

Comparative measurements with SODAR systems

**Correlation with meteorological masts for onshore and offshore
conditions and further measurements to compare SODARs**

F.T. Ormel
S.A. Herman (Editor)
P.J. Eecen

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B1. PERIOD 6

B1.1 Tower Wind Speed and Direction (Cabauw Mast's Measurements)

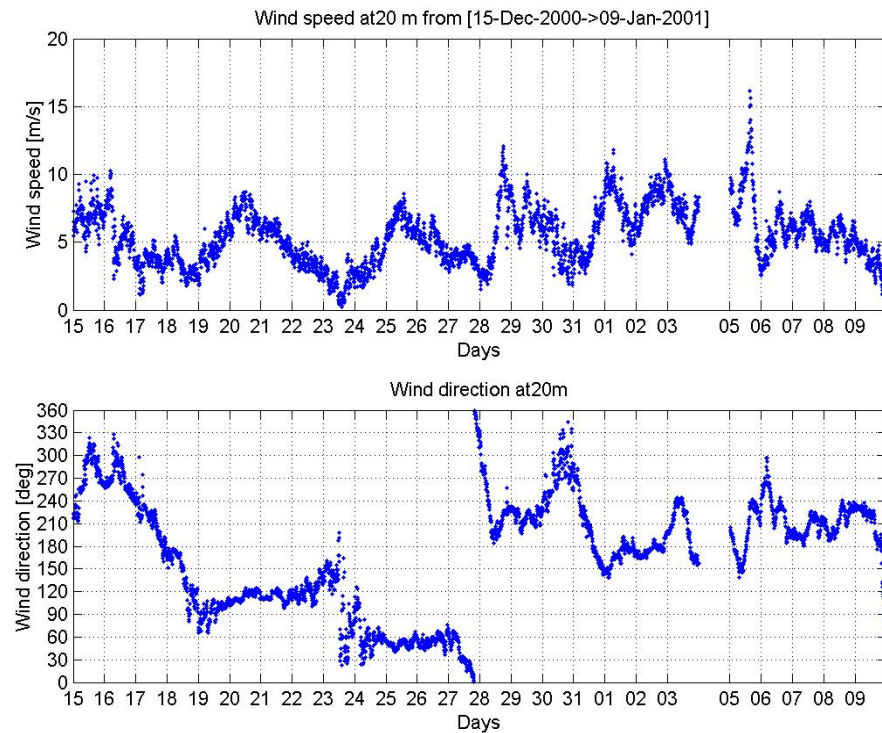


Figure B1. Tower wind speed and wind direction, period 6 at 20 metres height

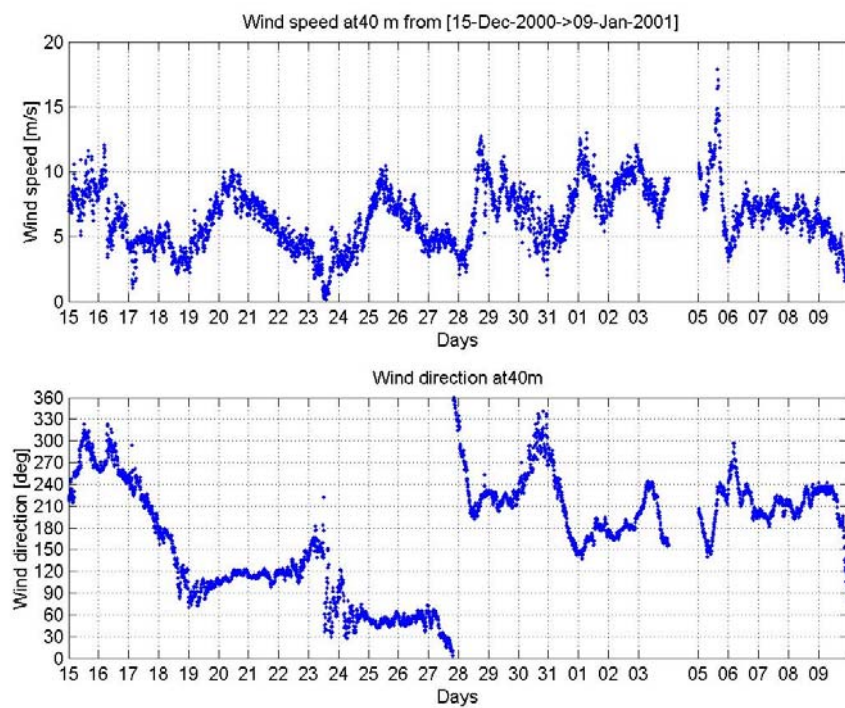


Figure B2. Tower wind speed and wind direction, period 6 at 40 metres height

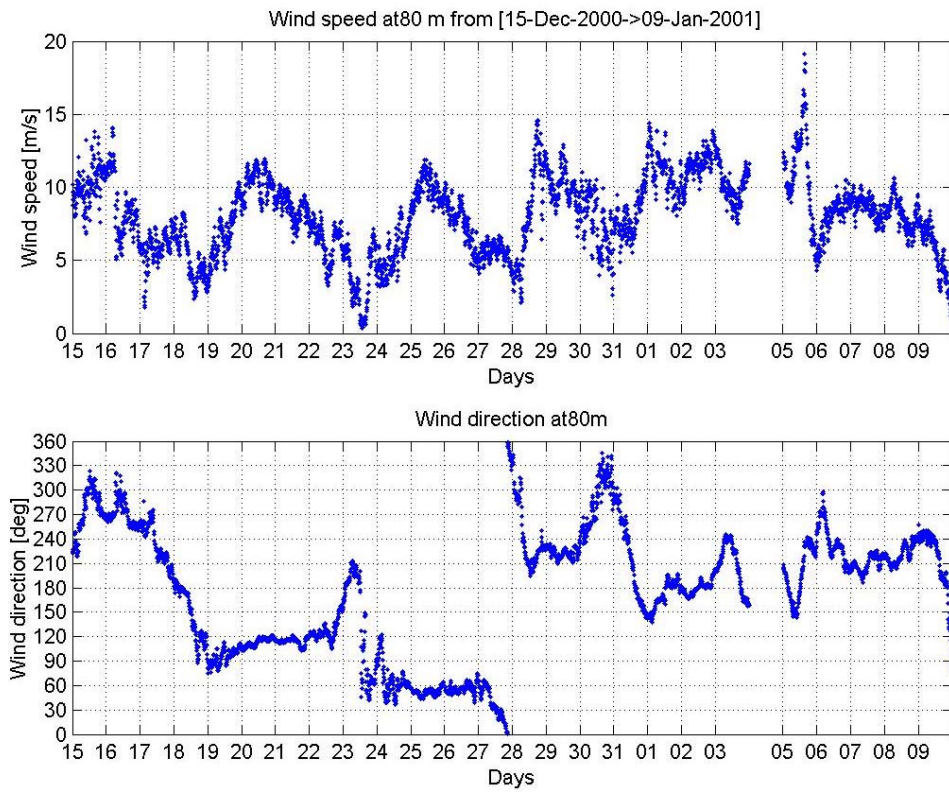


Figure B3. Tower wind speed and wind direction, period 6 at 80 metres height

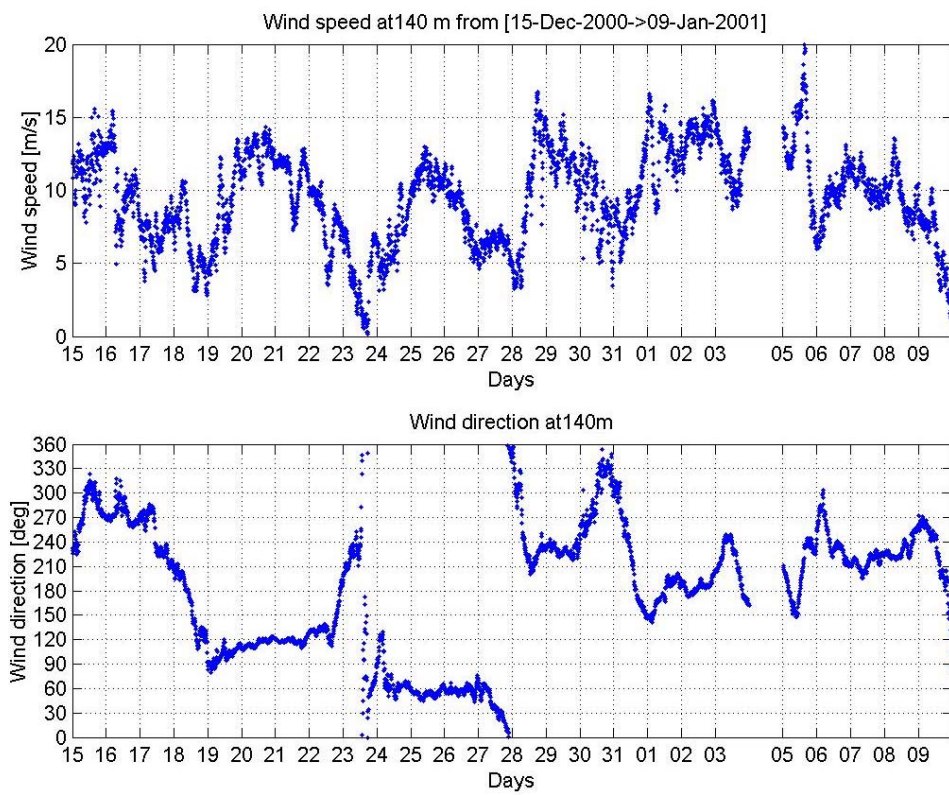


Figure B4. Tower wind speed and wind direction, period 6 at 140 metres height

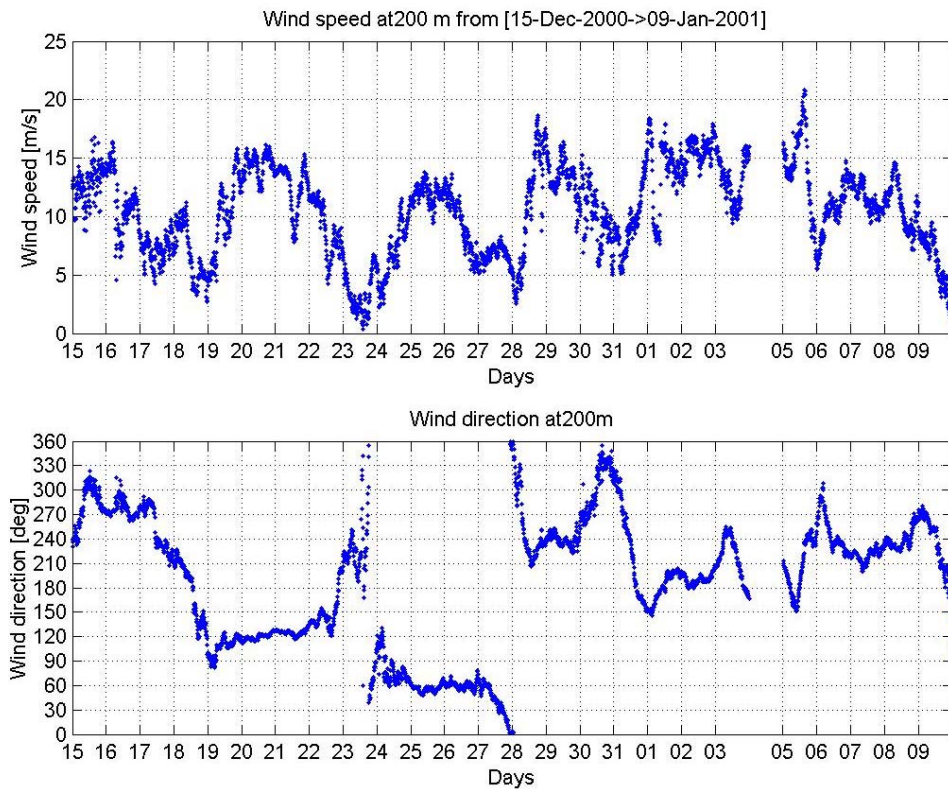


Figure B5. Tower wind speed and wind direction, period 6 at 200 metres height

B1.2 SODAR Wind Speed and Direction

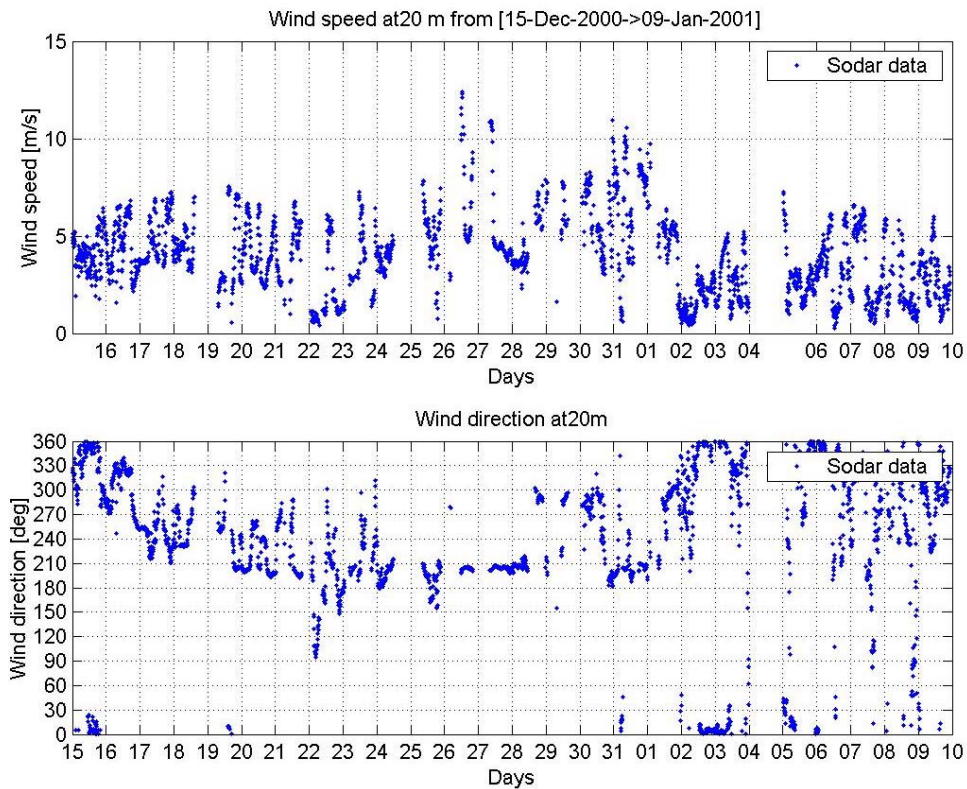


Figure B6. SODAR wind speed and wind direction, period 6 at 20 metres height

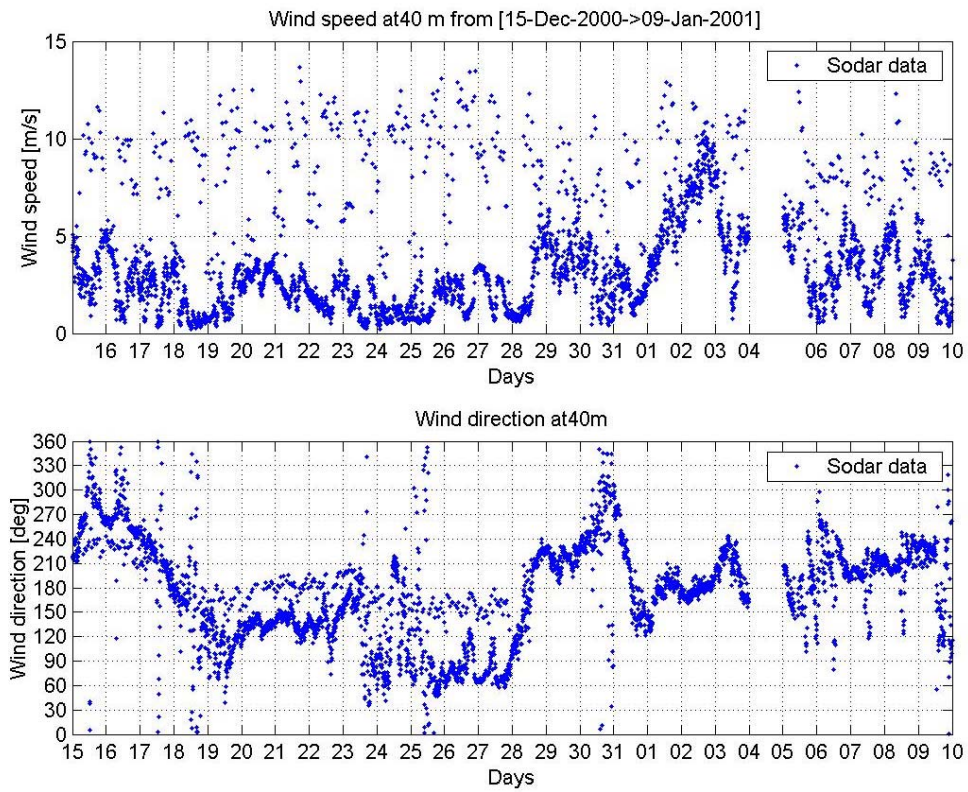


Figure B7. SODAR wind speed and wind direction, period 6 at 40 metres height

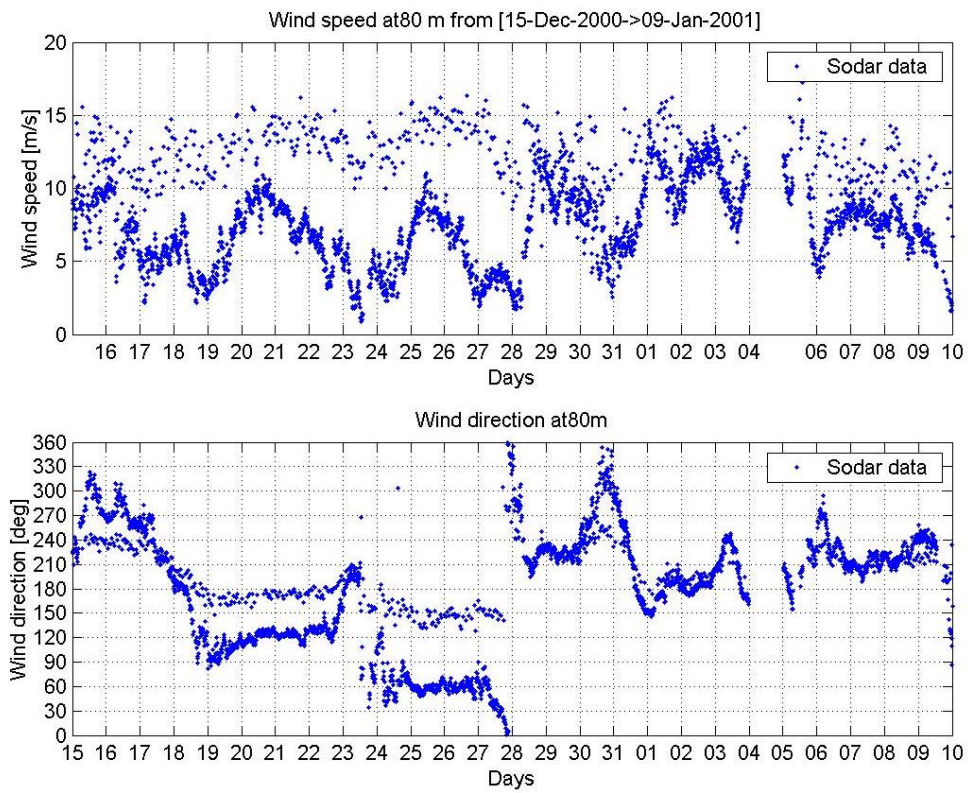


Figure B8. SODAR wind speed and wind direction, period 6 at 80 metres height

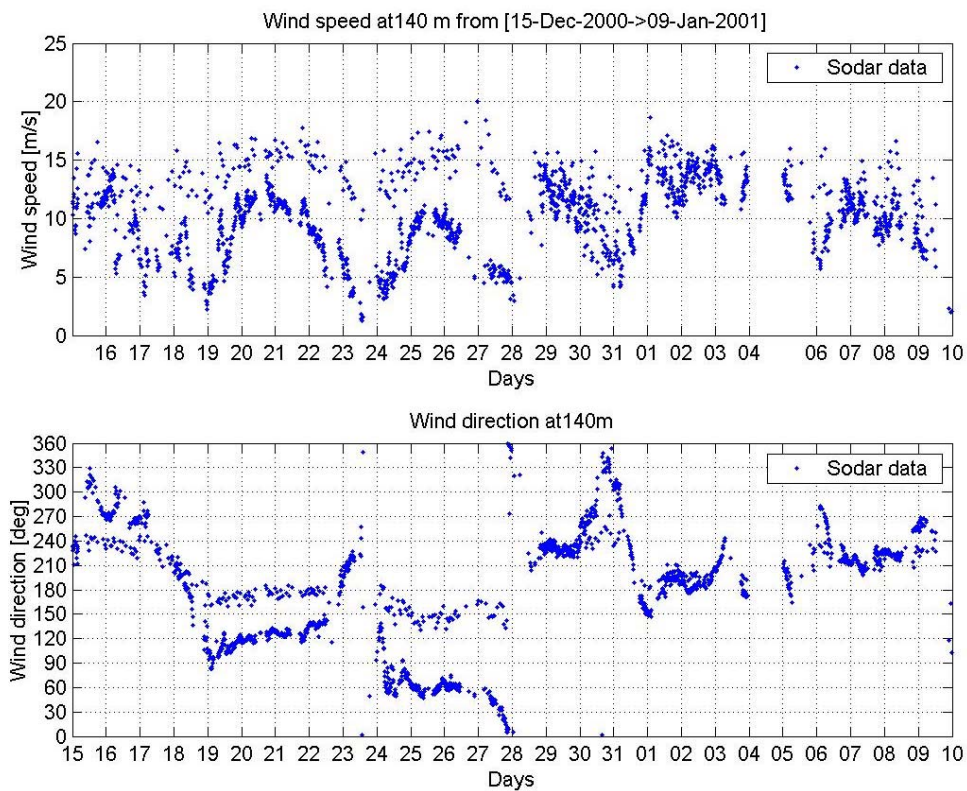


Figure B9. SODAR wind speed and wind direction, period 6 at 140 metres height

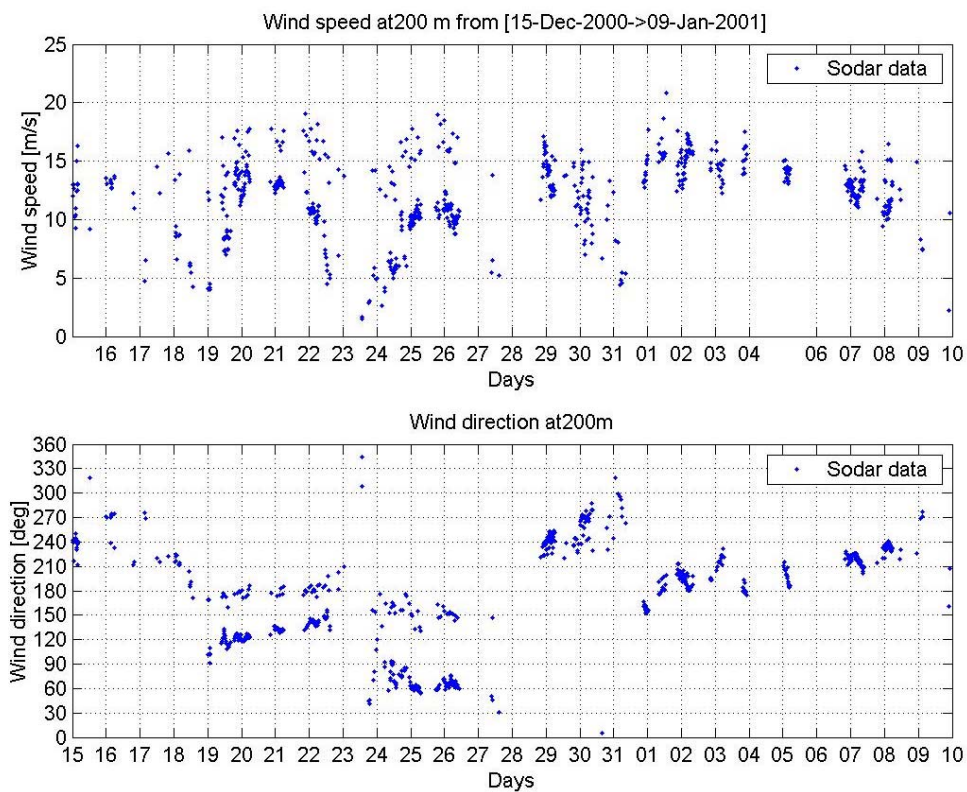


Figure B10. SODAR wind speed and wind direction, period 6 at 200 metres height

B1.3 Comparison of SODAR Wind Speed and Tower Wind Speed

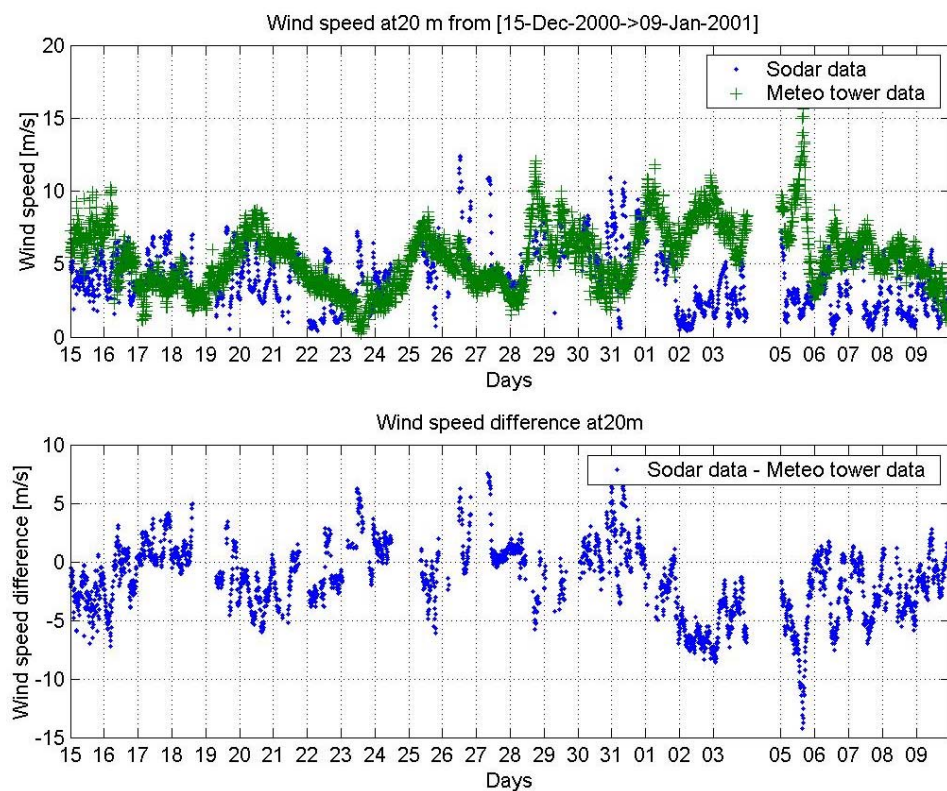


Figure B1. Comparison of Sodar and Tower wind speed for period 6 at 20 metres height.

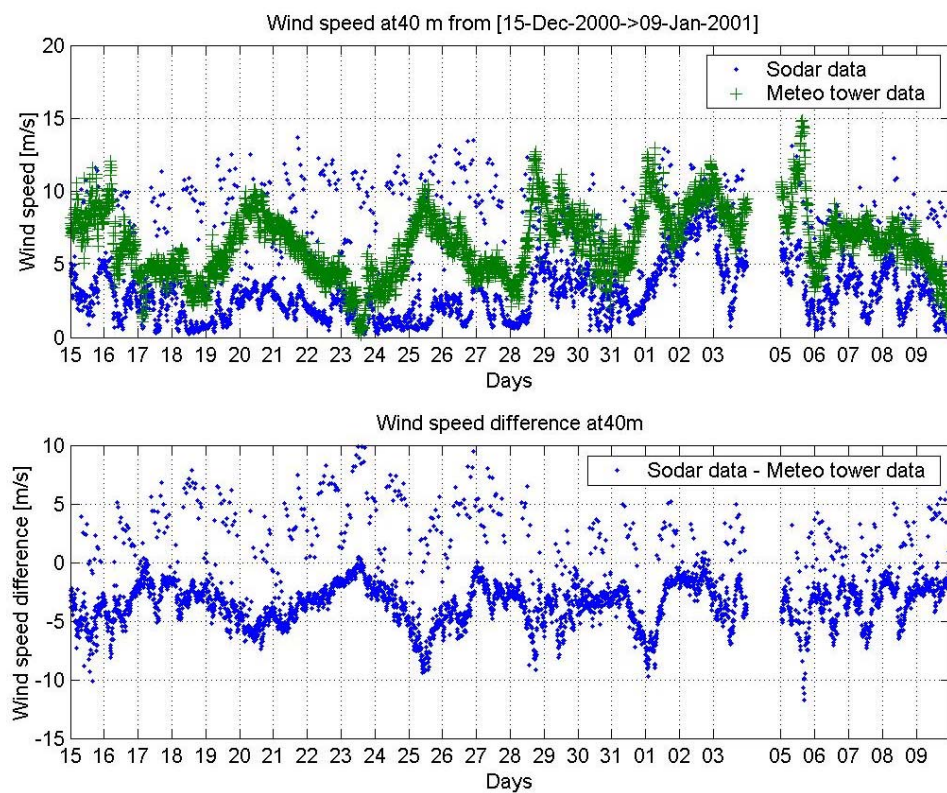


Figure B2. Comparison of Sodar and Tower wind speed for period 6 at 40 metres height.

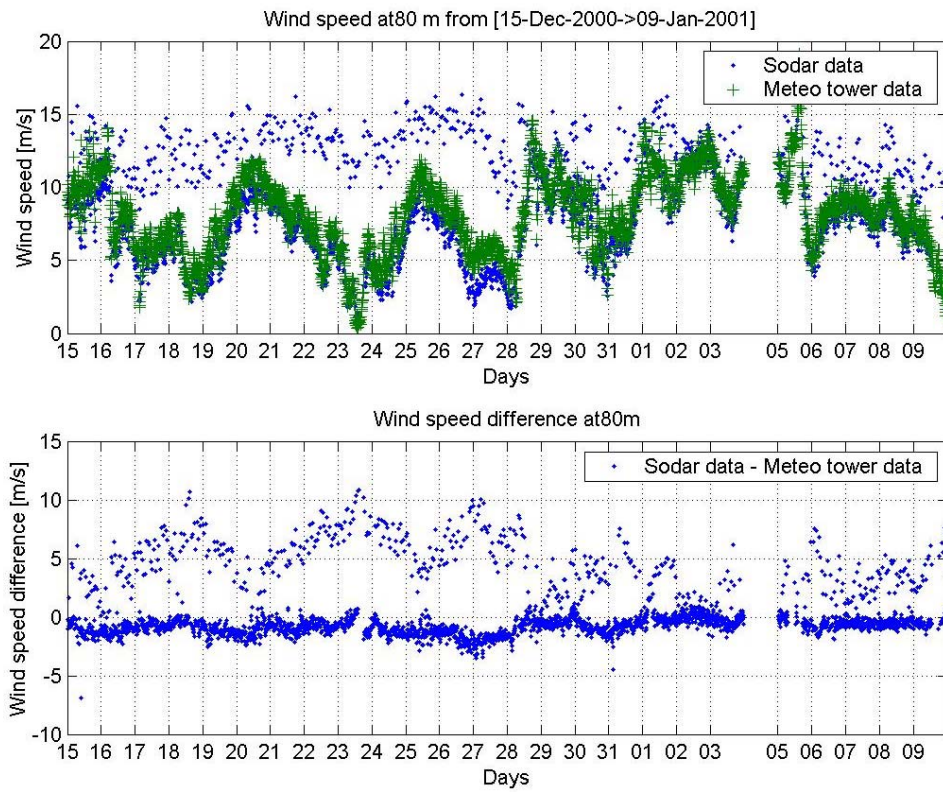


Figure B3. Comparison of Sodar and Tower wind speed for period 6 at 80 metres height.

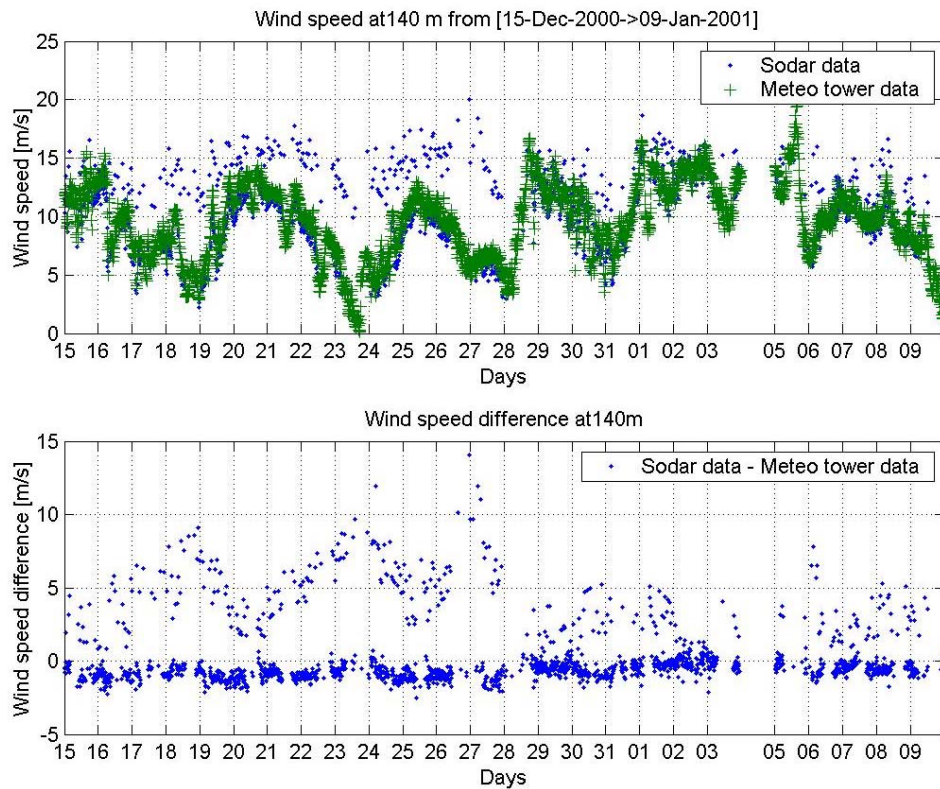


Figure B4. Comparison of Sodar and Tower wind speed for period 6 at 140 metres height.

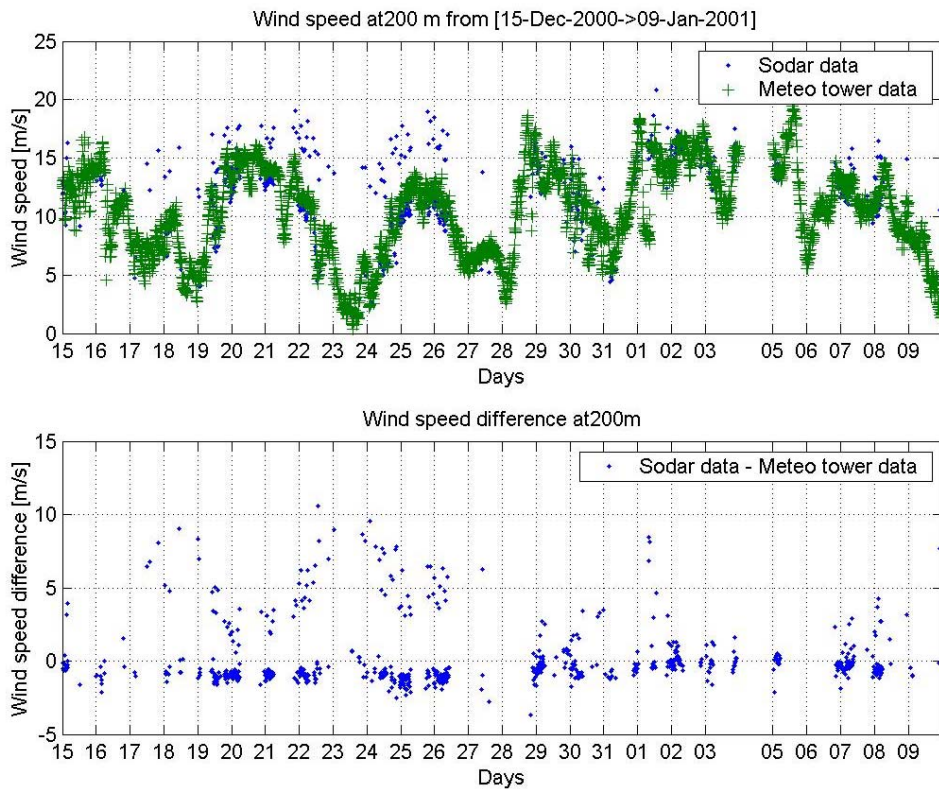


Figure B5. Comparison of Sodar and Tower wind speed for period 6 at 200 metres height.

B1.4 Comparison of SODAR Wind Direction and Tower Wind Direction

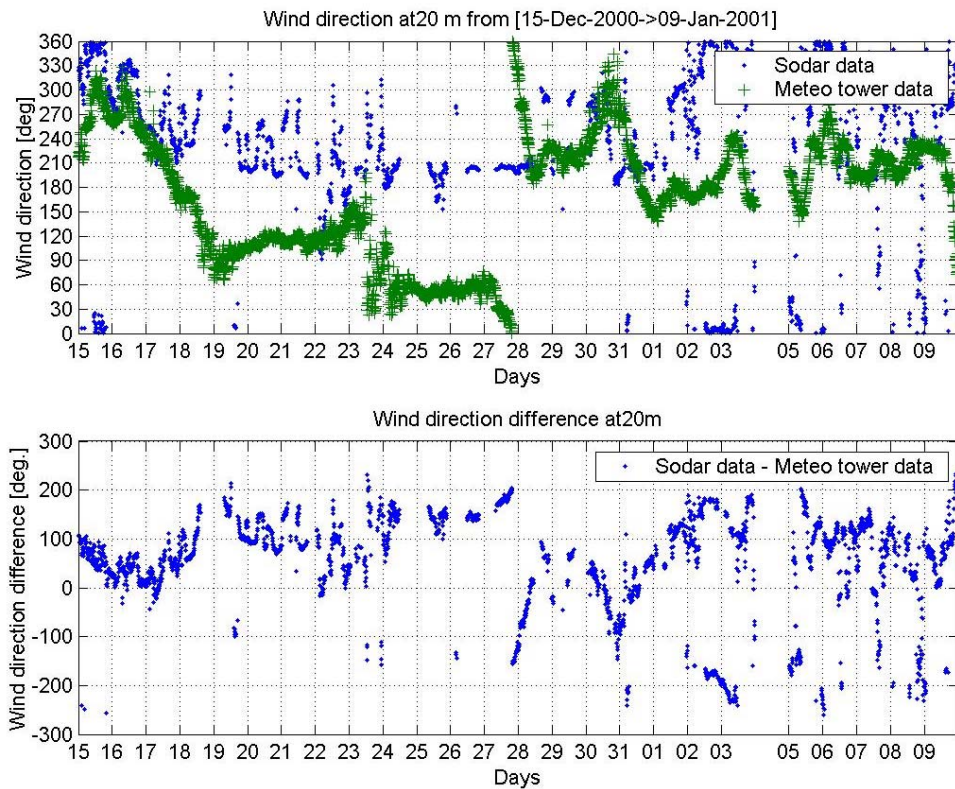


Figure B6. Comparison of Sodar and Tower wind direction for period 6 at 20 metres height.

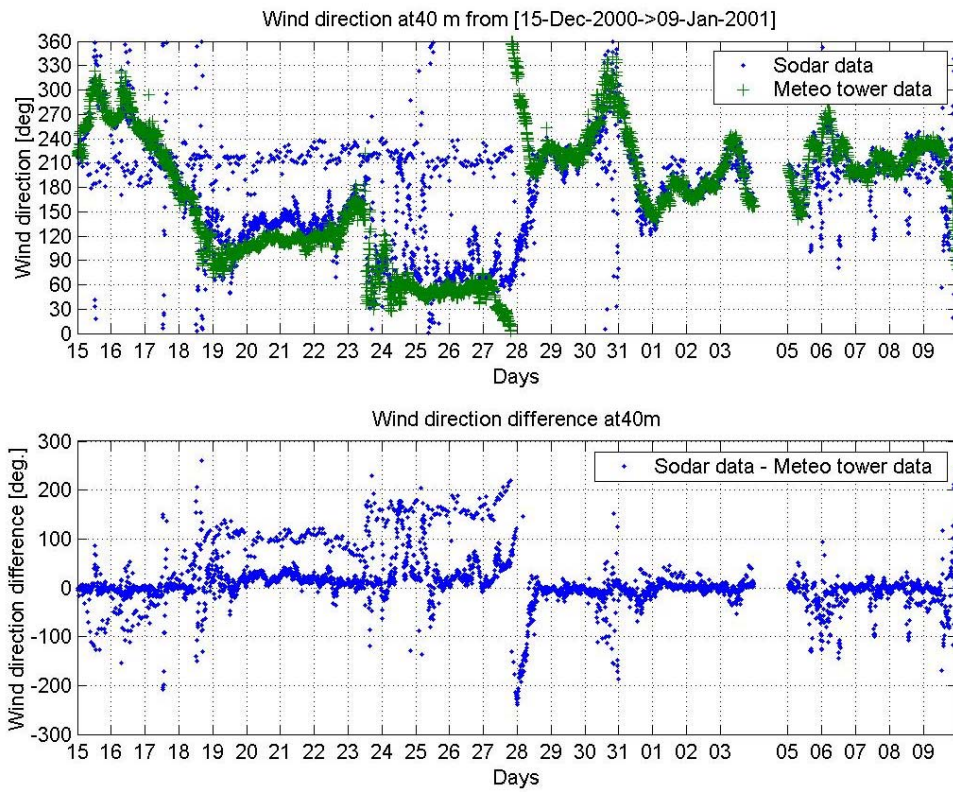


Figure B7. Comparison of Sodar and Tower wind direction for period 6 at 40 metres height.

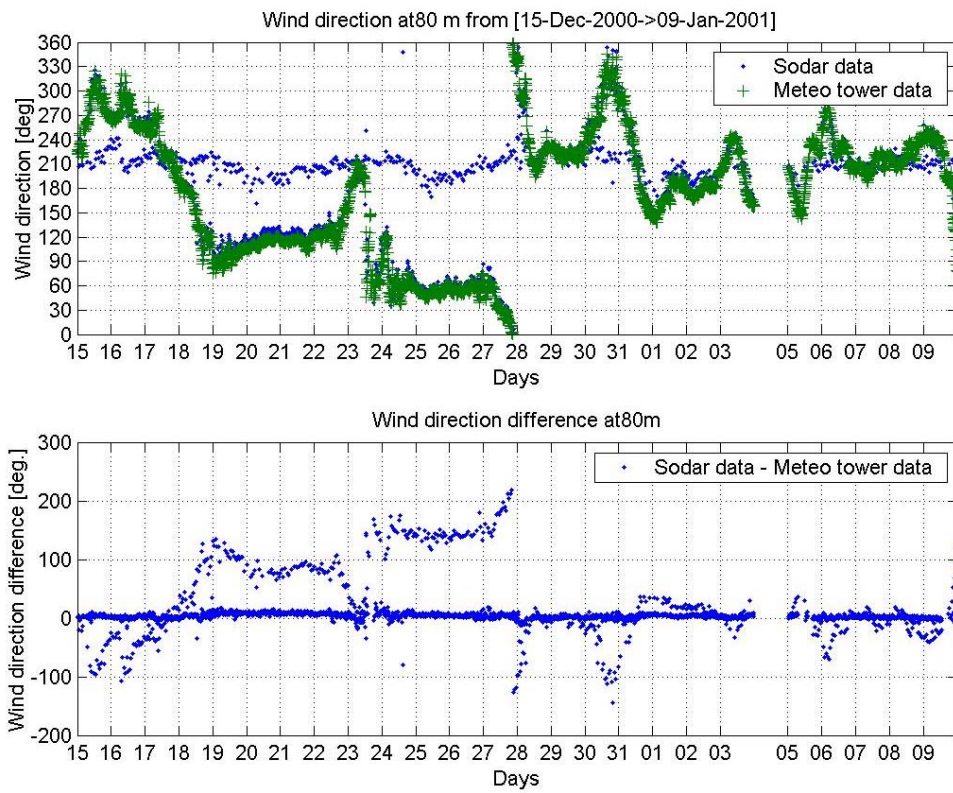


Figure B8. Comparison of Sodar and Tower wind direction for period 6 at 80 metres height.

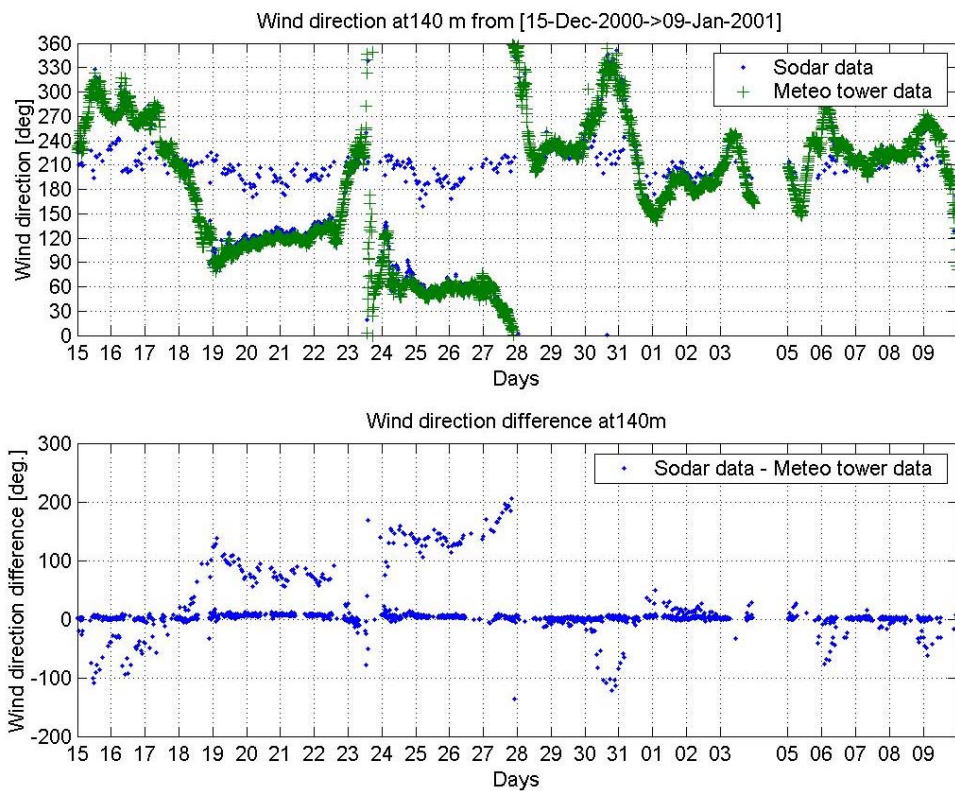


Figure B9. Comparison of Sodar and Tower wind direction for period 6 at 140 metres height.

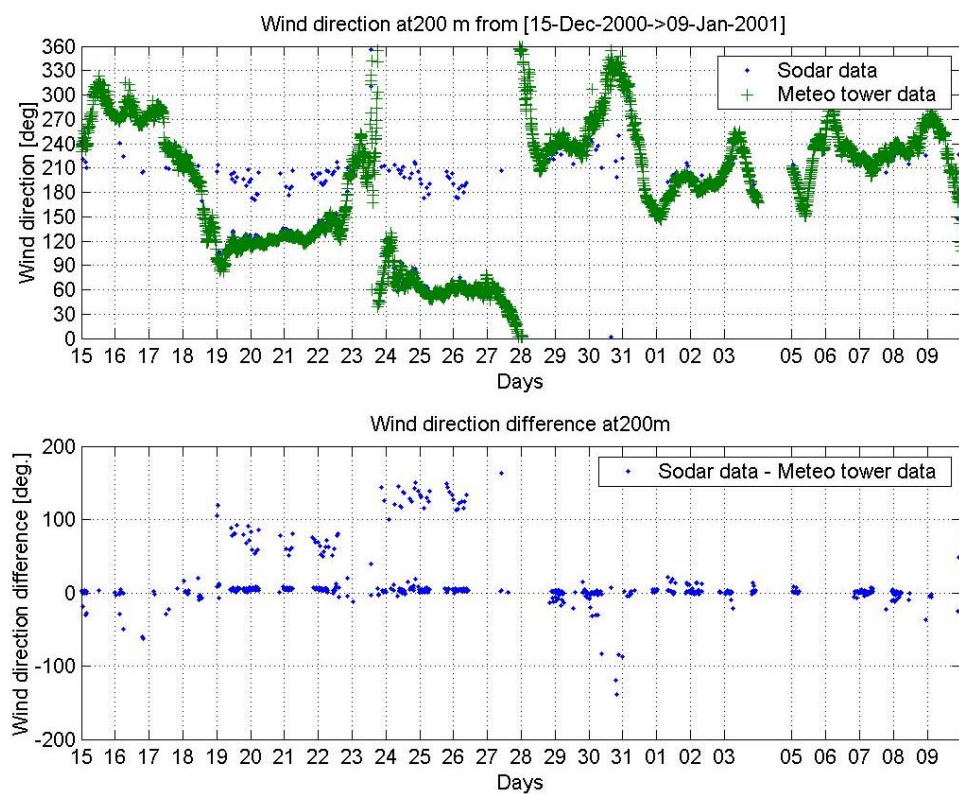


Figure B10. Comparison of Sodar and Tower wind direction for period 6 at 200 metres height.

B1.5 Wind Roses for SODAR and Tower Wind Directions

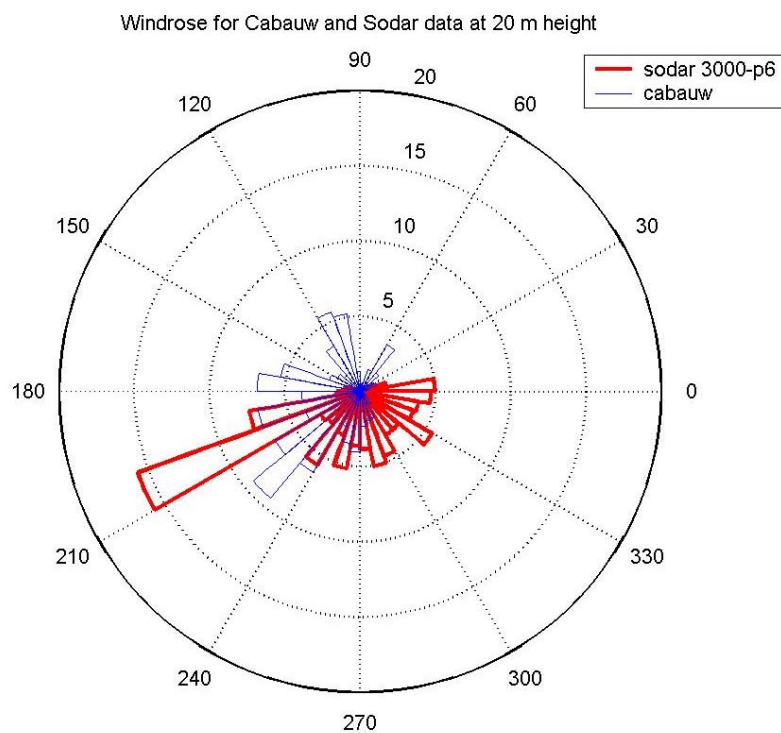


Figure B11. Wind roses for Sodar and Tower wind direction, period 6 at 20 metres height.

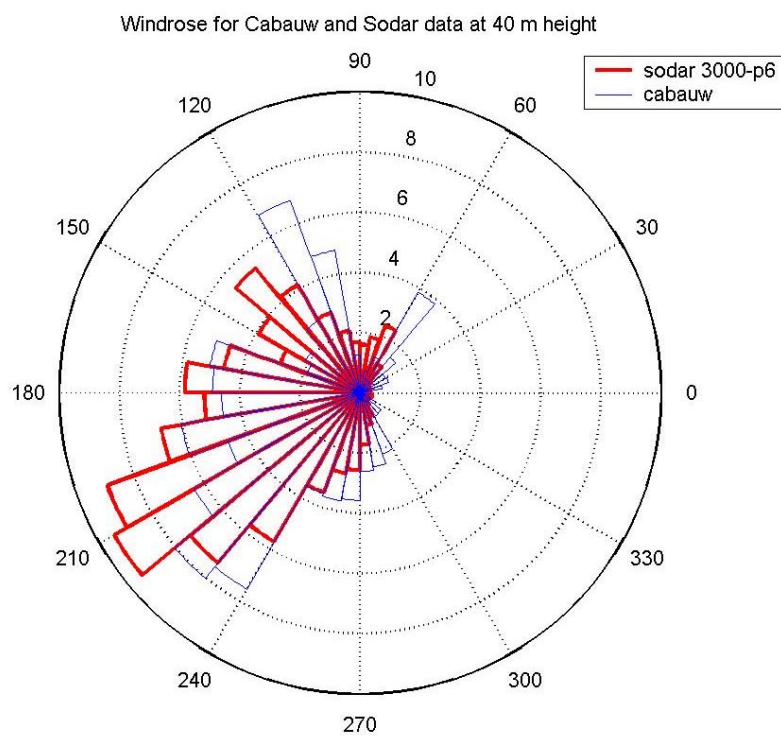


Figure B12. Wind roses for Sodar and Tower wind direction, period 6 at 40 metres height.

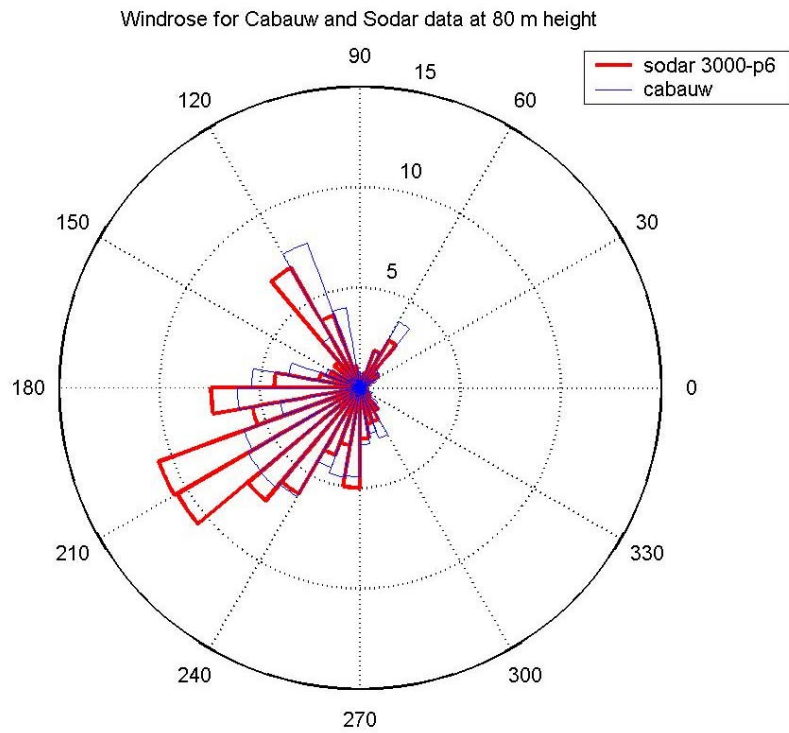


Figure B13. Wind roses for Sodar and Tower wind direction, period 6 at 80 metres height.

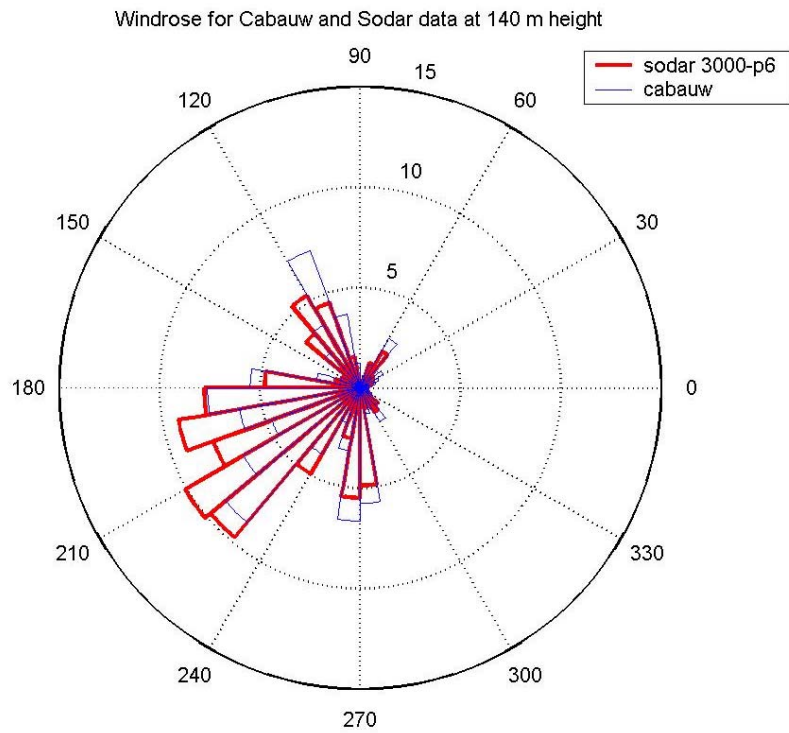


Figure B14. Wind roses for Sodar and Tower wind direction, period 6 at 140 metres height.

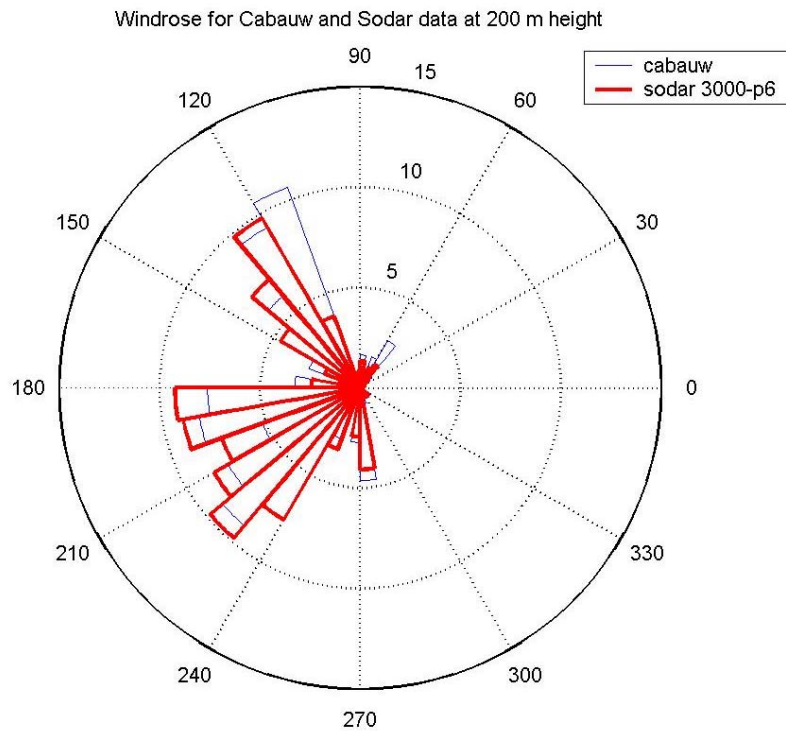


Figure B15. Wind roses for Sodar and Tower wind direction, period 6 at 200 metres height.

B1.6 Tower and SODAR Wind Speed Correlation Graphs

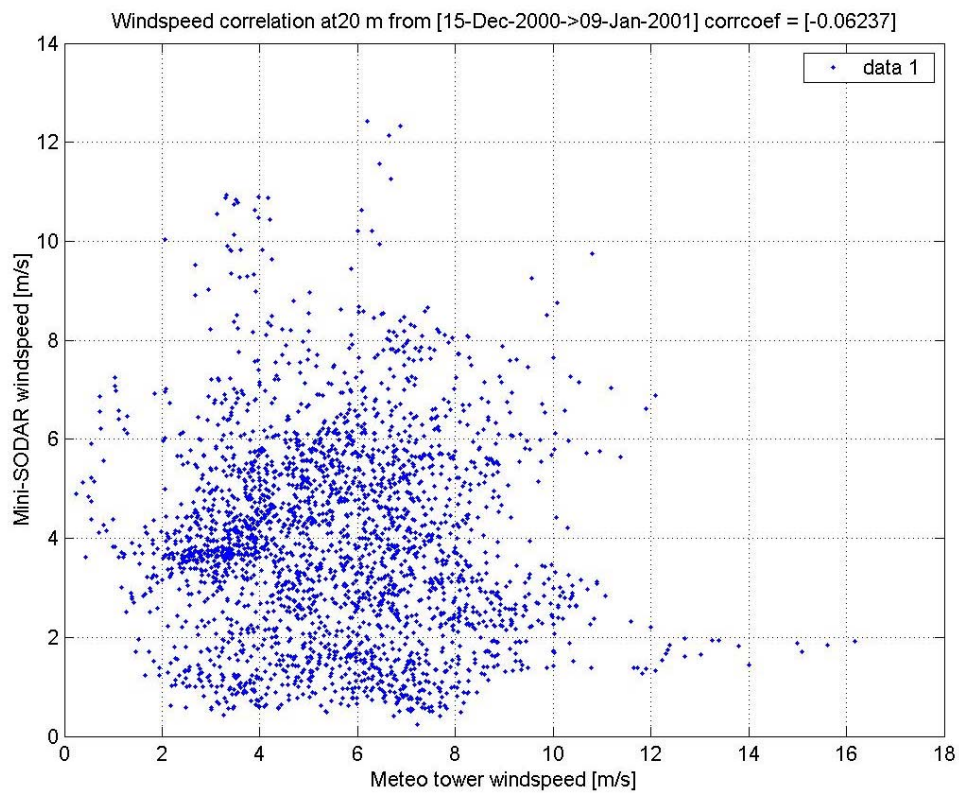


Figure B16. Tower wind speed plotted against Sodar wind speed, period 6 at 20 metres height.

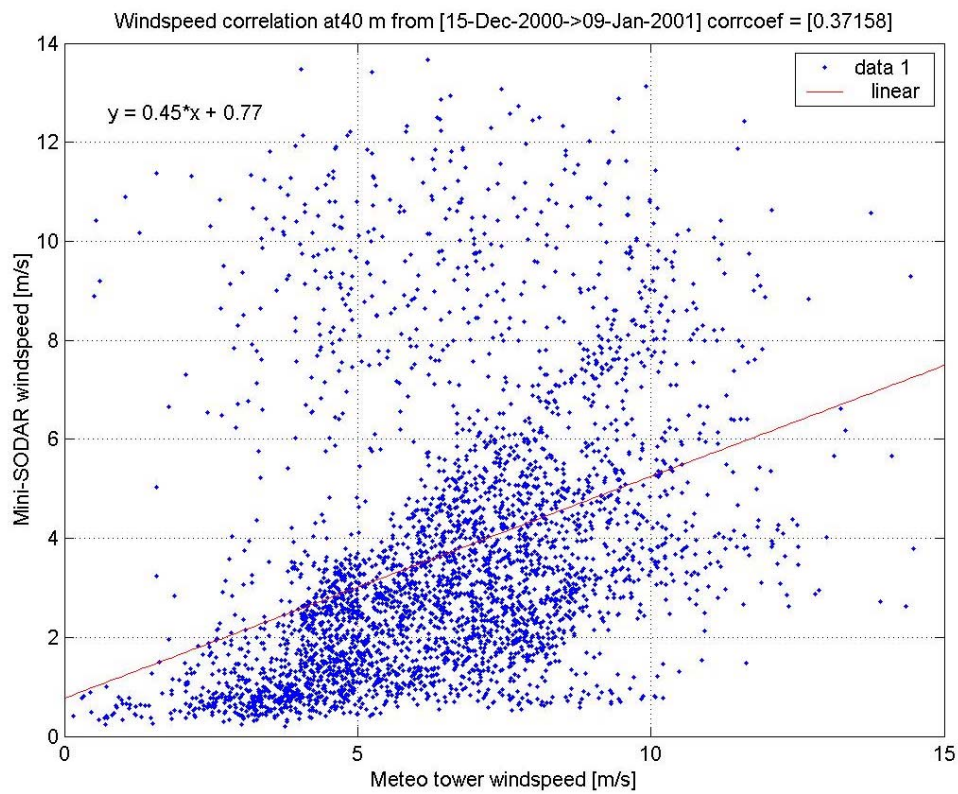


Figure B17. Tower wind speed plotted against Sodar wind speed, period 6 at 40 metres height.

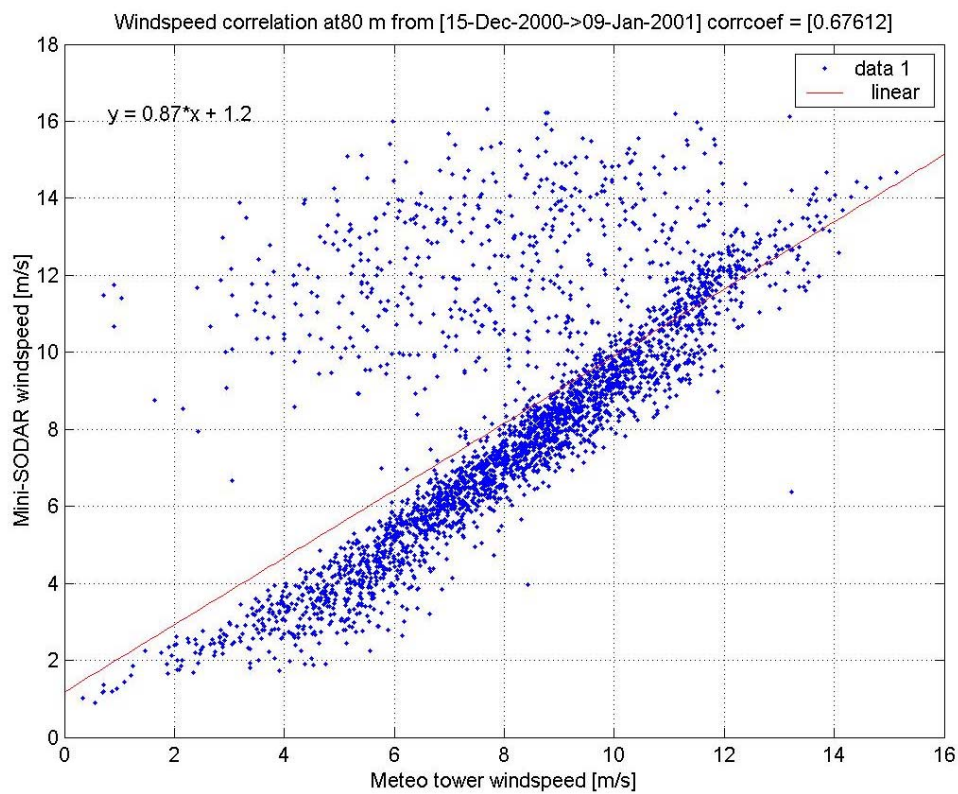


Figure B18. Tower wind speed plotted against Sodar wind speed, period 6 at 80 metres height.

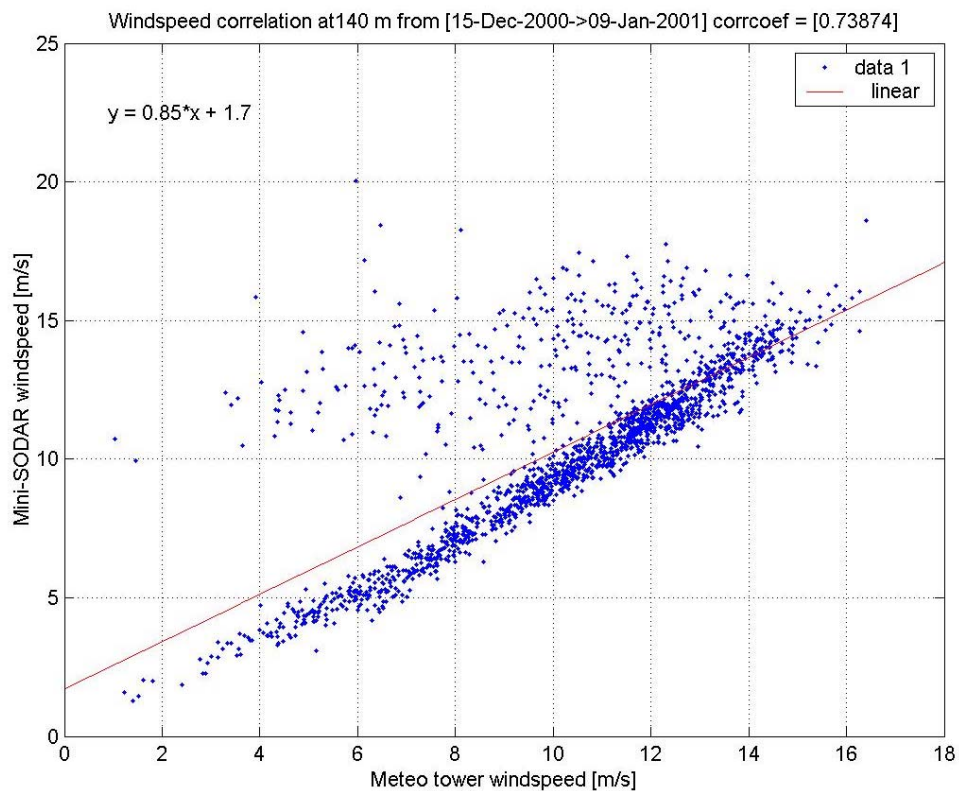


Figure B19. Tower wind speed plotted against Sodar wind speed, period 6 at 140 metres height.

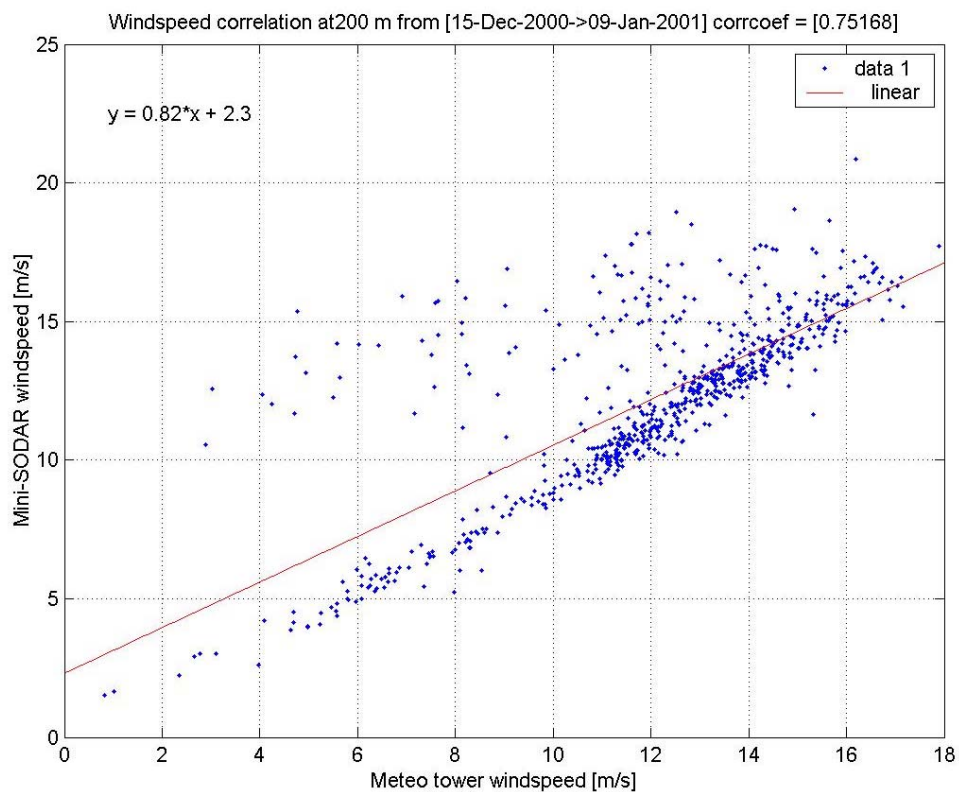


Figure B20. Tower wind speed plotted against Sodar wind speed, period 6 at 200 metres height.

B1.7 SODAR Height Performance

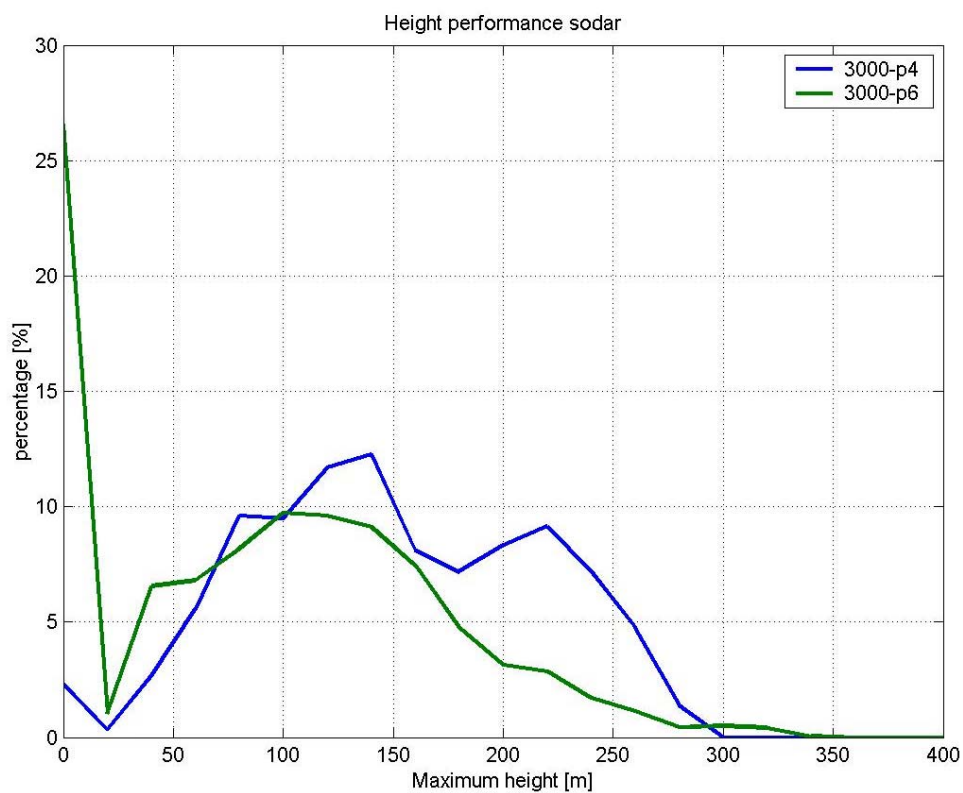


Figure B21. Sodar wind speed, distribution of maximum measured height for periods 4 and 6.

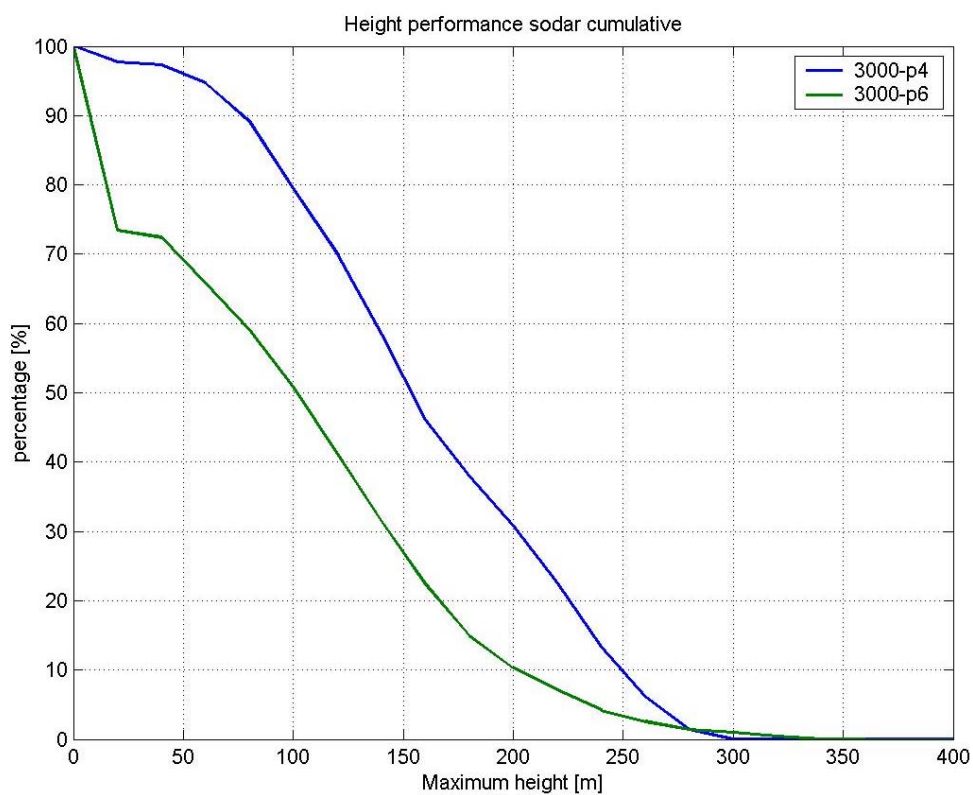


Figure B22. Sodar wind speed, cumulative distribution of maximum measured height for periods 4 and 6.

B1.8 Distribution of Wind Speed Difference between Tower and SODAR Measurements

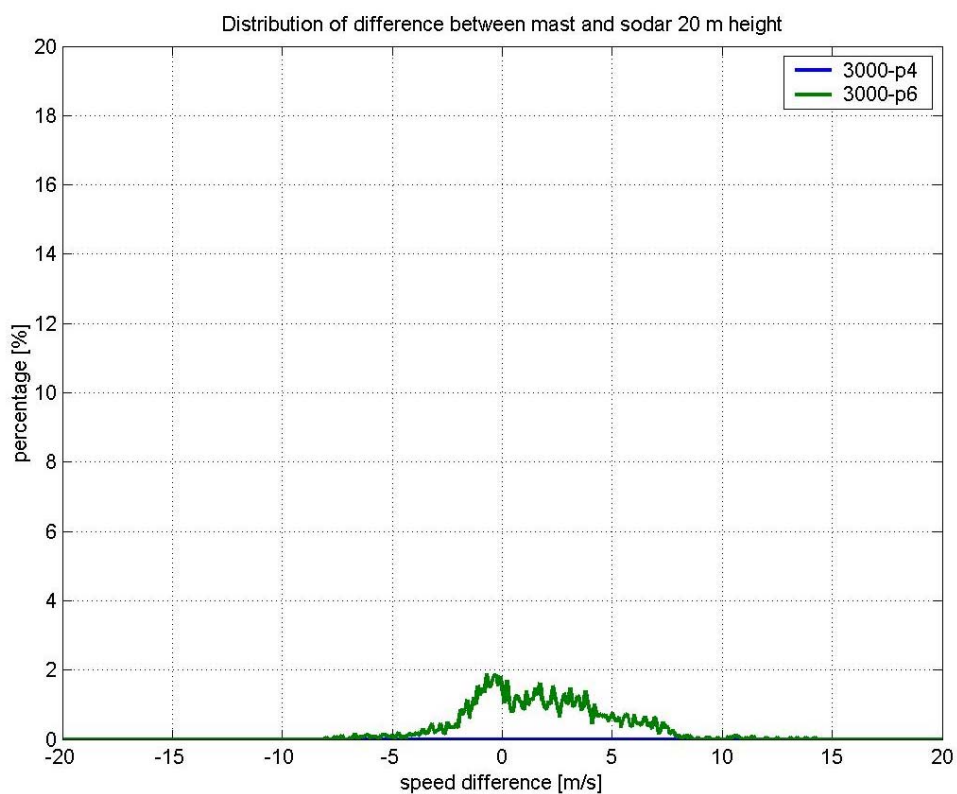


Figure B23. Occurrence distribution of (TWS-SWS), periods 4 and 6 at 20 metres height.

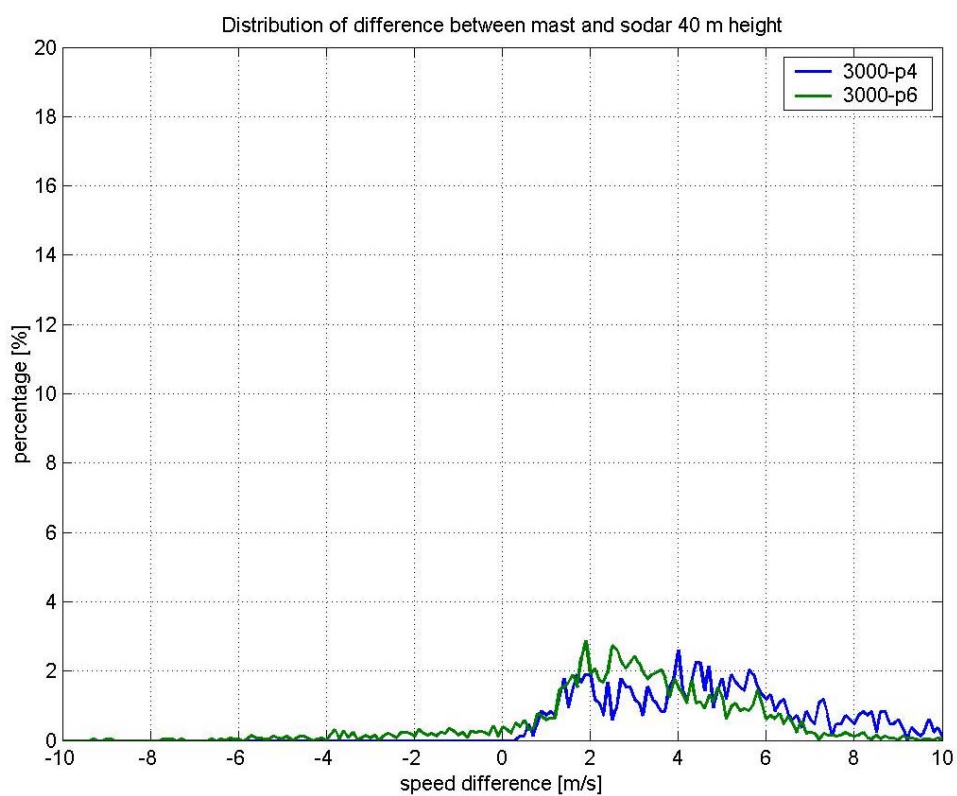


Figure B24. Occurrence distribution of (TWS-SWS), periods 4 and 6 at 40 metres height.

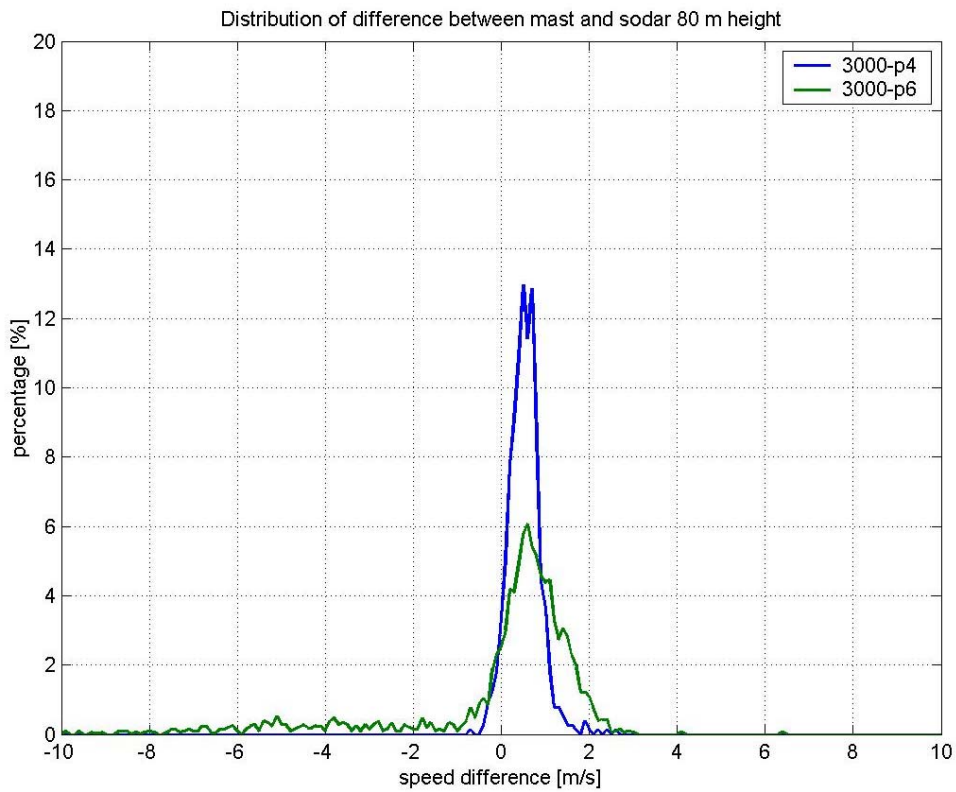


Figure B25. Occurrence distribution of (TWS-SWS), periods 4 and 6 at 80 metres height.

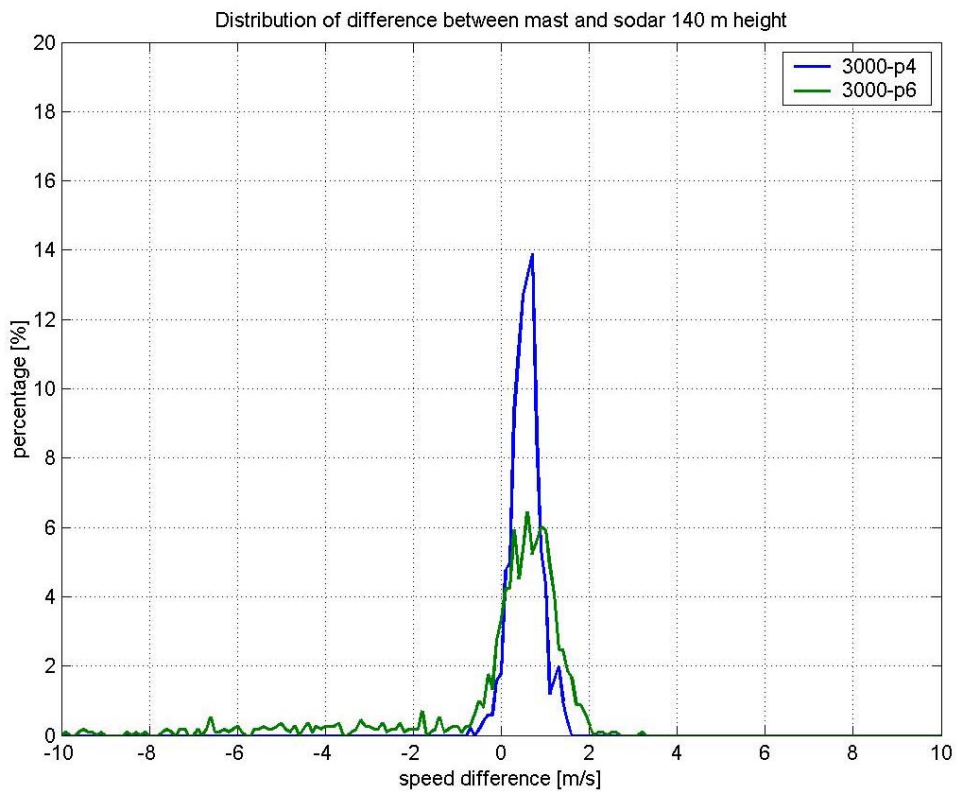


Figure B26. Occurrence distribution of (TWS-SWS), periods 4 and 6 at 140 metres height.

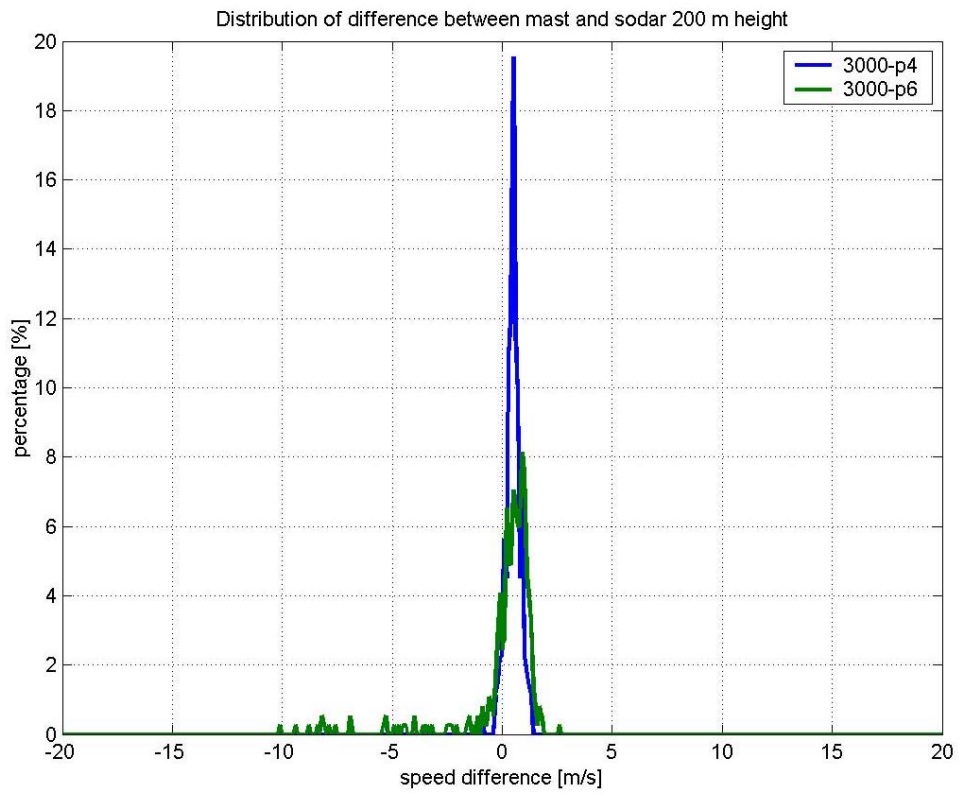


Figure B27. Occurrence distribution of (TWS-SWS), periods 4 and 6 at 200 metres height.

B2. PERIOD 8

B2.1 Tower Wind Speed and Direction (Cabauw Mast's Measurements)

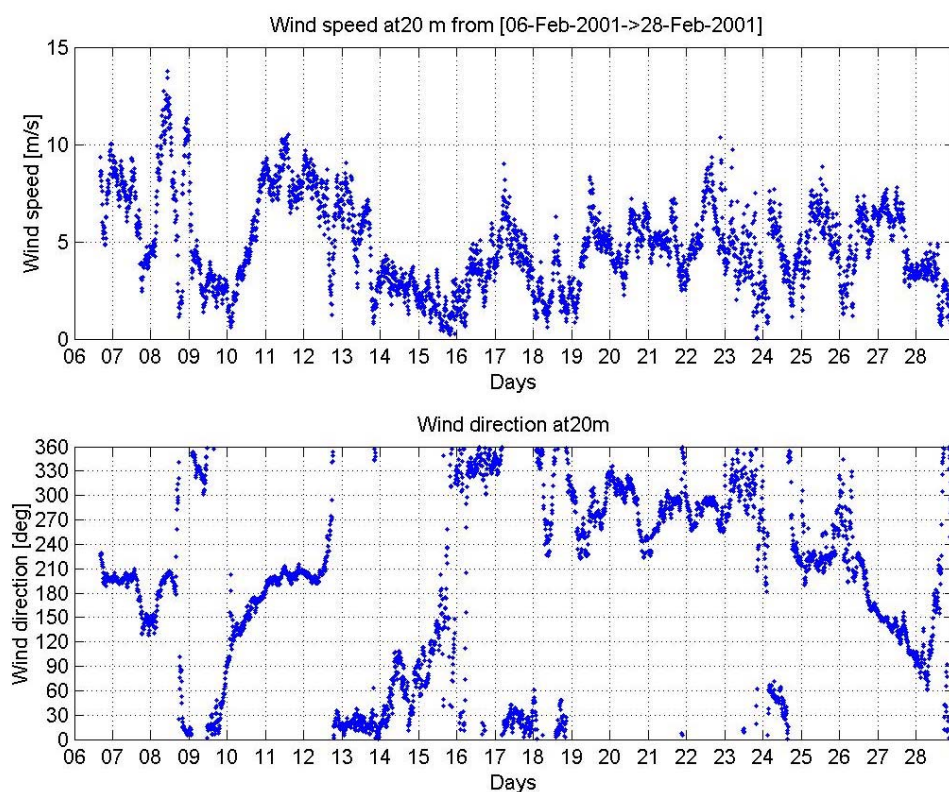


Figure B11. Tower wind speed and wind direction, period 8 at 20 metres height

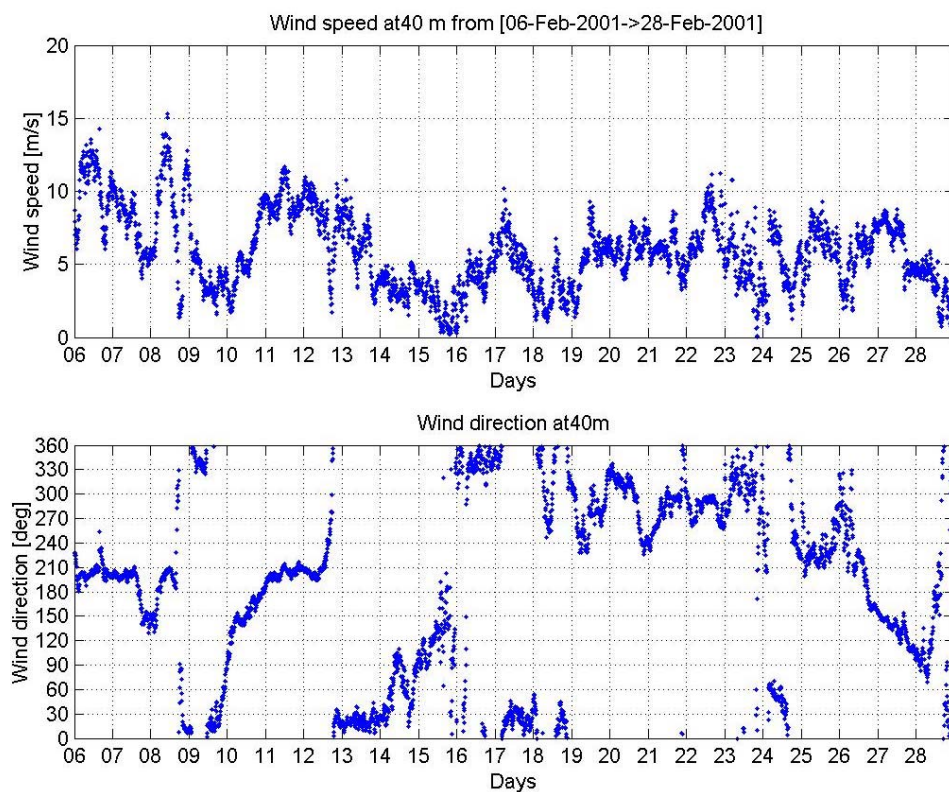


Figure B12. Tower wind speed and wind direction, period 8 at 40 metres height

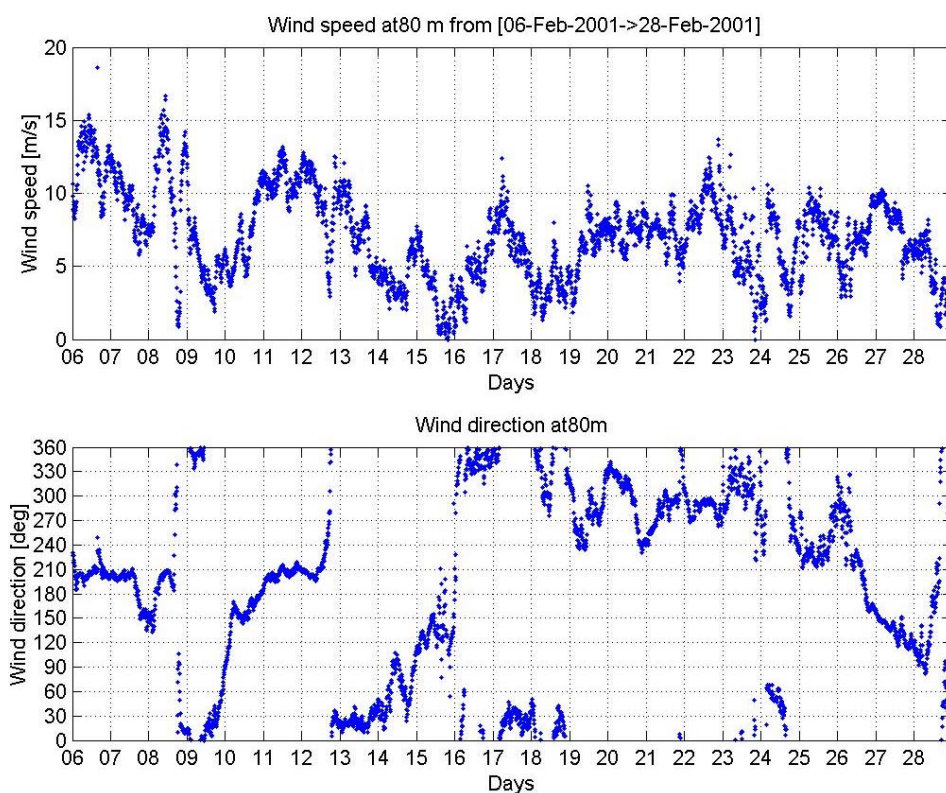


Figure B13. Tower wind speed and wind direction, period 8 at 80 metres height

B2.2 SODAR Wind Speed and Direction

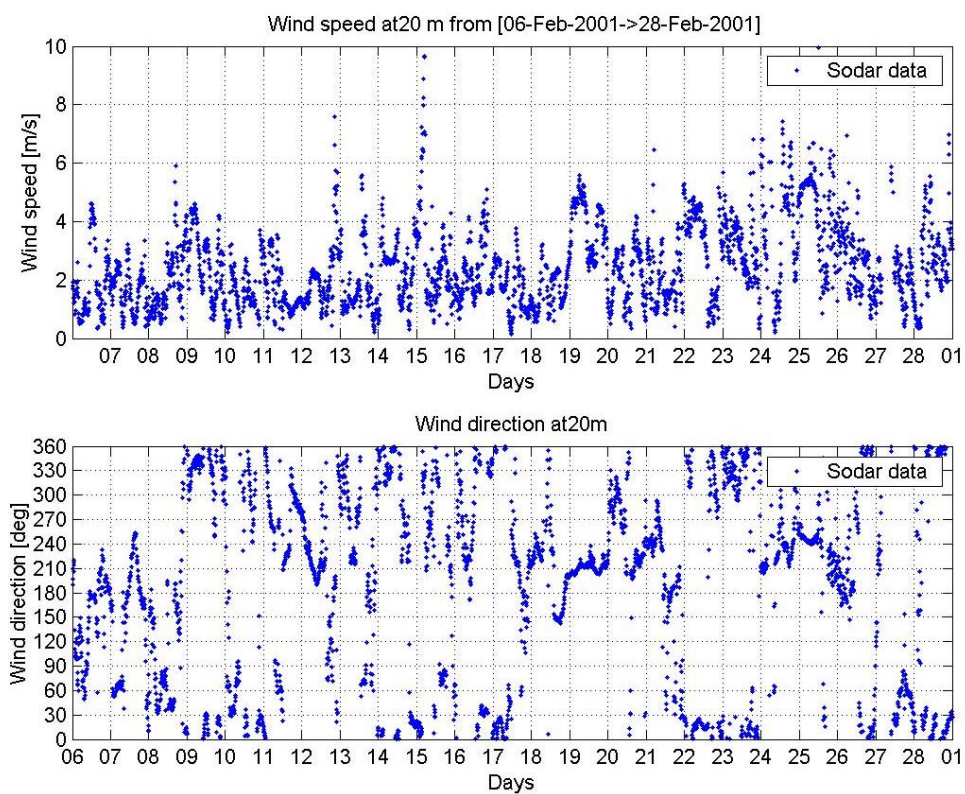


Figure B14. Sodar wind speed and wind direction, period 8 at 20 metres height

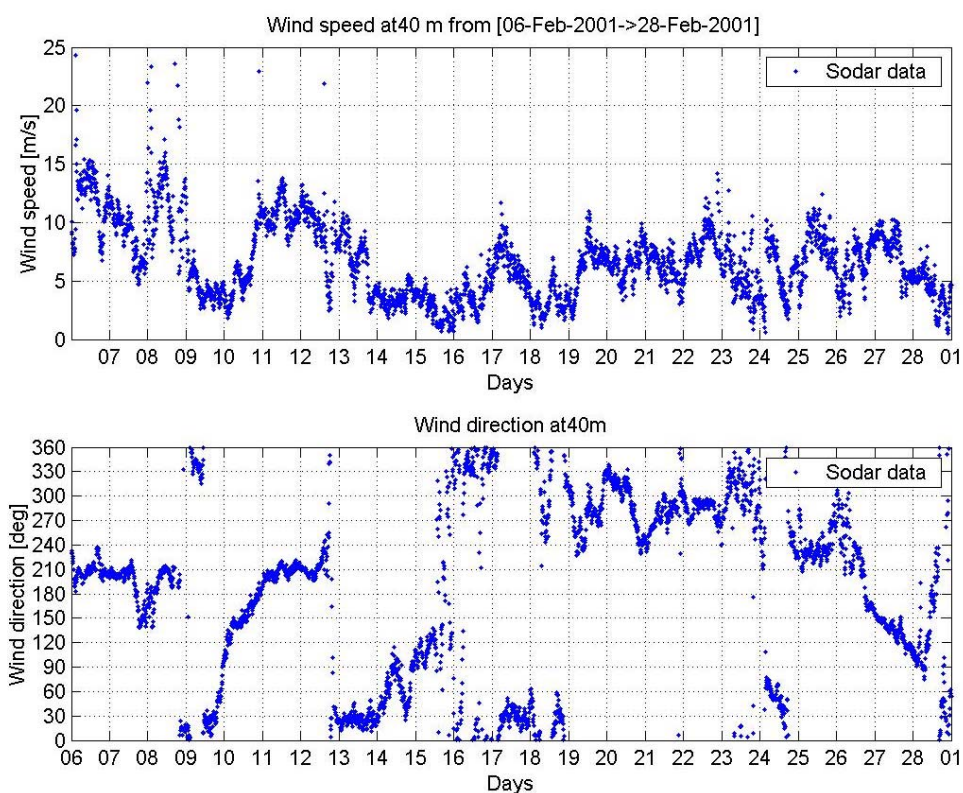


Figure B15. Sodar wind speed and wind direction, period 8 at 40 metres height

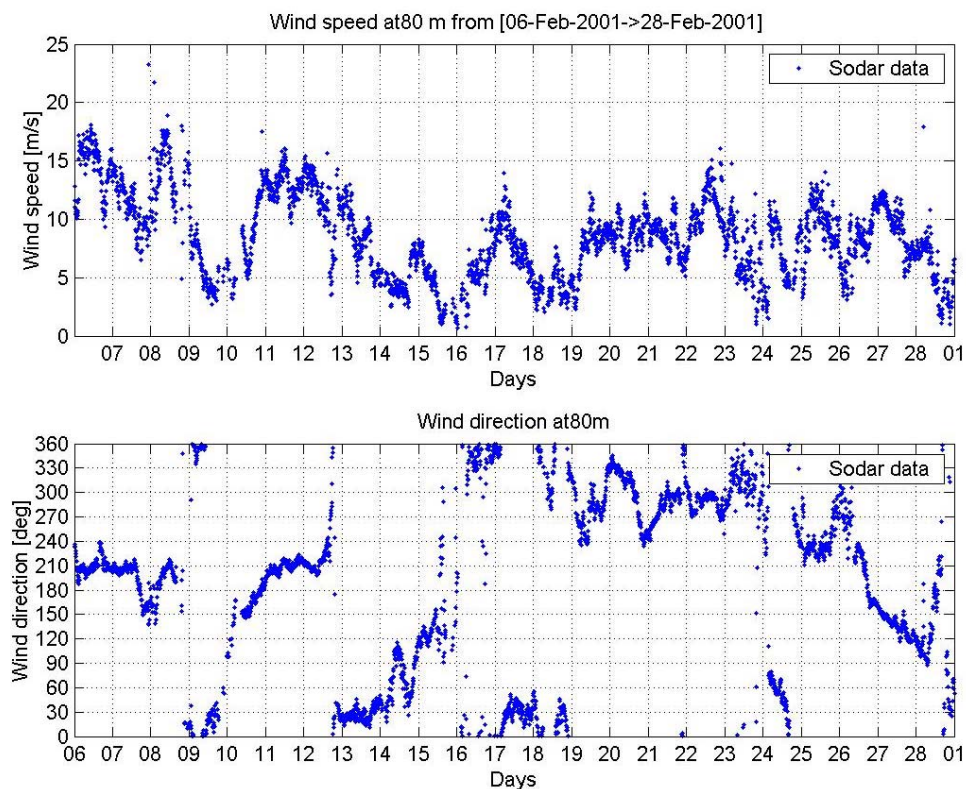


Figure B16. Sodar wind speed and wind direction, period 8 at 80 metres height

B2.3 Comparison of SODAR Wind Speed and Tower Wind Speed

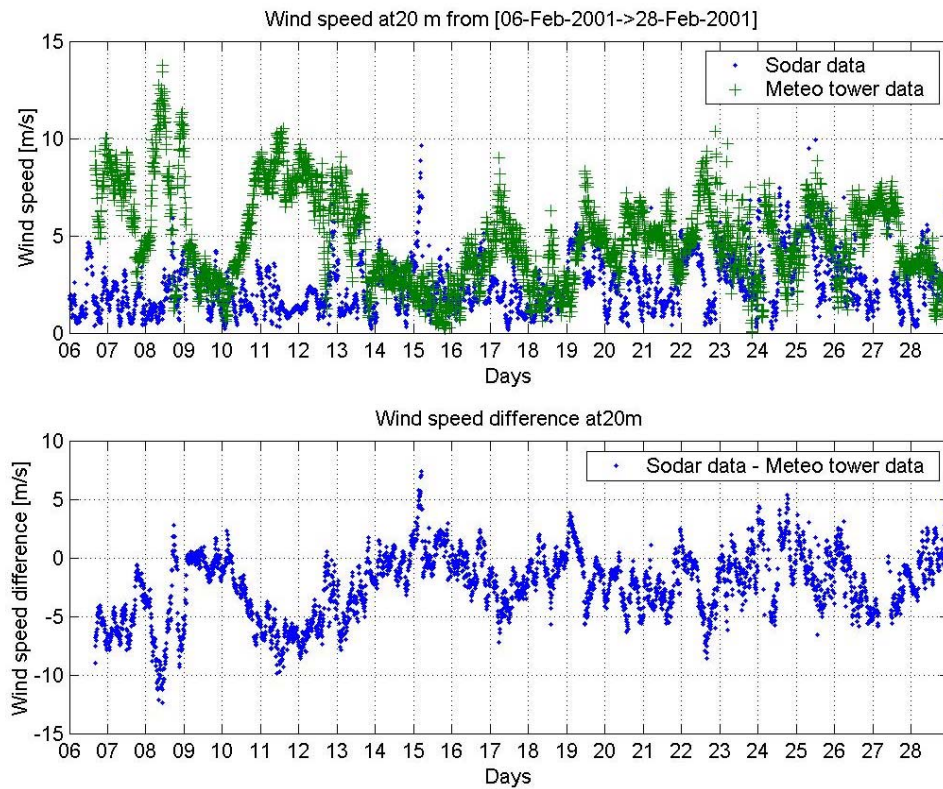


Figure B28. Comparison of Sodar and Tower wind speed for period 8 at 20 metres height.

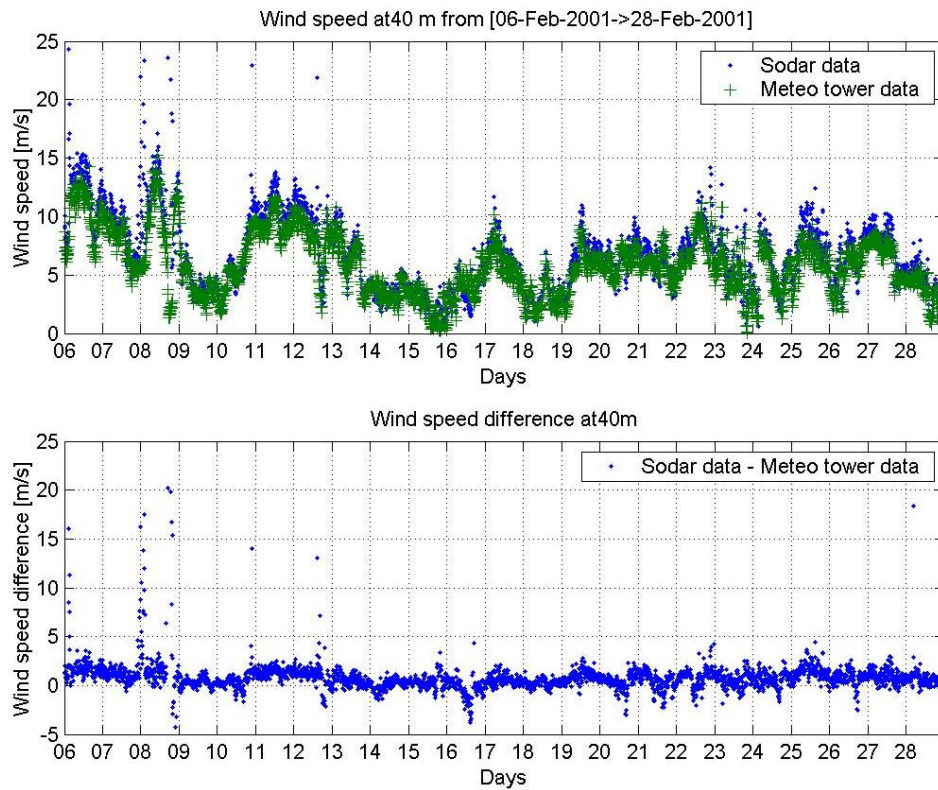


Figure B29. Comparison of Sodar and Tower wind speed for period 8 at 40 metres height.

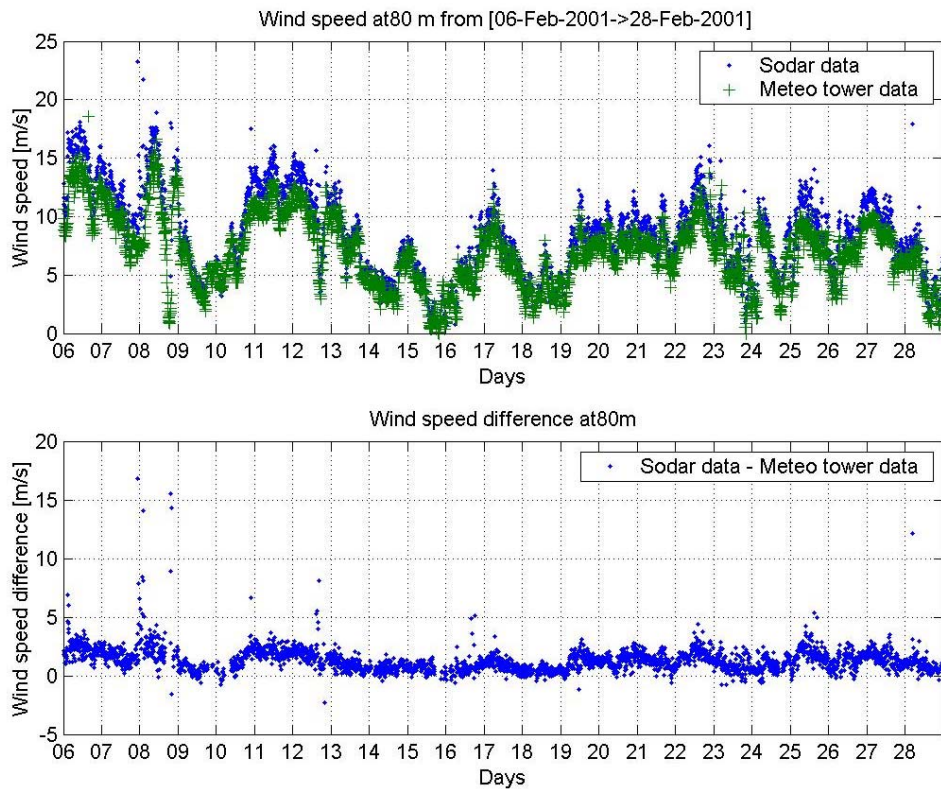


Figure B30. Comparison of Sodar and Tower wind speed for period 8 at 80 metres height.

B2.4 Comparison of SODAR Wind Direction and Tower Wind Direction

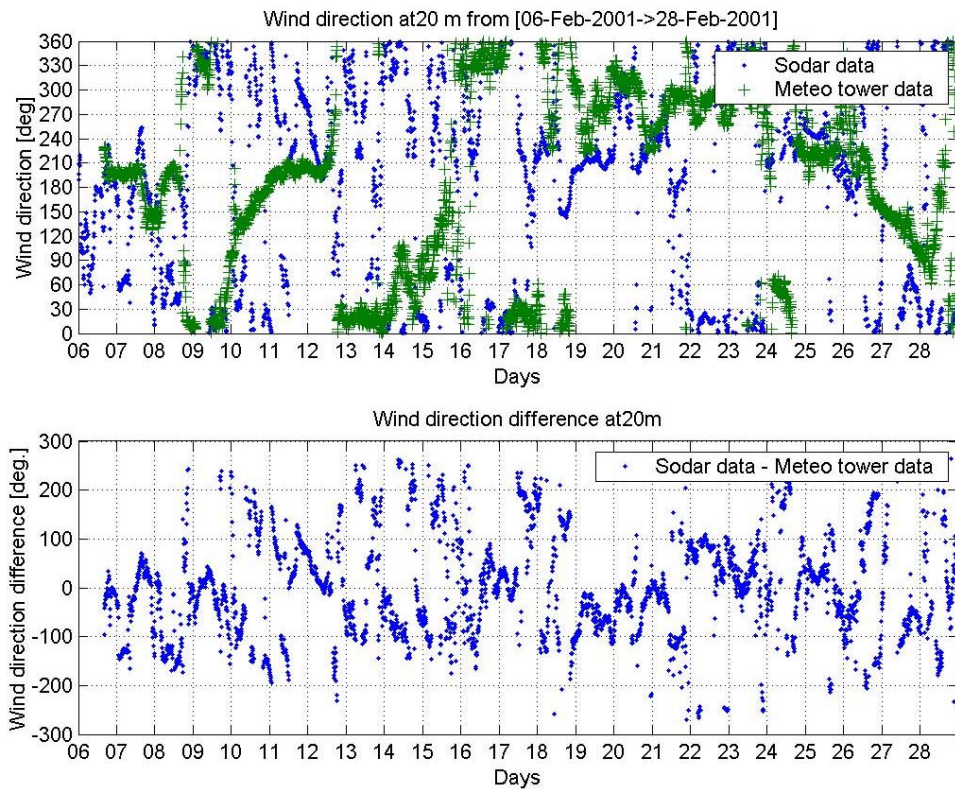


Figure B31. Comparison of Sodar and Tower wind speed for period 8 at 20 metres height.

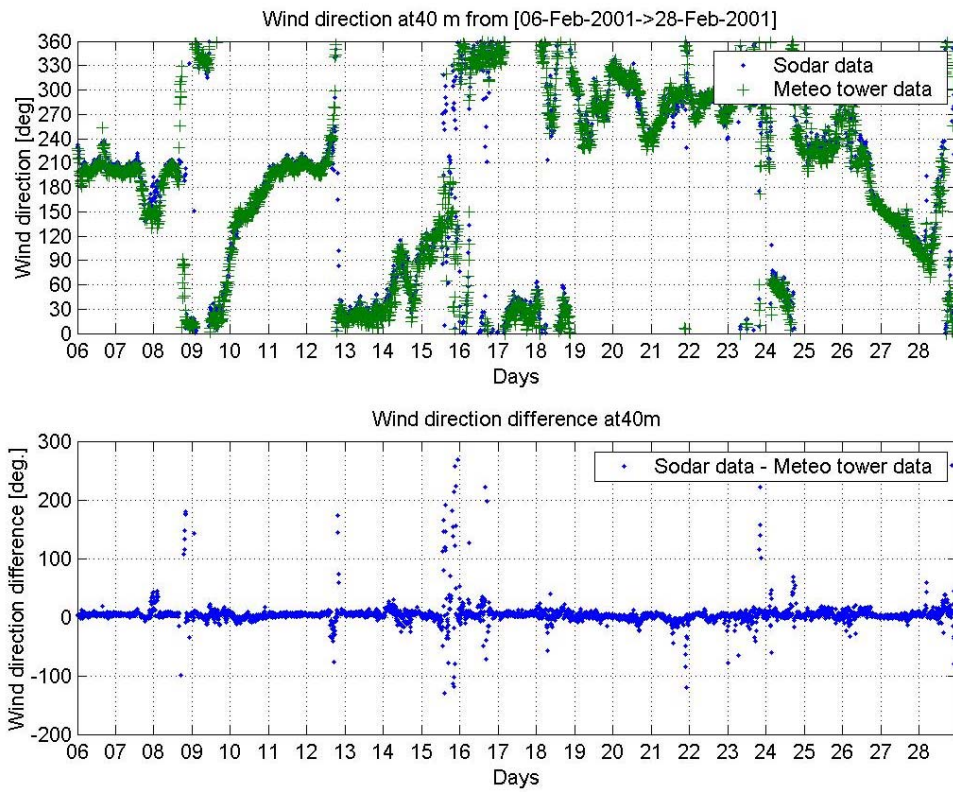


Figure B32. Comparison of Sodar and Tower wind speed for period 8 at 40 metres height.

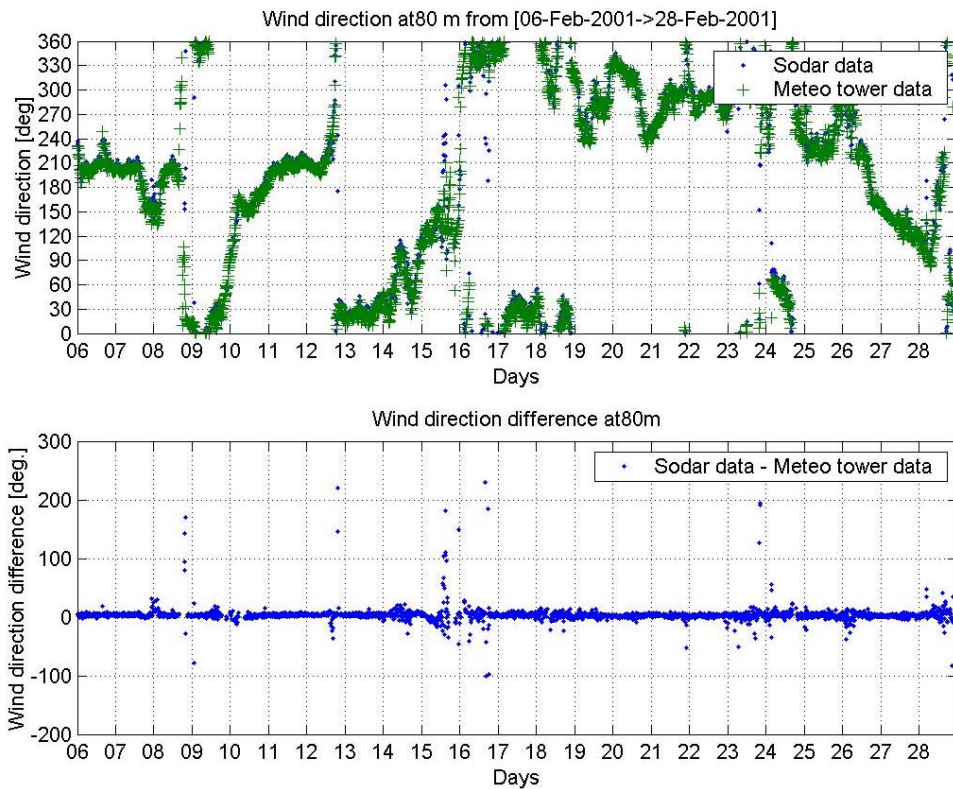


Figure B33. Comparison of Sodar and Tower wind speed for period 8 at 80 metres height.

B2.5 Wind Roses for SODAR and Tower Wind Directions

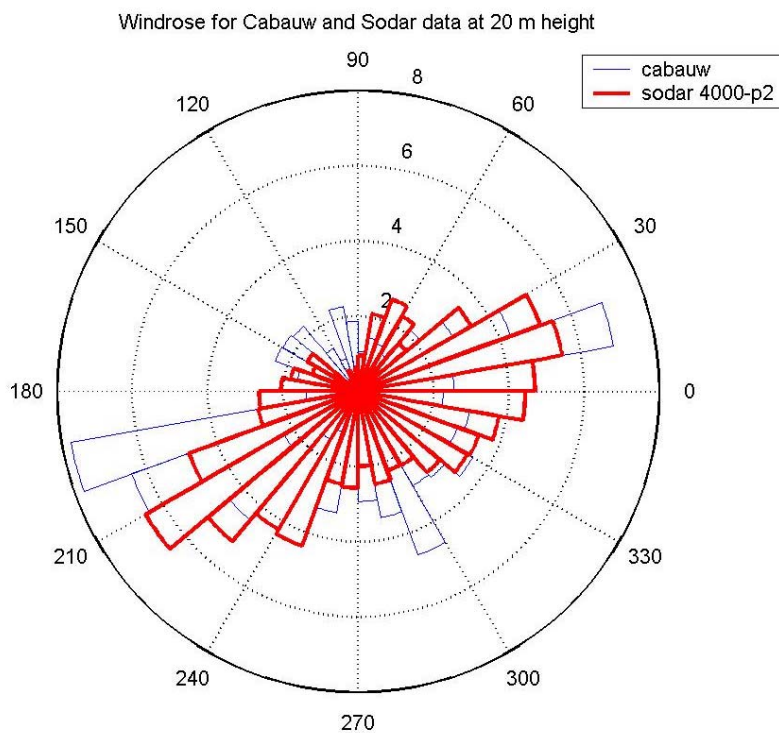


Figure B34. Wind Roses for Sodar and Tower wind direction, period 8 at 20 metres height.

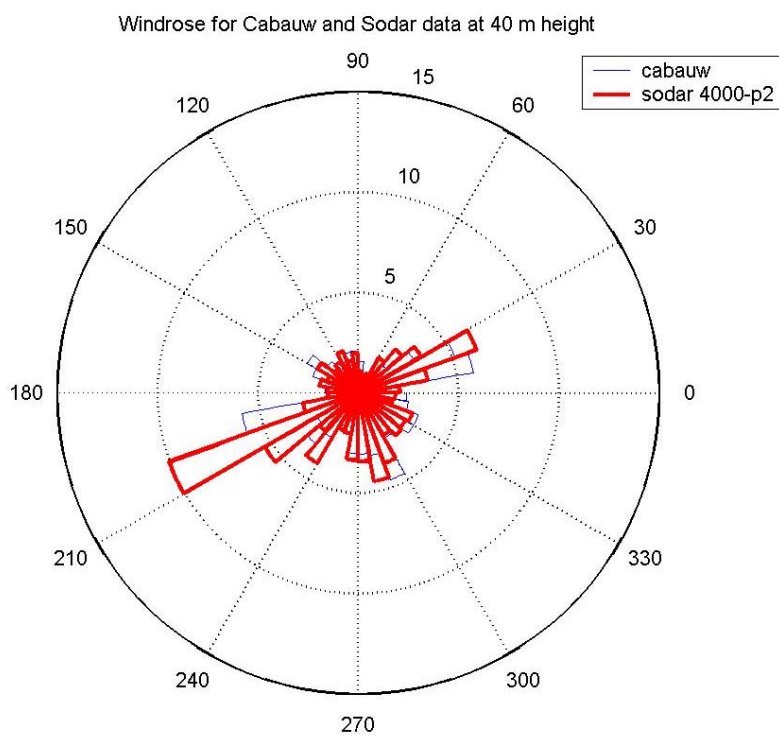


Figure B35. Wind Roses for Sodar and Tower wind direction, period 8 at 40 metres height.

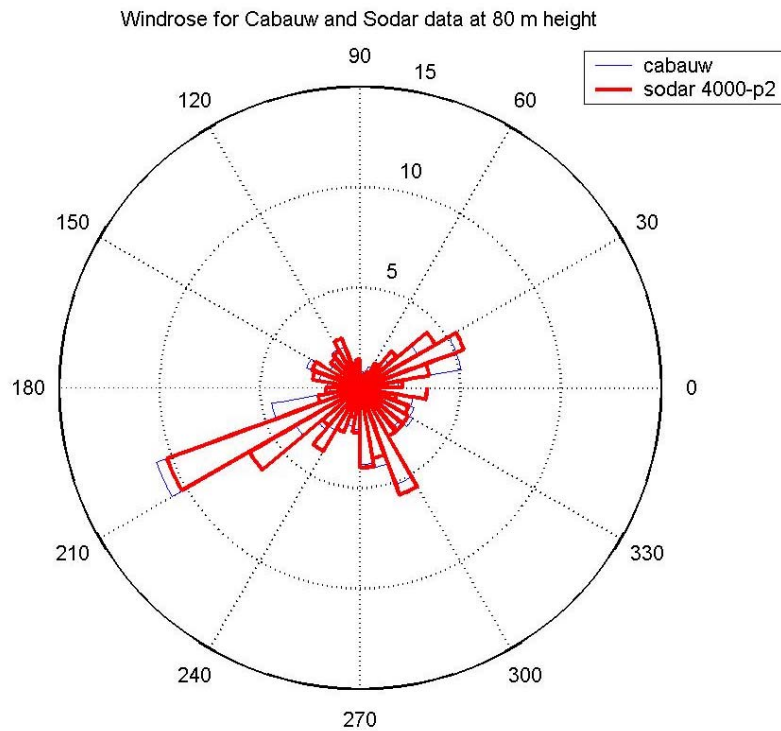


Figure B36. Wind Roses for Sodar and Tower wind direction, period 8 at 80 metres height.

B2.6 Tower and SODAR Wind Speed Correlation Graphs

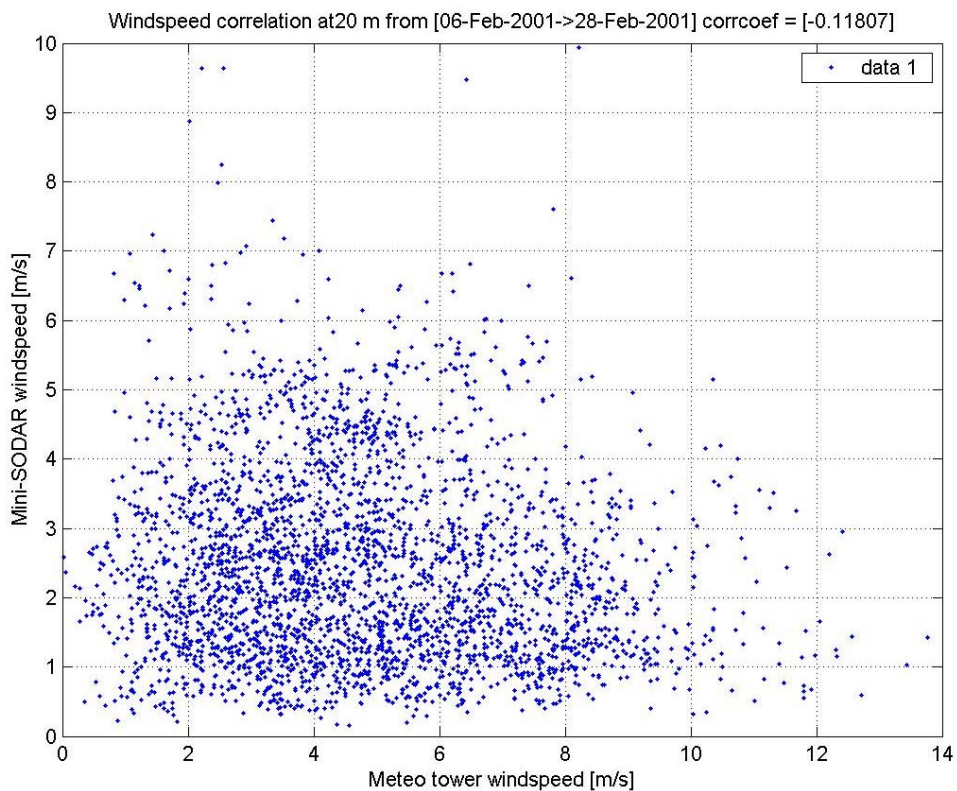


Figure B37. Tower wind speed plotted against Sodar wind speed, period 8 at 20 metres height.

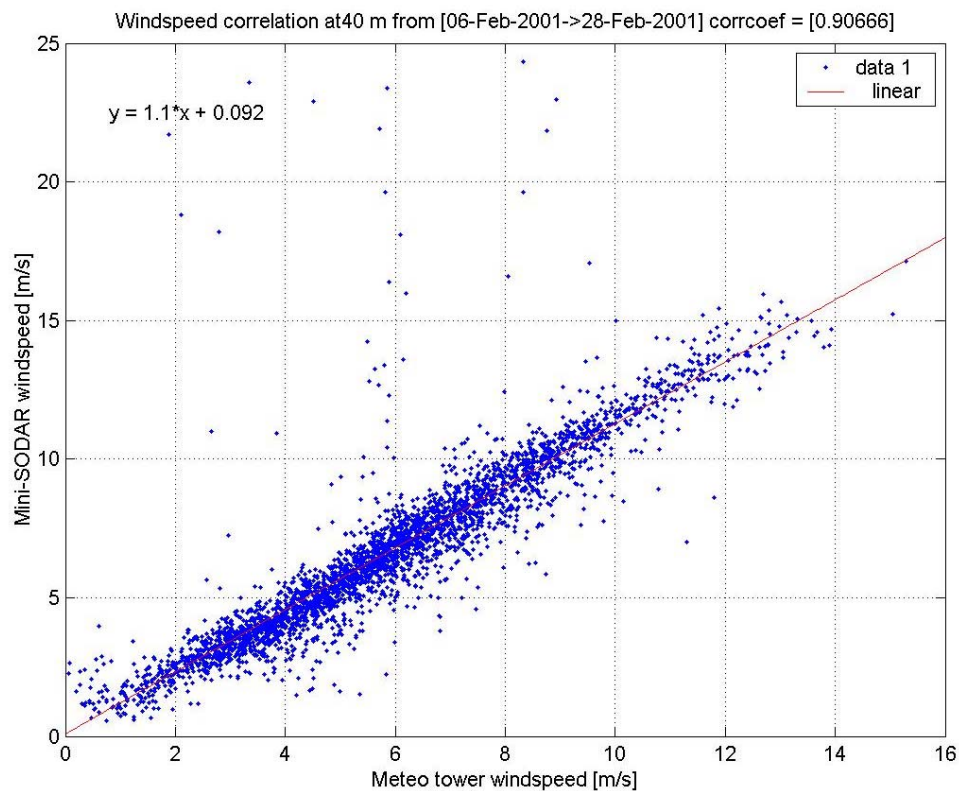


Figure B38. Tower wind speed plotted against Sodar wind speed, period 8 at 40 metres height.

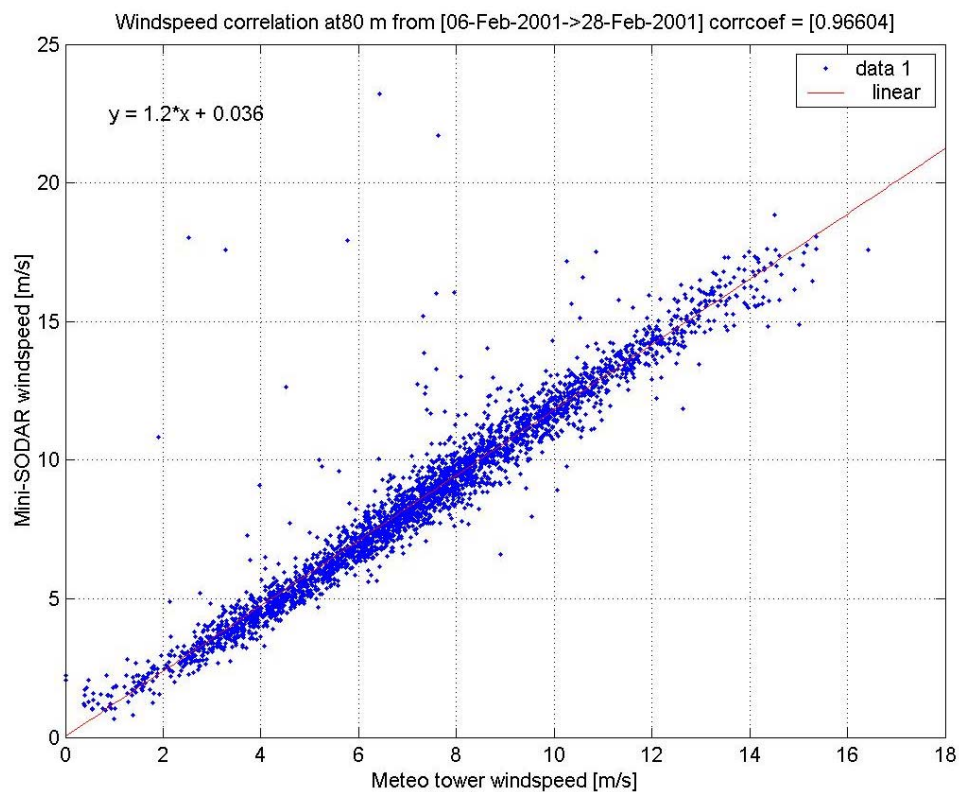


Figure B39. Tower wind speed plotted against Sodar wind speed, period 8 at 80 metres height.

B2.7 SODAR Height Performance

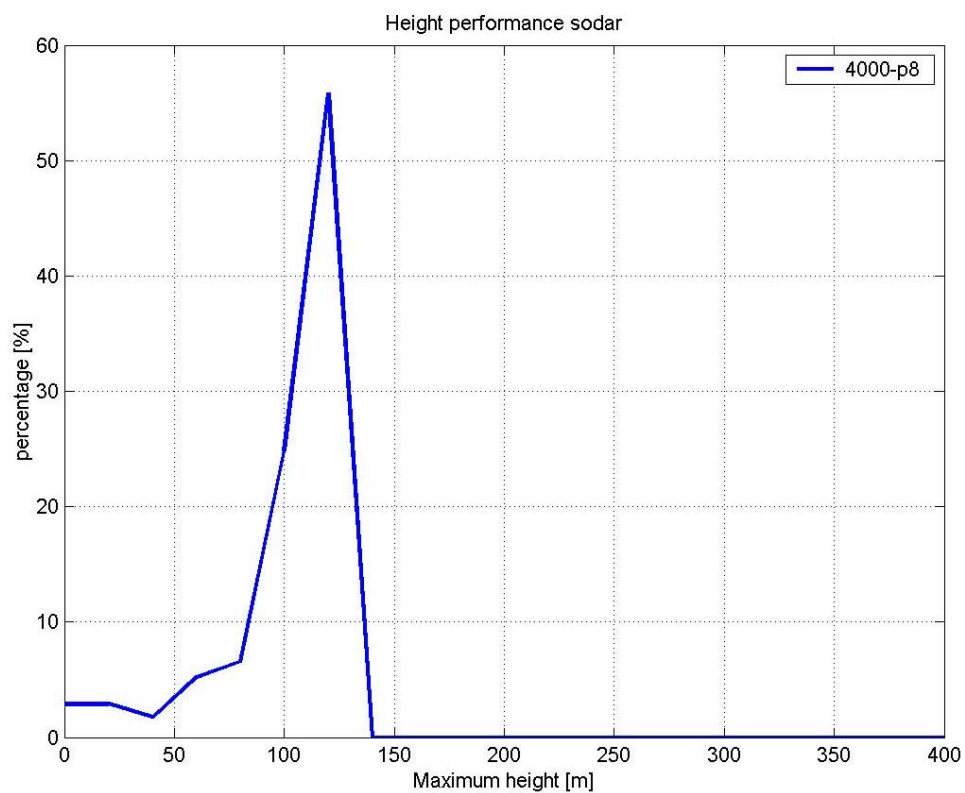


Figure B40. Sodar wind speed, distribution of maximum measured height for period 8.

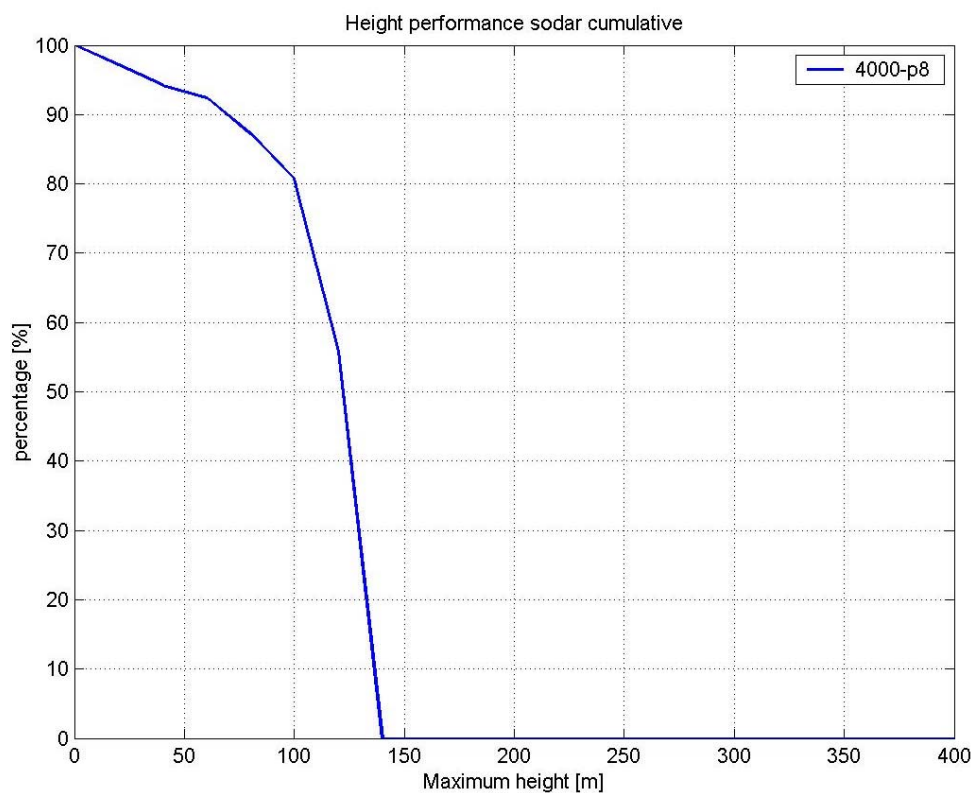


Figure B41. Sodar wind speed, cumulative distribution of maximum measured height for period 8.

B2.8 Distribution of Wind Speed Difference between Tower and SODAR Measurements

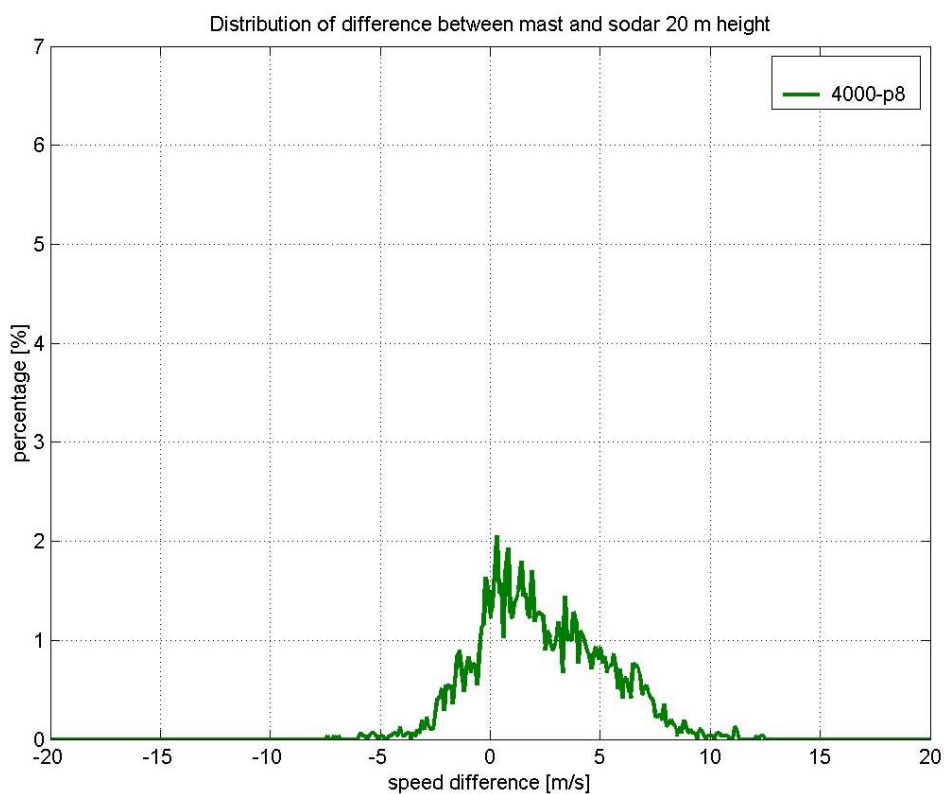


Figure B42. Occurrence distribution of (TWS-SWS), period 8 at 20 metres height.

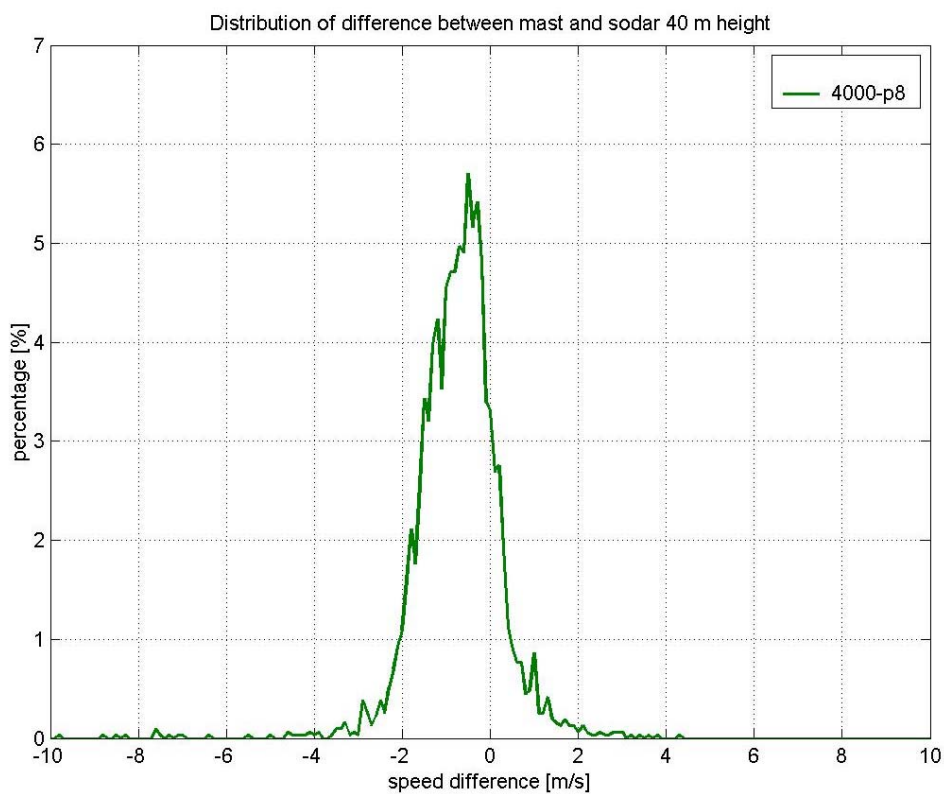


Figure B43. Occurrence distribution of (TWS-SWS), period 8 at 40 metres height.

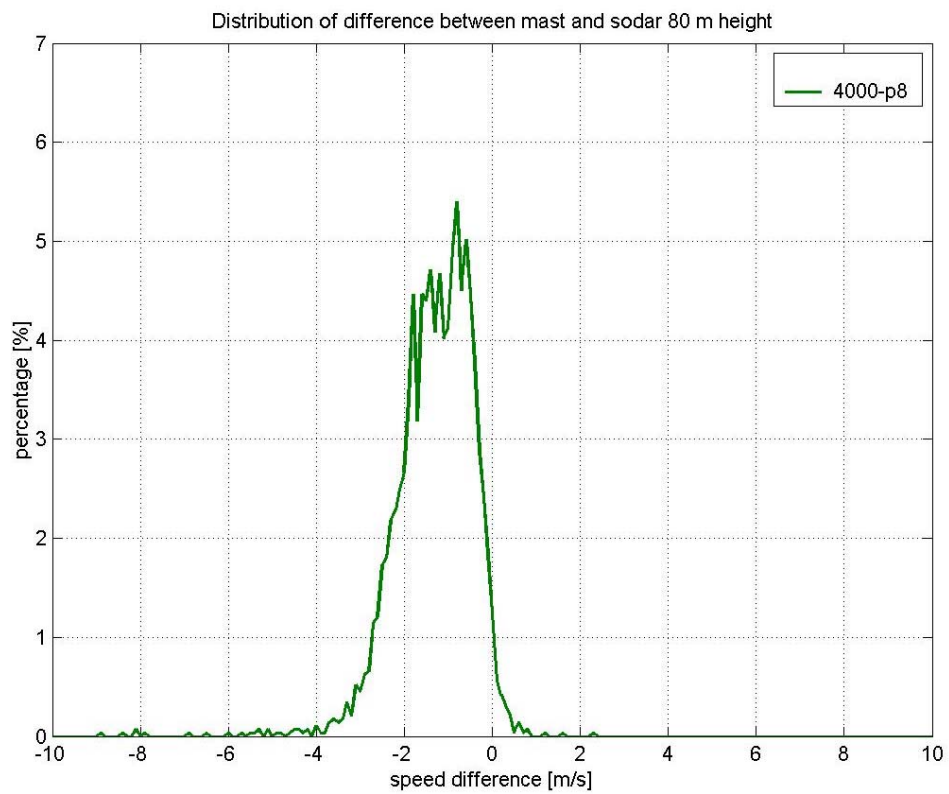


Figure B44. Occurrence distribution of (TWS-SWS), period 8 at 80 metres height.

ANNEX C – COMPARISON BETWEEN WIND SPEED AND WIND DIRECTION DIFFERENCES AND REAL VALUES

In this annex, eight graphs showing a comparison between wind speeds and wind direction are presented. The first four graphs show the difference between the measured wind speeds of the meteorological tower and the SODAR equipment plotted against the wind speed as measured by the meteo tower. The latter is considered as the reference (or real value). The comparison plots are given for periods 4 and 6 at 80 and 140 metres height respectively.

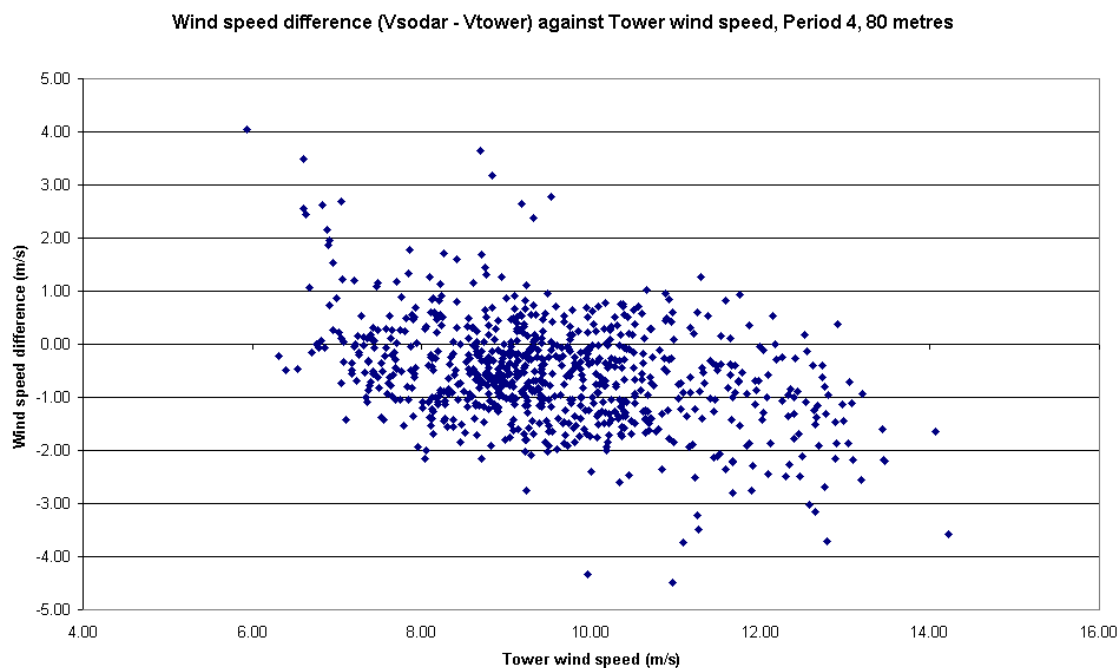


Figure C1. Wind speed difference against real wind speed, period 4 at 80 m height.

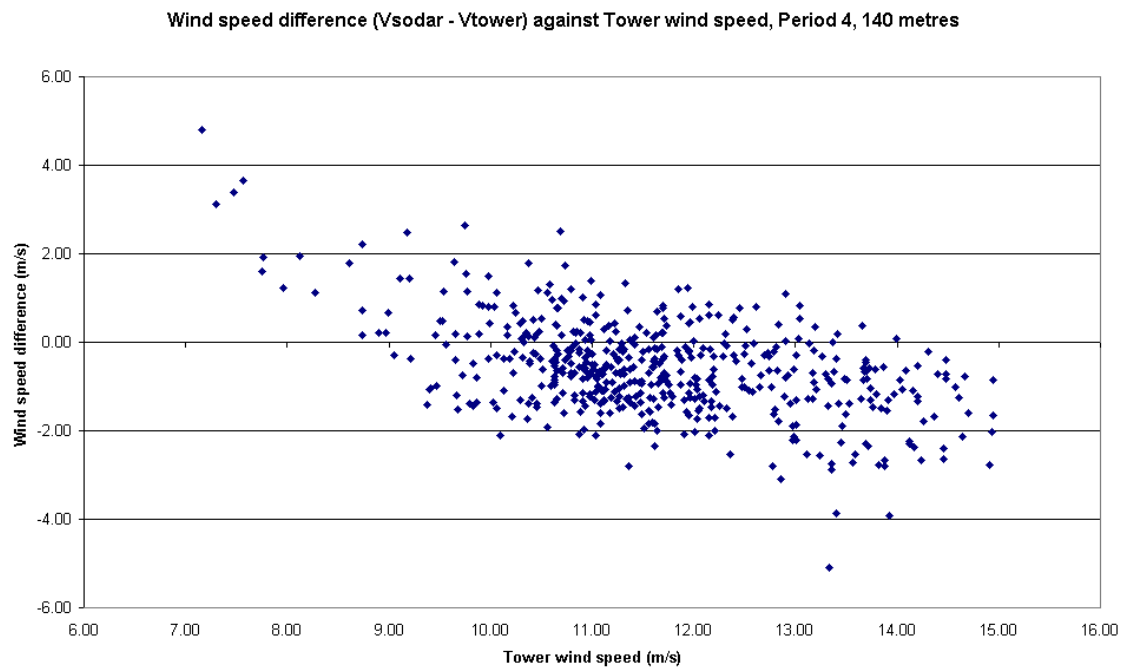


Figure C2. Wind speed difference against real wind speed, period 4 at 140 m height.

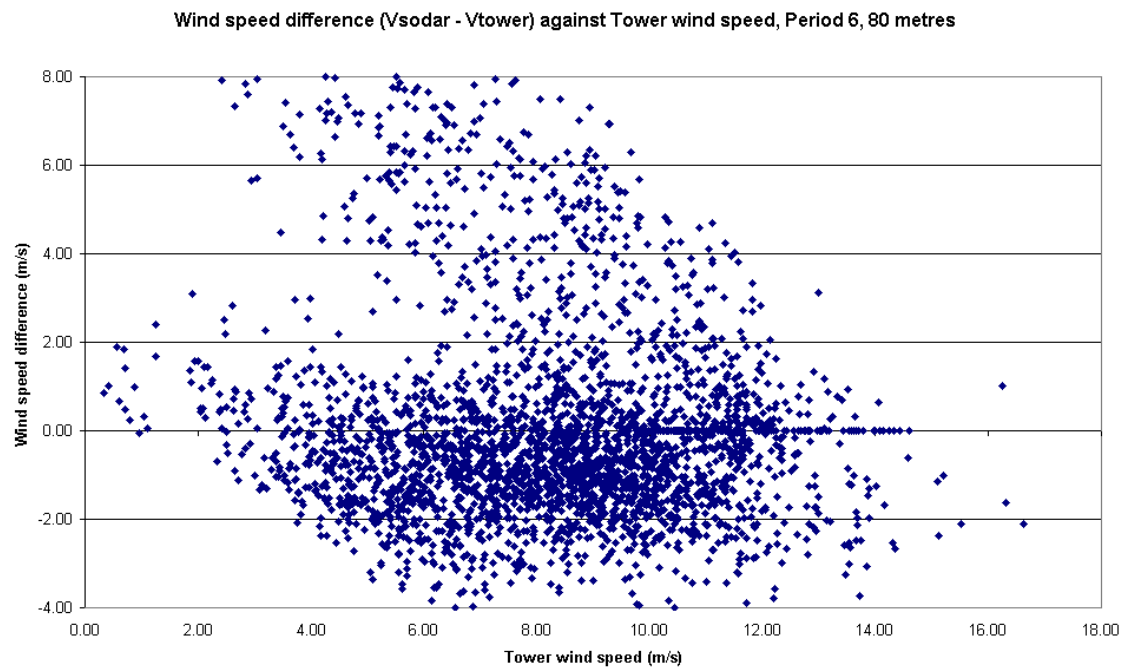


Figure C3. Wind speed difference against real wind speed, period 6 at 80 m heighth.

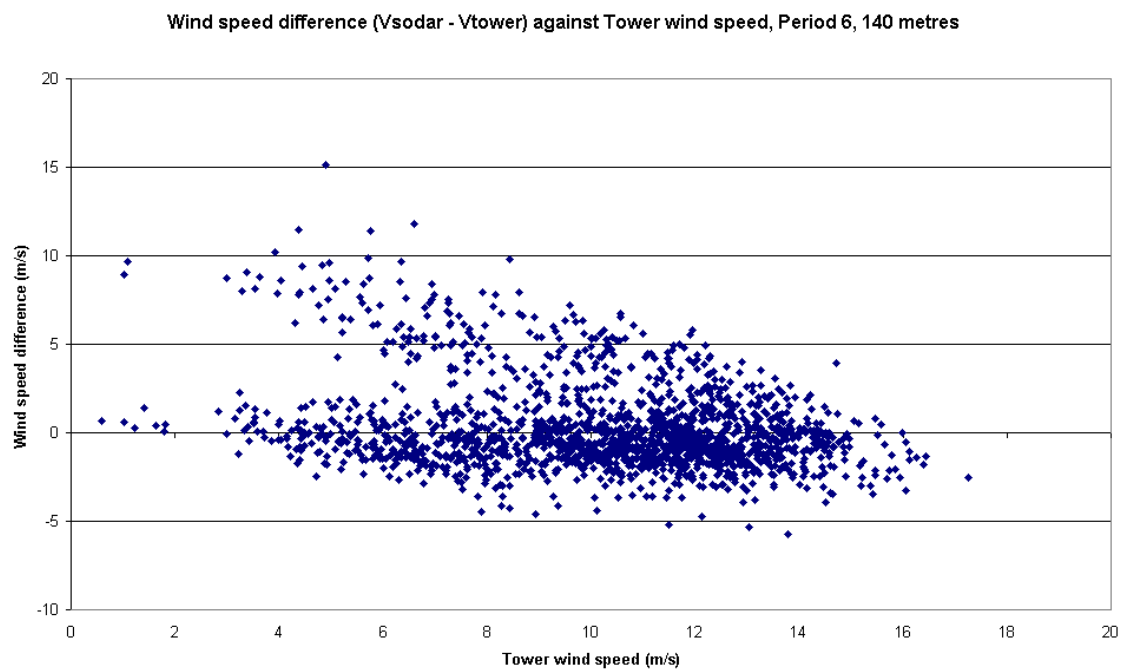


Figure C4. Wind speed difference against real wind speed, period 6 at 140 m height.

The following four graphs show the difference between the measured wind directions of the meteorological tower and the SODAR equipment plotted against the wind direction as given by the meteo tower. The latter is considered as the reference (or real value). The comparison plots are given for periods 4 and 6 at 80 and 140 metres height respectively.

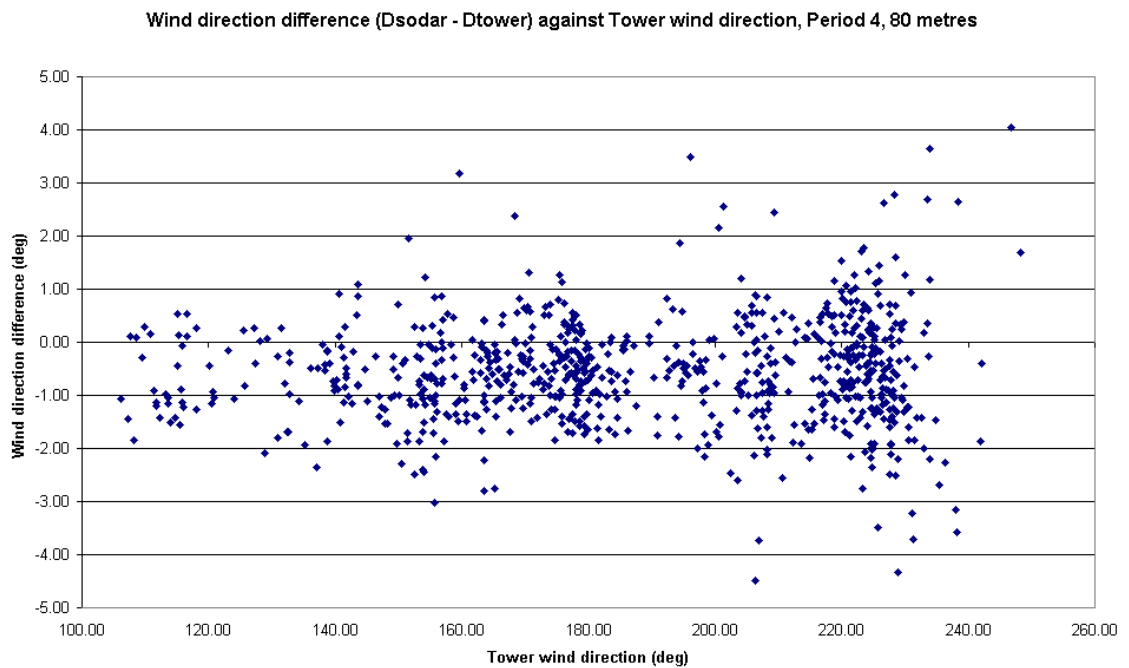


Figure C5. Wind direction difference against real wind direction, period 4 at 80 m heighth.

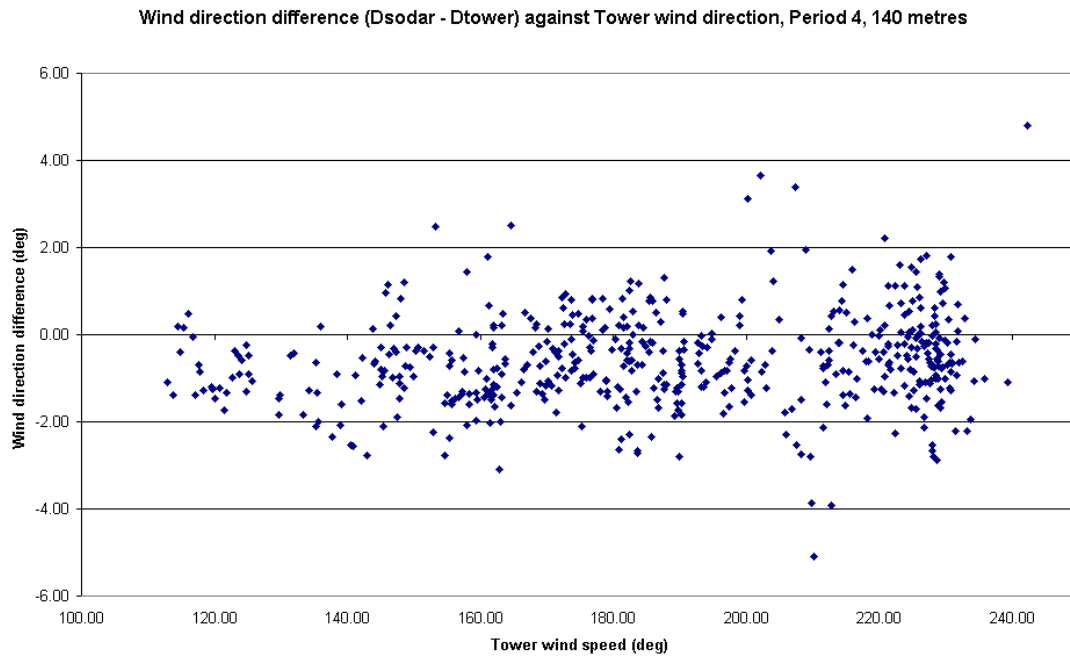


Figure C6. Wind direction difference against real wind direction, period 4 at 140 m heighth.

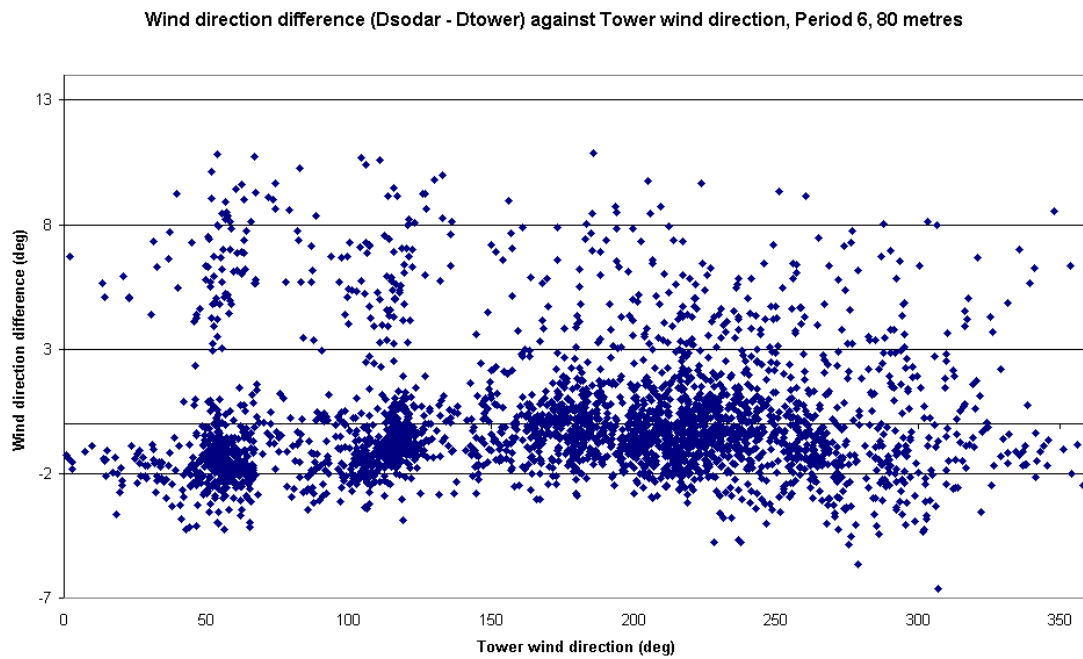


Figure C7. Wind direction difference against real wind direction, period 6 at 80 m heighth.

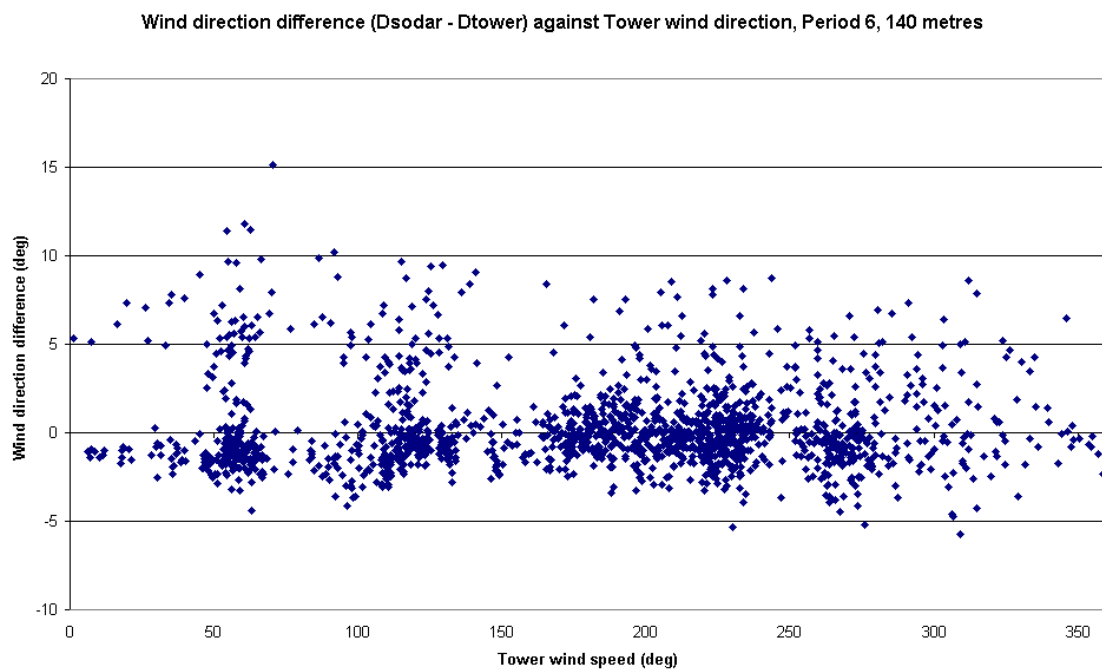


Figure C8. Wind direction difference against real wind direction, period 6 at 140 m heighth.