

Update Fino1-Plattform: Analyses of Data until June 2009

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This report gives a short summary of the most important meteorological parameters on the Fino1 platform for the period until June 2009 with an emphasis on the last half year (January - June 2009). For more detailed information about the Fino1-Plattform please refer to DEWI Magazine 24-26, 30 and 33.

Availability of measurements

Fig. 1 shows that the availability for the predominant part of sensors exceeds 99% within the first half-year 2009. Due to technical reasons of the logger design, data have to be filtered from the vanes at 50 m and 70 m, but with more than 93 % the availability is still good.

Wind Speed Statistics

Compared to previous years the first half-year 2009 is a relatively weak wind year. As shown in Fig. 2 and 3 the monthly mean wind speed from January to April was always below the long term data for the same period. With -2 m/s the maximum deviation can be found in January followed by March with a deviation of -1.45 m/s. Therefore the six-month mean wind speed (9.51 m/s) is about 5 % below the long term annual wind speed (10.06 m/s).

Even in gusts wind velocities of over 25 m/s were only rarely reached (Fig. 4). The highest 1-s wind speed was measured on 08 May with 29.1 m/s. On the same day, with 24.1 m/s, the highest mean maximum wind speed for a 10-min mean had been measured, but the daily mean was only 12.9 m/s. The maximum daily average of 19.4 m/s was reached on 02 February.

During the first half-year 2009 in 7.7 % (6.1%) of all days the daily mean wind speed was below (above) 5 m/s (15 m/s). On six days or 3.3 % of all days storm events occurred with at least one 10-min wind speed average above 20.8 m/s.

Looking at the wind speeds as a function of wind direction, in Fig. 5 is shown that high average wind speeds of more than 10 m/s, especially occur in the eastern sectors between 60° and 90° and in the western sectors between 195° and 210°.

On the right hand side the same distribution is shown for the year 2008 (Fig. 6). Comparing both, one recognizes that in 2008 the high wind velocities from western sections prevail. In both years wind from the north eastern sections show the lowest speed maxima.

In 2009 the difference between the sector with the lowest mean wind speed (15° - 30°, $V_{\text{mean}} = 6.7$ m/s) and the sector with the highest average wind speed (195° - 210°, $V_{\text{mean}} = 12.7$ m/s) is 6 m/s or about 53%.

Fig. 1: Availability of meteorological sensors at Fino1 Platform during the period from January to June 2009

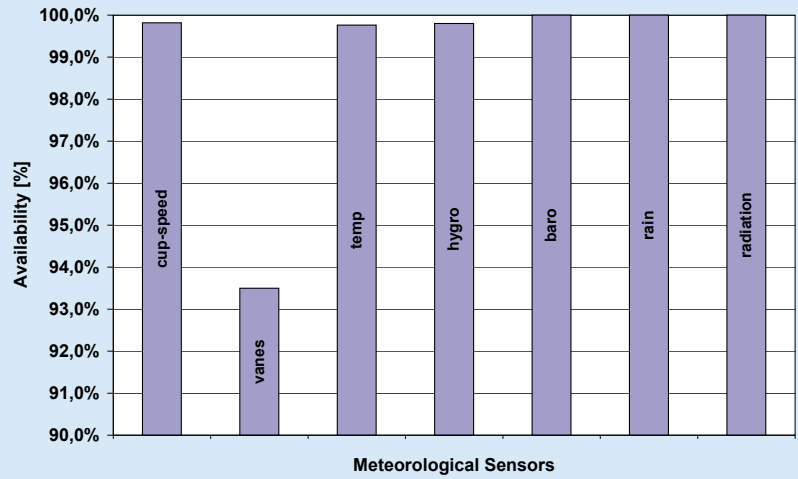


Fig. 2: Comparison of monthly mean wind speed and frequency distribution at 100 m height for the period from January to June 2009

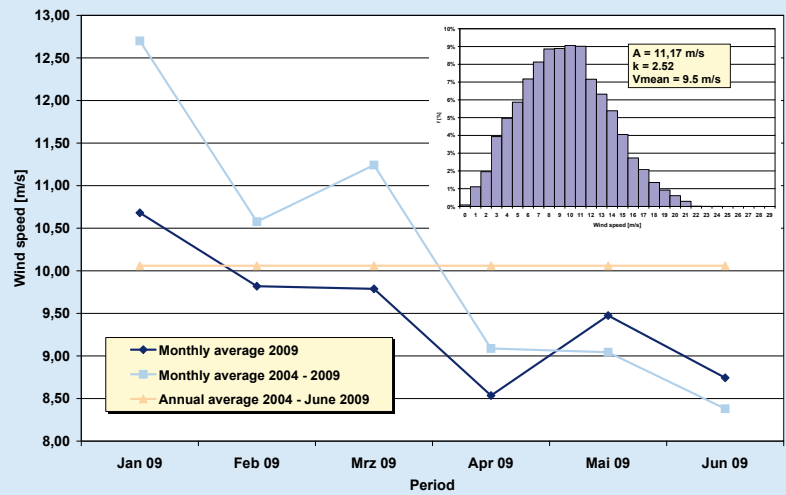


Fig. 3: Wind speed deviation at 100 m height for the period from January to June 2009 minus the period from 2004 to June 2009

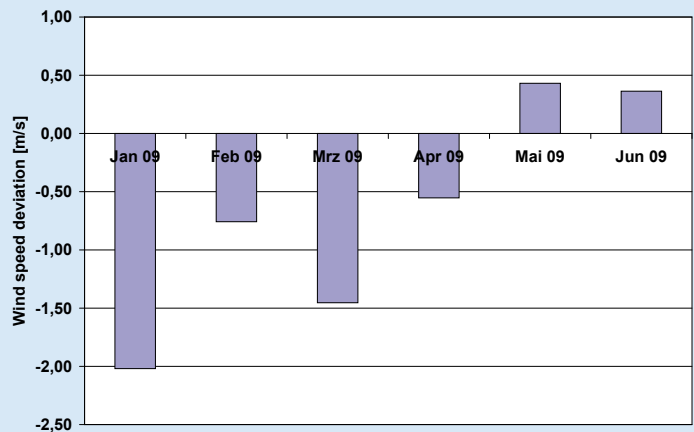
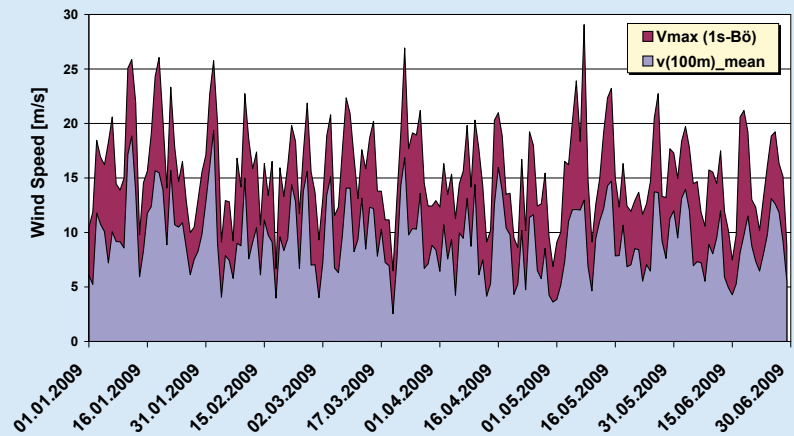


Fig. 4: Course for daily mean wind speed and max. 1-s gust at 100 m height for the period from January to June 2009



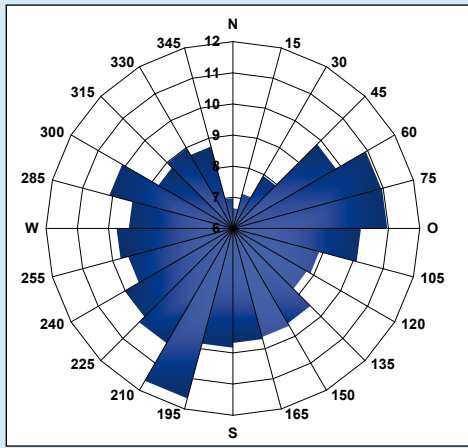


Fig. 5: 100 m-wind speed as a function of 90 m-wind direction for the period from January to June 2009

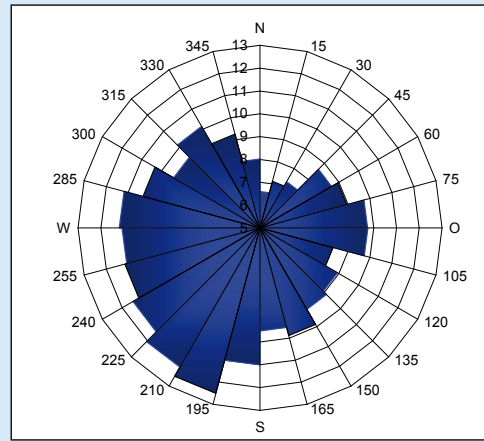


Fig. 6: 100 m-wind speed as a function of 90 m-wind direction for the year 2008

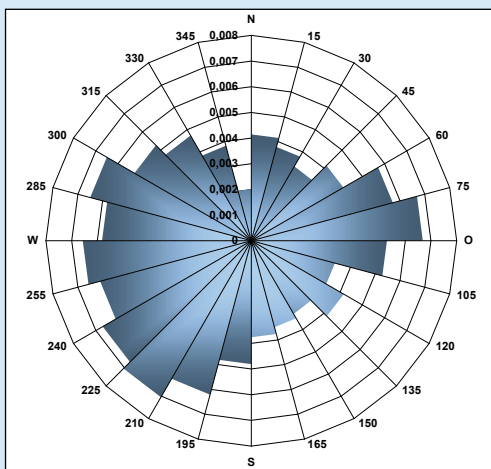


Fig. 7: 90 m-wind direction distribution during the period from January to June 2009

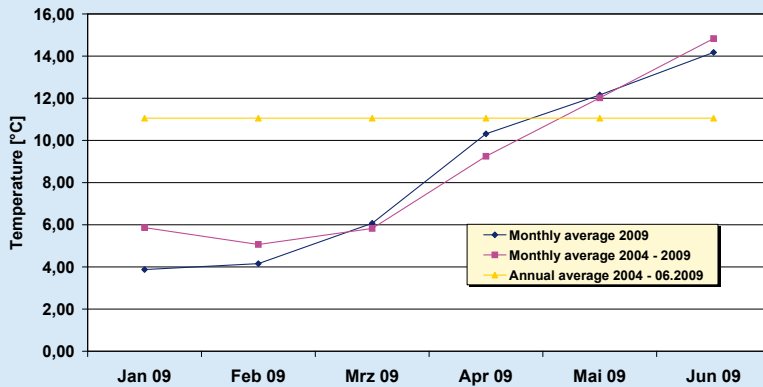


Fig. 8: Comparison of the monthly mean temperature at 50 m height for the period from January to June 2009

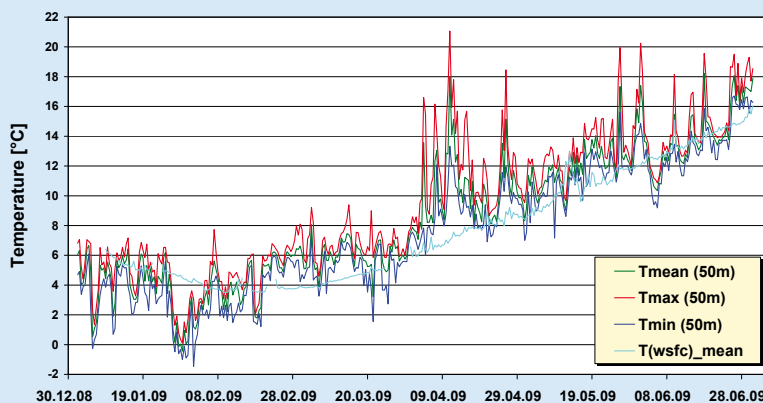


Fig. 9: Course of 12h-mean temperature at 50 m height in comparison with the 12h-mean water surface temperature during the period from January to June 2009

Fig. 10: Distribution of water surface temperature and 50 m-air temperature during the period from January to June 2009

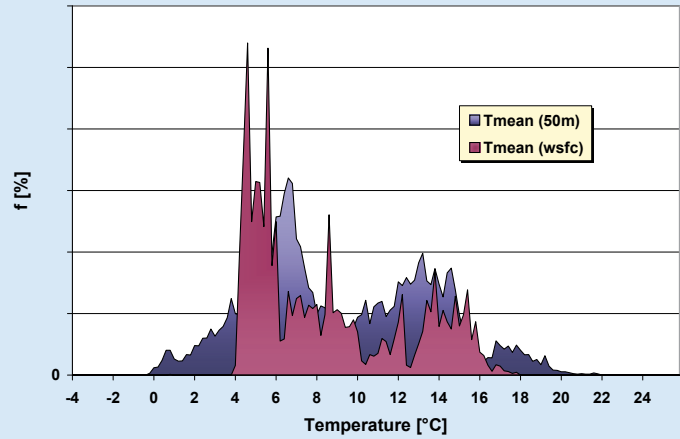
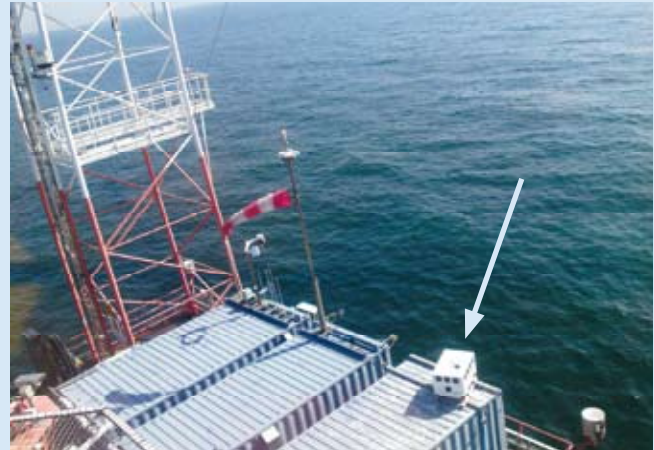


Fig. 11: Lidar system installed on the Fino1 Platform



Wind direction

When considering the wind direction distribution for the year 2009 one can see the typical pattern of the past years. Fig. 7 clearly shows a main maximum for west to south-western winds. A second, although smaller maximum exists for the wind sector between 60° - 105°.

Temperature Profile

The half-year mean temperature in 2009 at 50 m height was 8.5 °C and hence by 0.3 °C lower than in the comparable period from 2004 to June 2009. Significant deviations from the long term data can be observed from January to February, with a negative deviation of -2 °C, e. g. -0.9 °C and in April, which was 1.1 °C too warm (Fig. 8). With an average temperature of 3.9 °C (14.2 °C) January (June) was the coldest (warmest) month. Fig. 9 shows that the development of air temperature is strongly connected to the water temperature. One recognizes no significant course of the day, the min and max temperatures are close to the mean temperature. The course peaks of the air temperature could be referred to the advection of warmer or colder air masses. During the period from January to June 2009 the

coldest day was 29 January with a 12h-mean temperature of -0.4 °C. It was also the only day with a mean temperature below 0 °C. With a mean temperature of 17.7 °C the 26 June was the warmest day during the first half-year of 2009. Looking at the 10-min average the absolute maximum of the mean temperature (21.1 °C) was measured on 11 April and the absolute minimum mean temperature (-1.5 °C) on 01 February.

As shown in Fig. 10, the water surface temperature only rarely drops below +4 °C. It has a distinct maximum between 4 °C and 6 °C and a less marked from 13-18 °C. The air temperature in 50 m height shows the same maxima only shifted by some degrees.

Outlook

In June a Lidar system was installed on the Fino1 Platform. The WindCube©, a development of the French company Leosphere is fixed on a container in the western angle of the platform. The campaign shall give more information about the behaviour of the LIDAR-measurement in the off-shore environment with respect to later use in the RAVE research project. First data analyses look very promising concerning the correlation of both measurements.