

Overview of weather conditions at Breinosa

Anna Sjöblom

In October 2007, a new standard weather station was deployed at Breinosa (520 m above mean sea level) by the Kjell Henriksen Observatory outside Longyearbyen, Svalbard. The station consists of measurements of temperature and humidity (Vaisala, HMP45) at 3 m and wind speed and direction (R M Young Wind Monitor, 05103-5) at 4 m. In addition atmospheric pressure (Setra, CS100) is measured. The station is measuring with a 5 min sampling rate.

Three years of data (November 2007 – October 2010) have been analysed. The average wind speed was 3.9 m s^{-1} , but gusts (2 s maximum) up to 32.6 m s^{-1} have occurred. The average temperature was -7.0°C , the maximum temperature 11.0°C and the minimum temperature -31.4°C . Relative humidity was generally high, with an average value of 83%, but a relative humidity as low as 16% was recorded during the measuring period. Table 1 shows average values per month.

Table 1. Average values per month. WS: wind speed, WD: wind direction, T: temperature, RH: relative humidity.

	<i>WS</i> [m s^{-1}]	<i>Max WS (2 s)</i> [m s^{-1}]	<i>WD</i> [$^\circ$]	<i>T</i> [$^\circ\text{C}$]	<i>Max T (5 min)</i> [$^\circ\text{C}$]	<i>Min T (5 min)</i> [$^\circ\text{C}$]	<i>RH</i> [%]
<i>January</i>	5.3	32.6	125	-12.2	1.2	-31.4	82
<i>February</i>	5.4	23.1	88	-13.5	0.0	-27.8	76
<i>March</i>	3.9	25.7	76	-15.8	-2.2	-27.1	78
<i>April</i>	3.3	19.8	85	-13.2	-1.5	-24.7	73
<i>May</i>	3.3	18.5	117	-4.9	3.3	-14.2	83
<i>June</i>	3.2	22.9	47	-1.1	8.3	-7.4	85
<i>July</i>	3.3	19.7	106	2.8	11.0	-4.3	86
<i>August</i>	2.4	20.2	80	1.9	10.5	-4.3	86
<i>September</i>	3.7	24.1	112	-1.6	7.1	-10.2	90
<i>October</i>	4.2	23.0	87	-8.0	4.6	-18.3	88
<i>November</i>	4.7	23.4	98	-8.7	2.1	-23.3	83
<i>December</i>	4.6	29.0	123	-10.4	0.9	-25.8	84

Wind speed and wind direction

The wind speed at Breinosa is highly variable as seen in Fig. 1, where 30 min averages of the wind speed are shown.

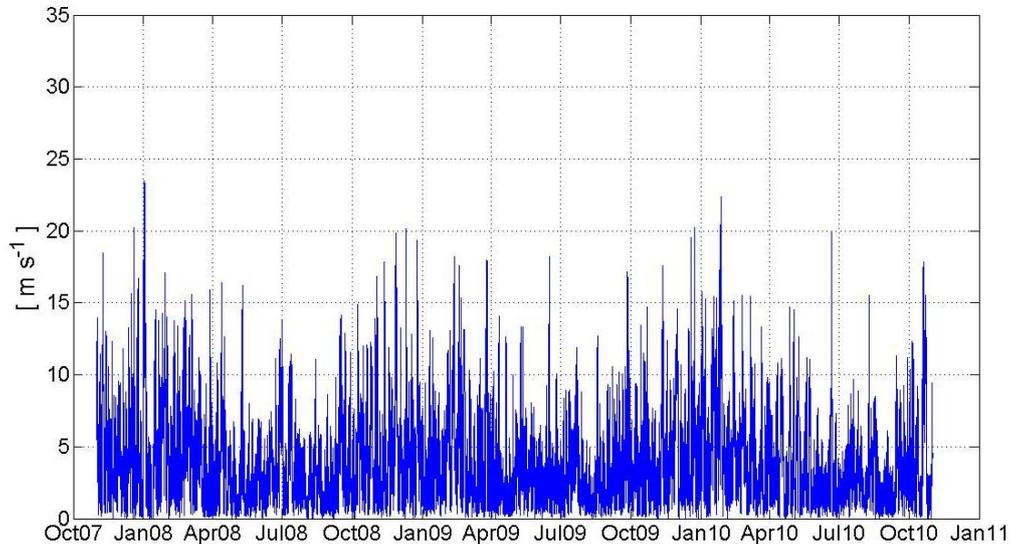


Figure 1. Average wind speed (30-min).

The wind speed is generally higher during the winter, and the variation is also larger than during the summer. There is also a variation in wind speed from year to year as seen in Fig. 2, where average values for each month during the three year period are shown.

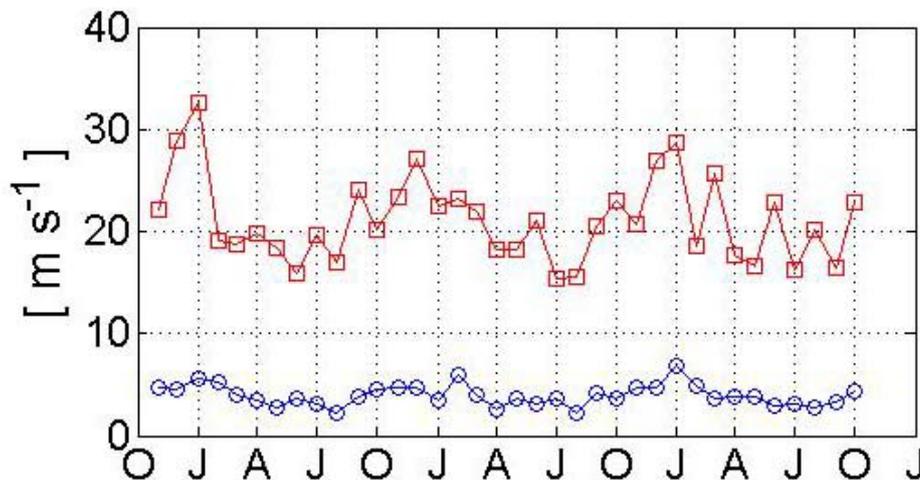


Figure 2. Monthly average values of wind speed: \circ - average values, \square - highest gust (2 s).

That the highest average wind speed occurs during the winter is even more noticeable when averaging over each month, as seen in Fig. 3 and Table 1.

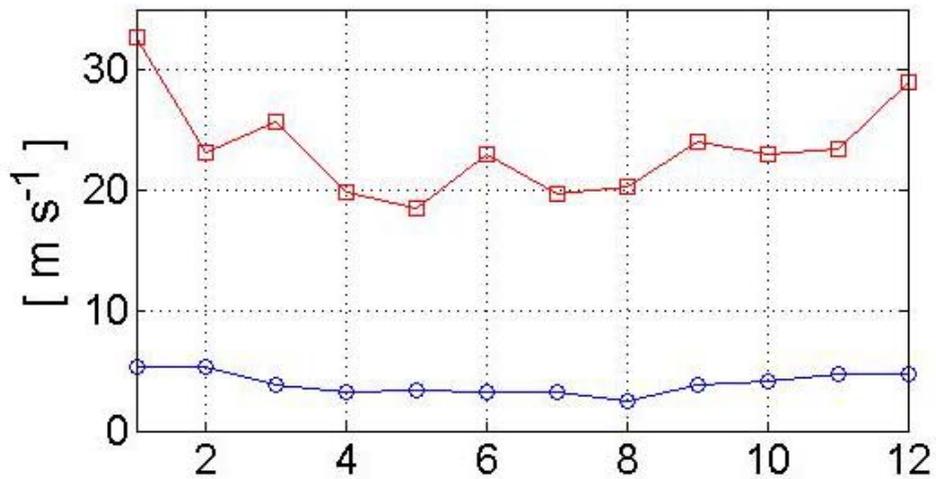


Figure 3. Average values per month of wind speed: -○- average values, -□- highest gust (2 s).

The wind direction is mainly controlled by the surrounding mountains, and therefore the average wind direction does not vary significantly, as seen in Fig. 4. However, some deviations, as for example in August 2010 can occur, and the wind direction is then often 180° different due to the same channelling effects caused by the mountains.

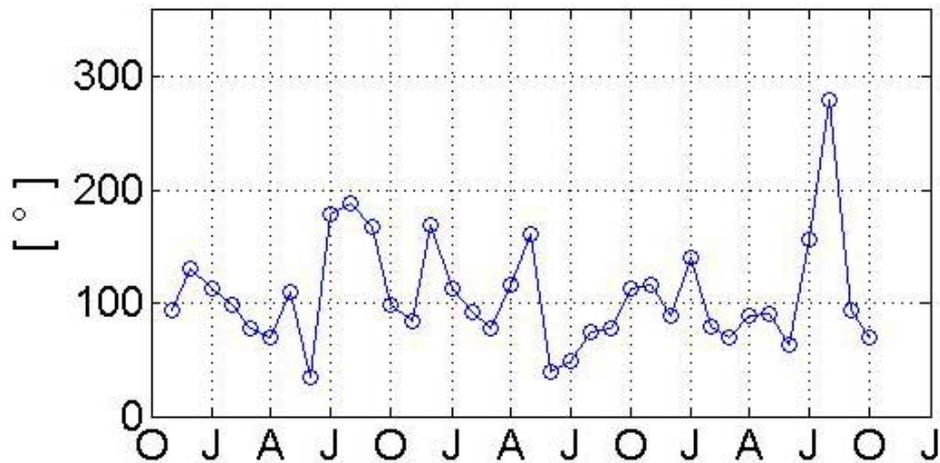


Figure 4. Monthly average values of wind direction.

On average though, the wind direction is close to 100°, i.e. east-south-east (Fig. 5 and Table 1).

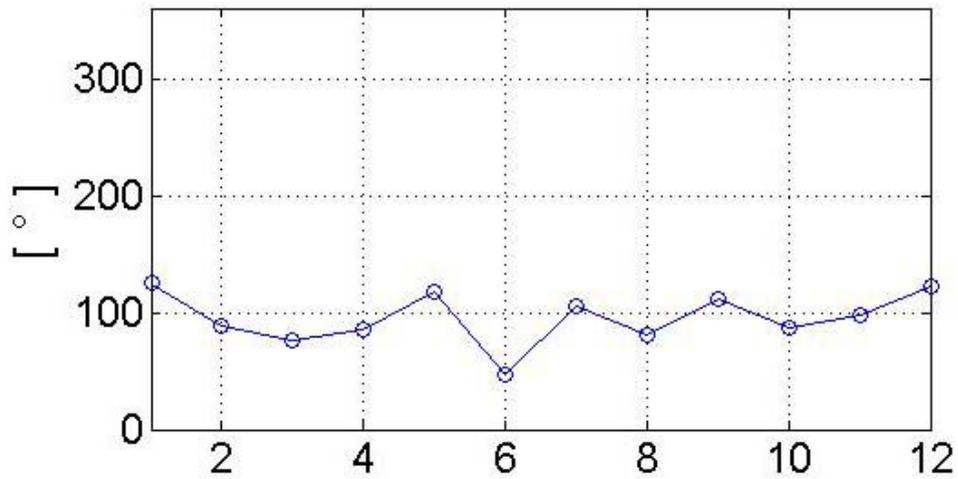


Figure 5. Average values per month of wind direction.

Temperature

Since Breinoso is situated 520 m above mean sea level, the temperatures during the summer are usually colder than at sea level, and the temperatures during the winter are normally warmer. As for wind speed, the temperature is more variable during the winter than during the summer; seen in Fig. 6, where 30 min averages are shown.

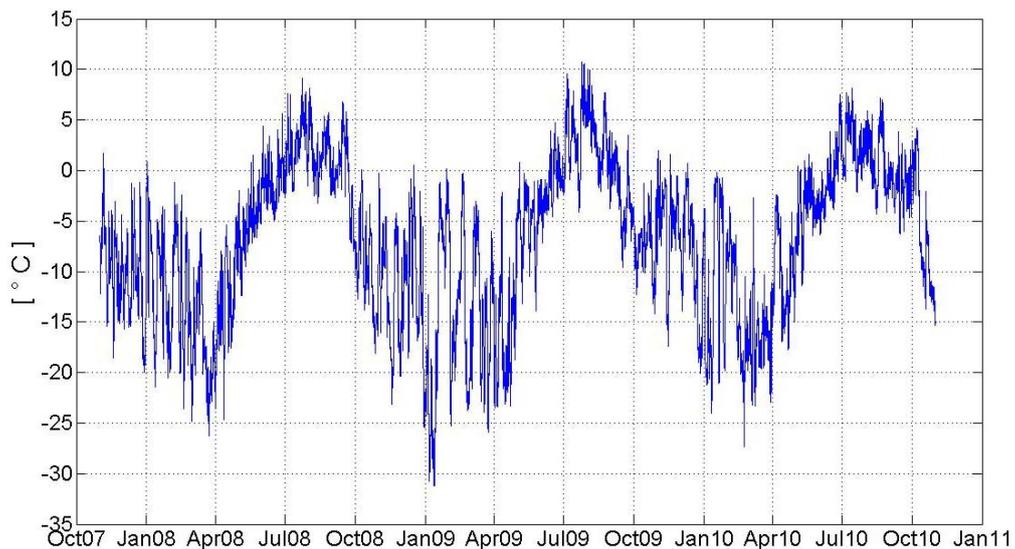


Figure 6. Average temperature (30 min).

The average temperatures do not change significantly from year to year (Fig. 7), but 2009 was the year with both the highest and the lowest temperatures.

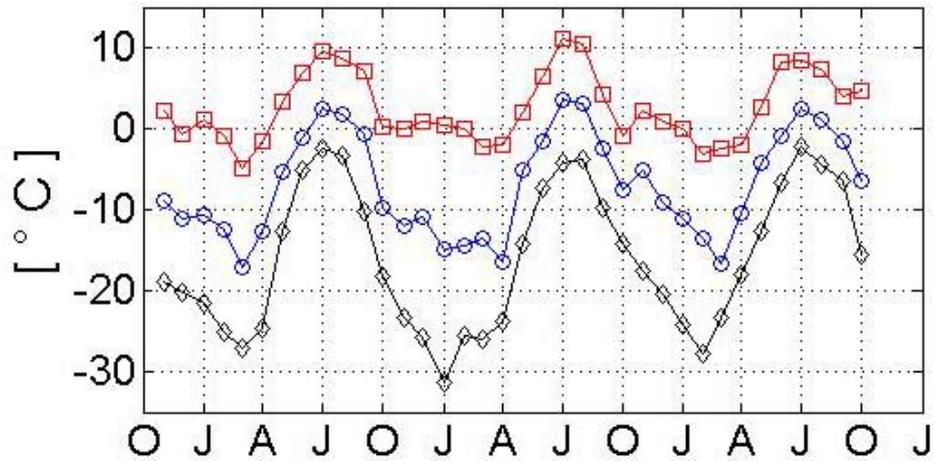


Figure 7. Monthly average values of temperature: -○- average values, -□- maximum temperature (5 min), -◇- minimum temperature (5 min).

As seen in Fig. 8 and also in Table 1, March is on average the coldest month while July is the warmest.

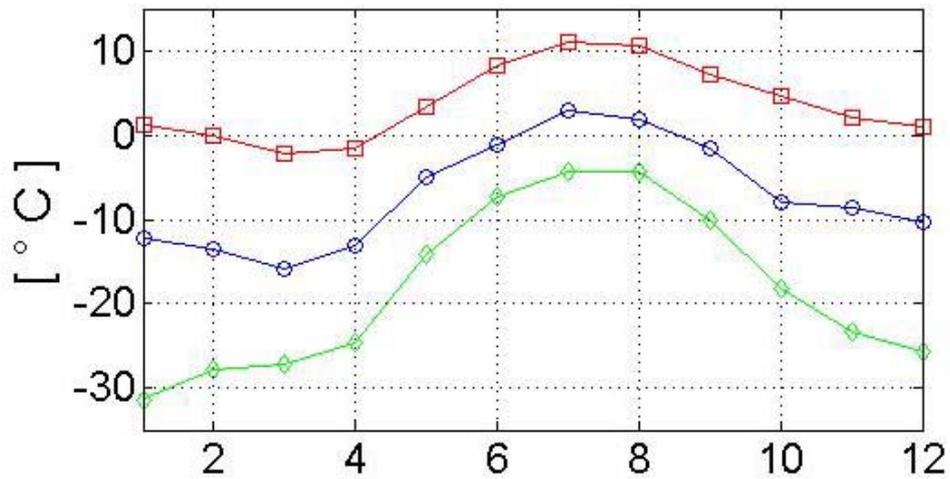


Figure 8. Average values per month of temperature: -○- average values, -□- maximum temperature (5 min), -◇- minimum temperature (5 min).

Relative humidity

The relative humidity is generally high, as can be expected in colder climates, but the highest values often occur during the summer, as seen in Fig. 9. The reason for this, is mainly the low cloud cover and light precipitation, which is common during these months. The variation in relative humidity is, however, largest during the winter (Fig. 9).

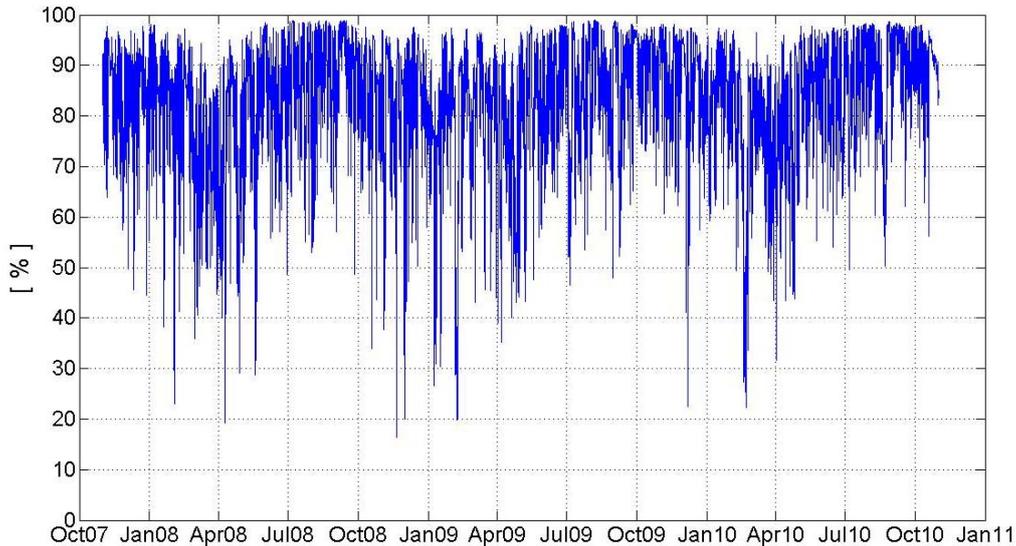


Figure 9. Average relative humidity (30 min).

Moreover, as with wind and temperature, there is not a large difference between the average monthly values for each year (Fig. 10).

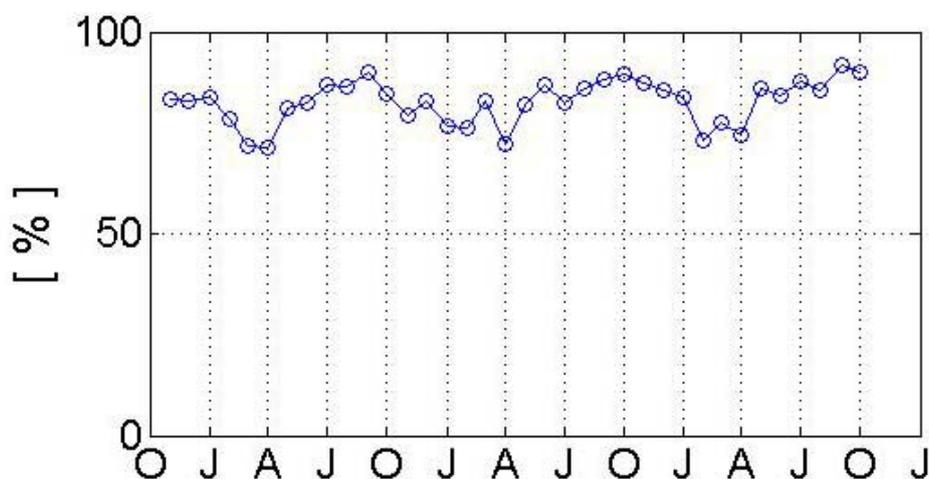


Figure 10. Monthly average values of relative humidity.

Even if there is some difference between the months (Fig. 11 and Table 1), the average relative humidity remains high, above 70%.

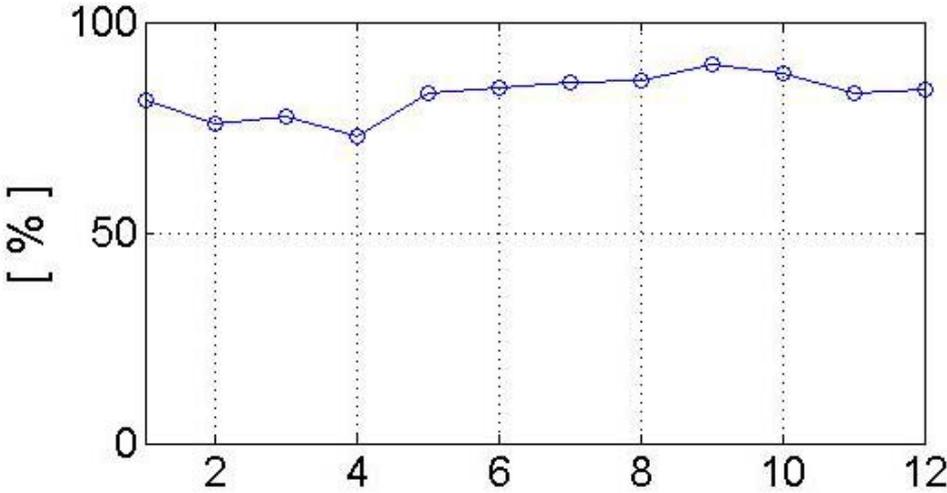


Figure 11. Average monthly values of relative humidity.