west central Sweden.

Air humidity varied fairy little over the day but with higher values in night-time and lower in mid-day. The geographical distribution showed higher humidity in south-west Sweden and lower in the central North. Wind generally is rather locally dependent but also related to coastal areas and high altitudes providing higher speed. Wind speed at the Level II sites showed on average higher values in south Sweden and lower in the northern parts. The prevailing wind direction was from south-west but for the other wind directions a larg part of the time coming from east in south Sweden, with comparably more northerly winds in north Sweden.

In a larger geographical comparison, the conditions for Sweden were fairly similar over the country but with a latitudinal distribution for some variables. Precipitation furnished higher values in the West and on higher altitudes. Based on the Sweden as a country, there were regional differences.

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