ECMWF - Report on the ERS-2 Scatterometer

Title: MONITORING STATISTICS OF ERS-2 SCATTEROMETER FOR ESA (Project Ref. 11699/95/NL/CN)

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•Date: 26 July 2000

1 - INTRODUCTION

During cycle 54 ERS-2 was affected by a spacecraft anomaly for an unusually long period from 7 UTC 30 June 2000 until 16 UTC 5 July 2000. No data was received during that period. For the remaining part of the monitoring period ERS-2 was very stable with only one data void period of 12 hours around 0 UTC 11 July 2000. Except for a small amount of poor quality data from the first cycle after the spacecraft anomaly break, the data quality was high.for the remaining part of the monitoring cycle.

The ECMWF data assimilation system was changed during cycle 54 (27 June 2000). The modifications are not expected to modify the model winds over the oceans. This has been confirmed by comparing winds from the old versus the new assimilation system for the period 13-27 June 2000. The UWI wind speed bias statistics are almost identical for the two assimilation systems during that parallel period.

2 - ERS-2 STATISTICS FROM 13 JUNE TO 17 JULY 2000

Compared to the results from the previous cycle, the level of the descending track Fore and Aft beam sigma0 biases with respect to the ECMWF model first guess winds are slightly smaller for high incidence angles. For ascending tracks there is a smaller bias for Fore and Aft measurements over the whole incidence angle range. The reduction does not compensate completely for the systematic shift introduced in the previous

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monitoring cycle. The Mid beam biases are identical to the previous monitoring cycle. All curves still have a fairly flat distribution over the whole incidence angle range.

The distance to the cone history shows the very uniform high data volume during this monitoring cycle, except for the two periods (described above) without data. It looks like the mean normalised distance to the cone level for all node ranges has increased a bit since the model change 27 June 2000. The UWI and 4D-Var processed wind speed monitoring plots show a standard deviation spike at 6 UTC 11 July 2000, this is due to low data volume and not due to poor data quality.

The UWI winds have an average bias of -0.82 m/s, (-1.20 m/s for nodes 1-2 down to -0.63 m/s for nodes 11-19). This is slightly worse than the results from the previous cycle. The standard deviations are also slightly worse than the results from the previous cycle: the standard deviation is on the average 1.53 m/s, and similar for all nodes.

The standard deviation for ECMWF (4D-Var) processed data is similar to the results from the last monitoring cycle, the average value is 1.63 m/s. The bias is slightly worse than the results from the cycle 53 report: the average value is similar to the previous cycle's, it is now -0.52 m/s. The (scatterometer - model) direction standard deviations were ranging between 30 and 65 degrees for the UWI data (the average value 47 degrees) and between 15 and 30 degrees (average value 19.1 degrees) for their 4D-Var counterparts. The direction standard deviations are similar to the numbers in the previous report period. As usual, the directional bias is close to zero for both UWI and 4D-Var products. The scatter plot of model 10 m wind speeds versus UWI wind speeds shows the slightly larger bias compared to the plot from the previous cycle, as one would expect from the discussion above. The direction scatter plot is in close agreement with the results from the previous cycle. The changed speed biases are larger than could be expected just from the model change, but it could be due to seasonal variations.

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3 - FIGURE CAPTION

Fig. 1: Ratio of < σ0**0.625 > over < CMOD4(First Guess)**0.625 > converted in dB for fore beam (solid line), mid beam (dashed line) and aft beam (dotted line) as a function of incidence angle for descending and ascending tracks. The thin lines indicate the error bars on the estimated mean. (fig 1a: as fig1 but proper first guess values used.)

Fig. 2: Mean normalised distance to the cone computed every 6 hours for nodes 1-2, 3-4, 5 to 7, 8 to 10, 11 to 14 and 15 to 19 (solid curve close to 1 when no instrumental problems are present). The dotted curve shows the number of incoming triplets in logarithmic scale (1 corresponds to 60000 triplets) and the dashed one indicates the proportion of triplets rejected by the ESA flag, the SST or the land/sea mask, i.e. affected by technical problems (0: all data kept, 1: no data kept).

Fig. 3: Mean (solid line) and standard deviation (dashed line) of the wind speed difference UWI - First Guess for the data retained by the 4D-Var quality control. (fig 3a: as fig3 but proper first guess values used)

Fig. 4: Same as Fig. 3, but for the wind direction difference. Statistics are computed only for wind speeds higher than 4 m/s.

Fig. 5-6: Same as Fig. 3 and 4 respectively, but for the 4D-Var processed data.

Fig. 7: Two-dimensional histogram of First Guess and UWI wind speeds, for the data kept by the 4D-Var quality control. Circles denote the mean values in the y-direction, and squares those in the x-direction.

Fig. 8: Same as Fig. 7, but for wind direction. Only wind speeds higher than 4m/s are taken into account.

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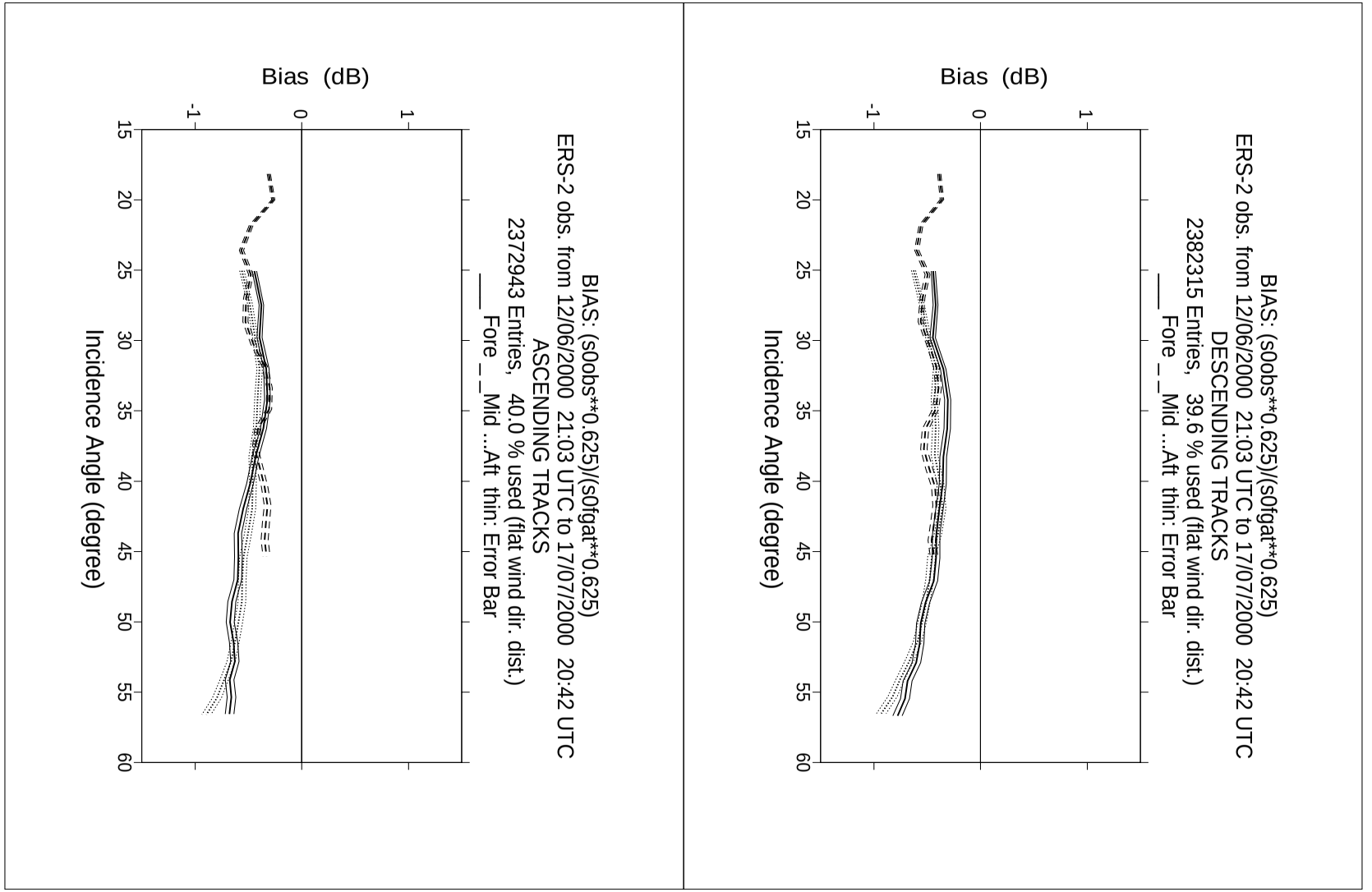

FIGURE 1

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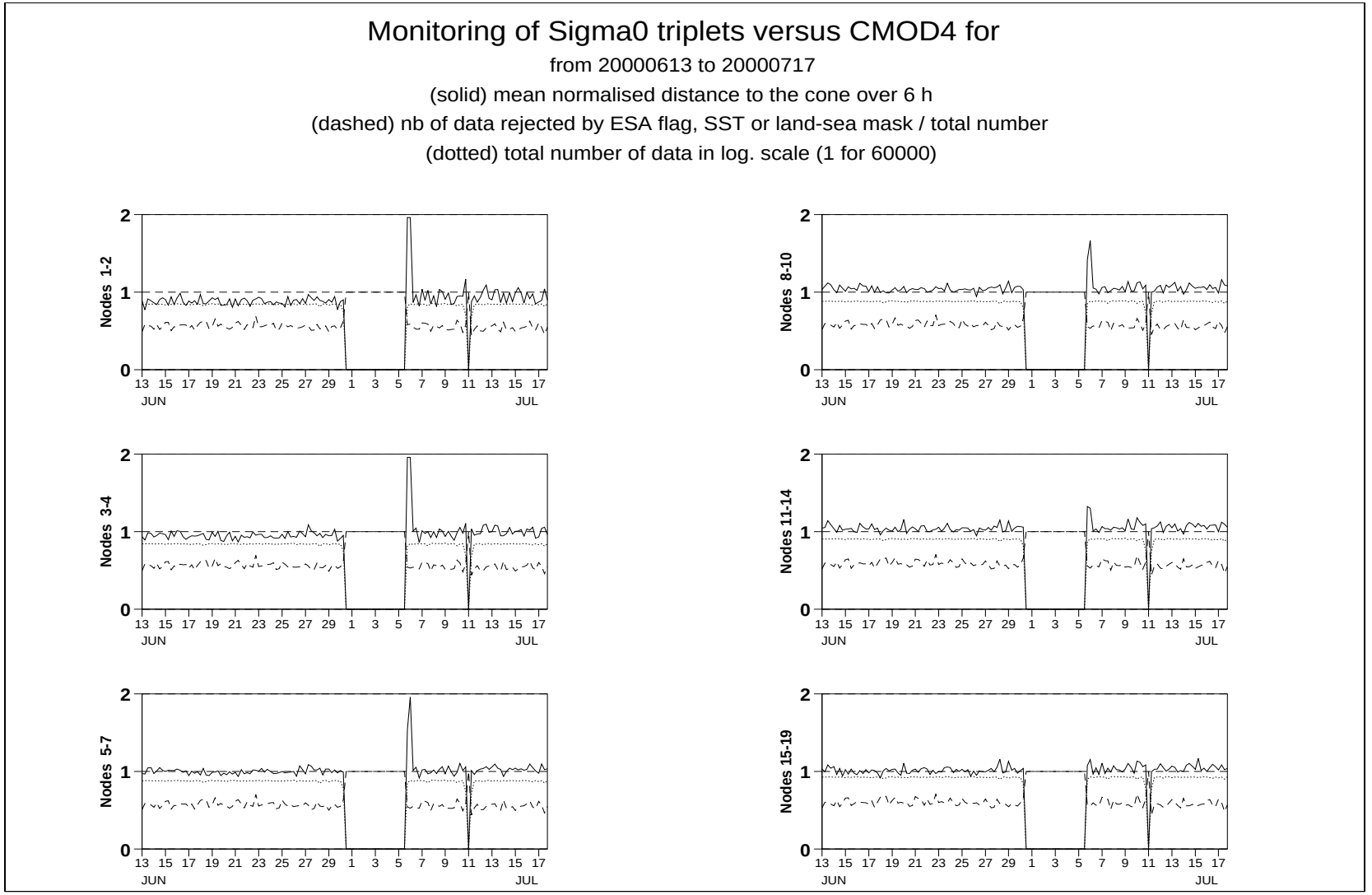

FIGURE 2

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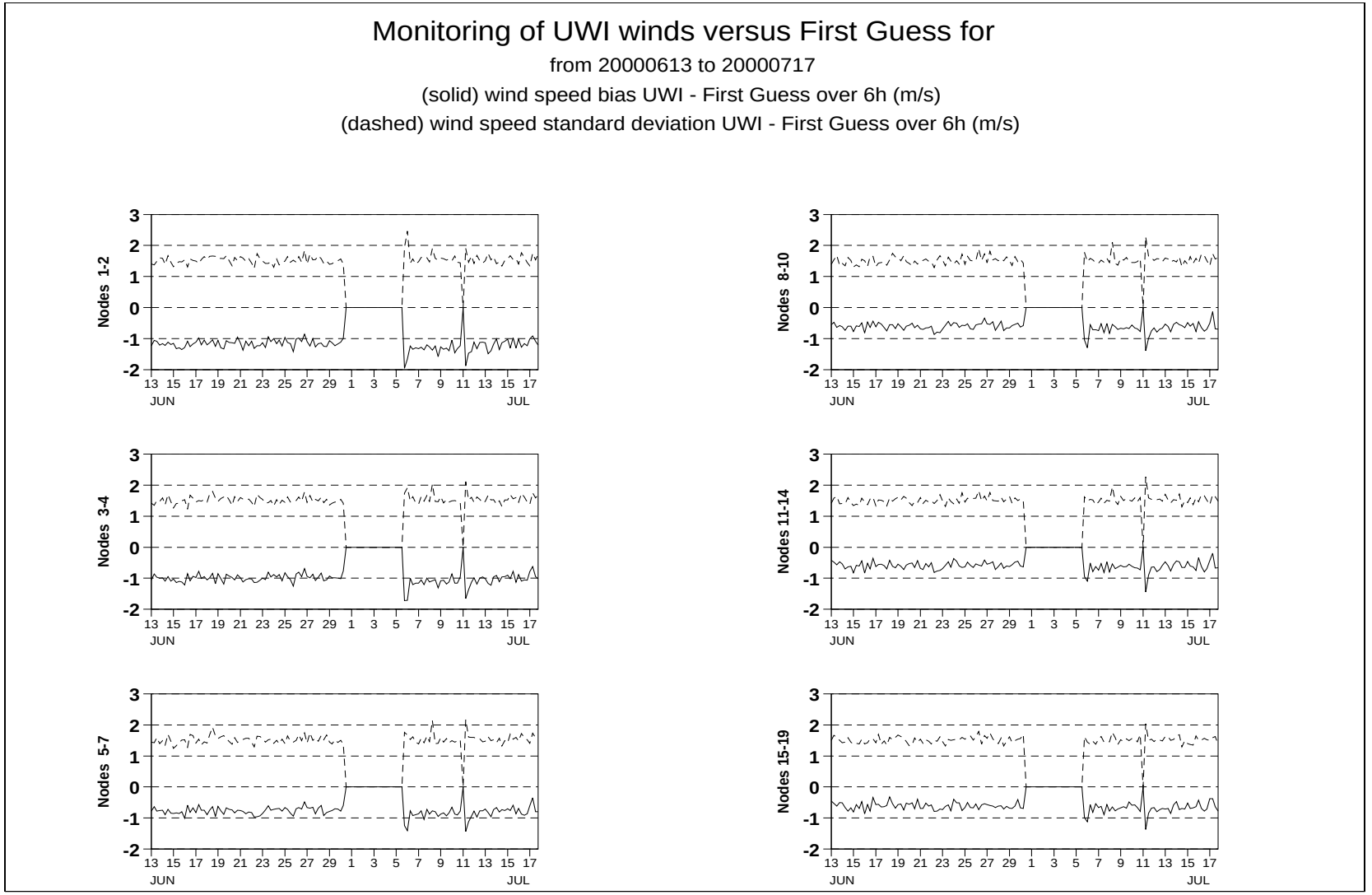

FIGURE 3

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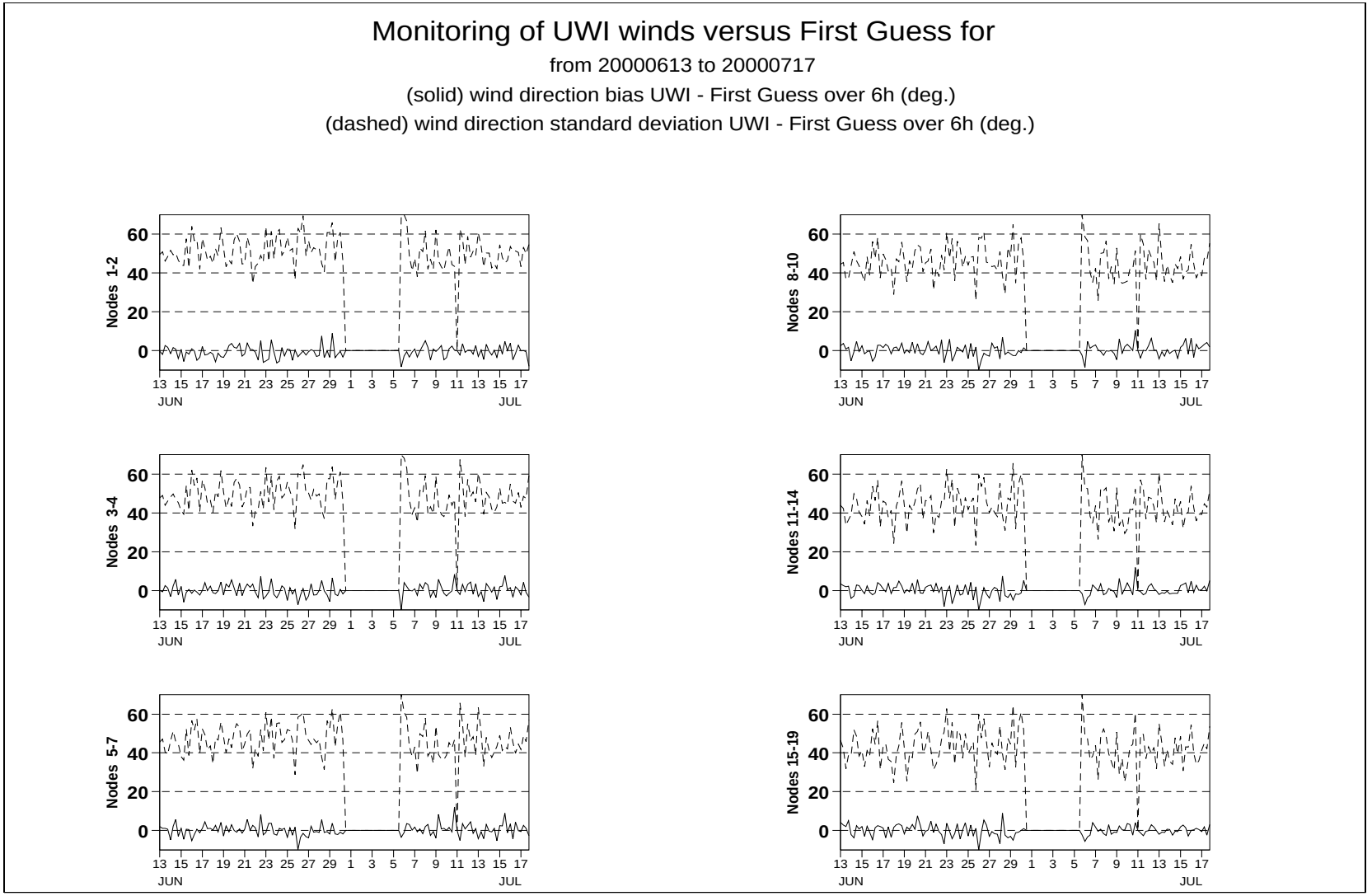

FIGURE 4

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Monitoring of 4D-Var processed winds versus First Guess for
from 20000613 to 20000717
(solid) wind speed bias 4D-Var - First Guess over 6h (m/s)
(dashed) wind speed standard deviation 4D-Var - First Guess over 6h (m/s)

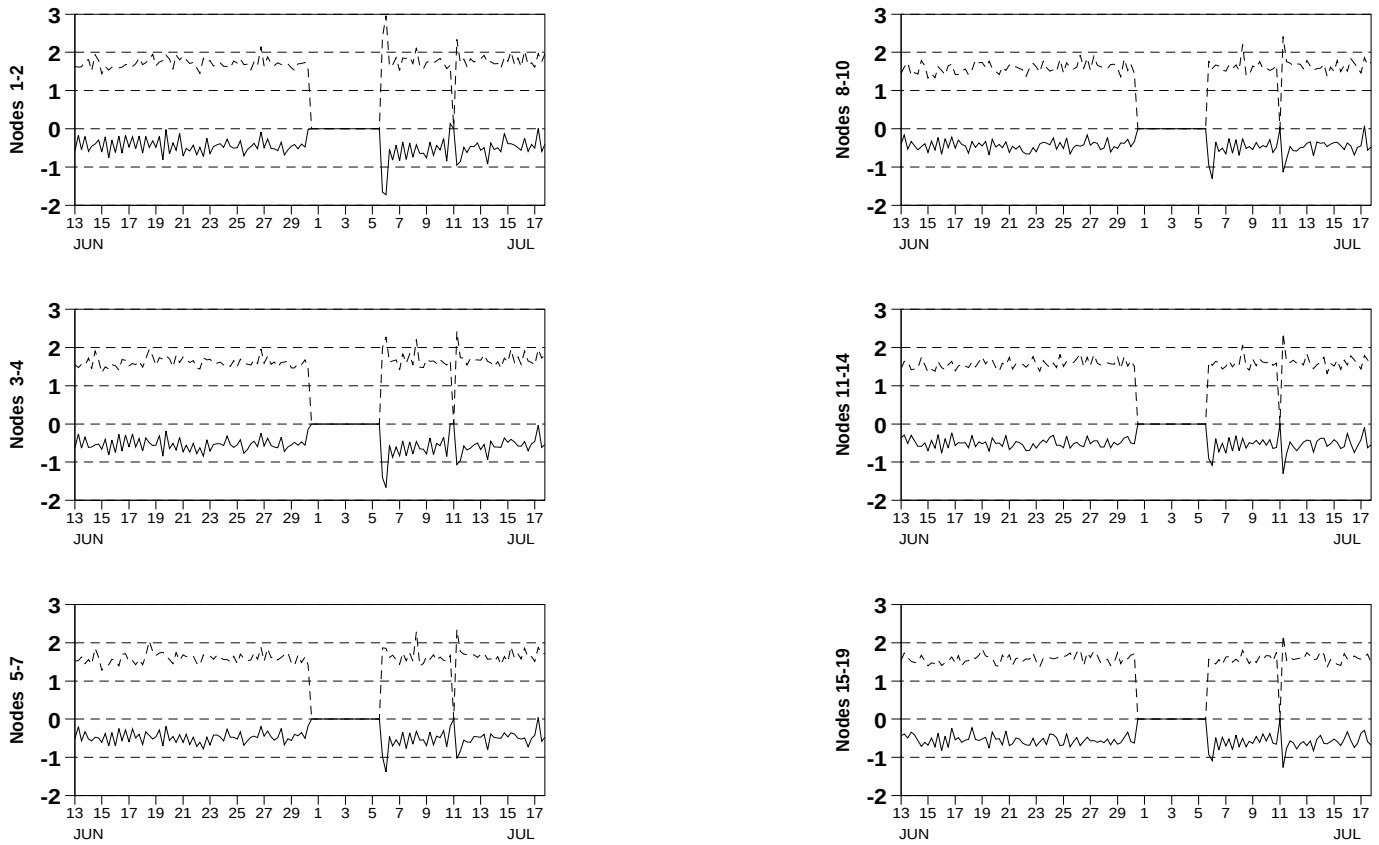

FIGURE 5

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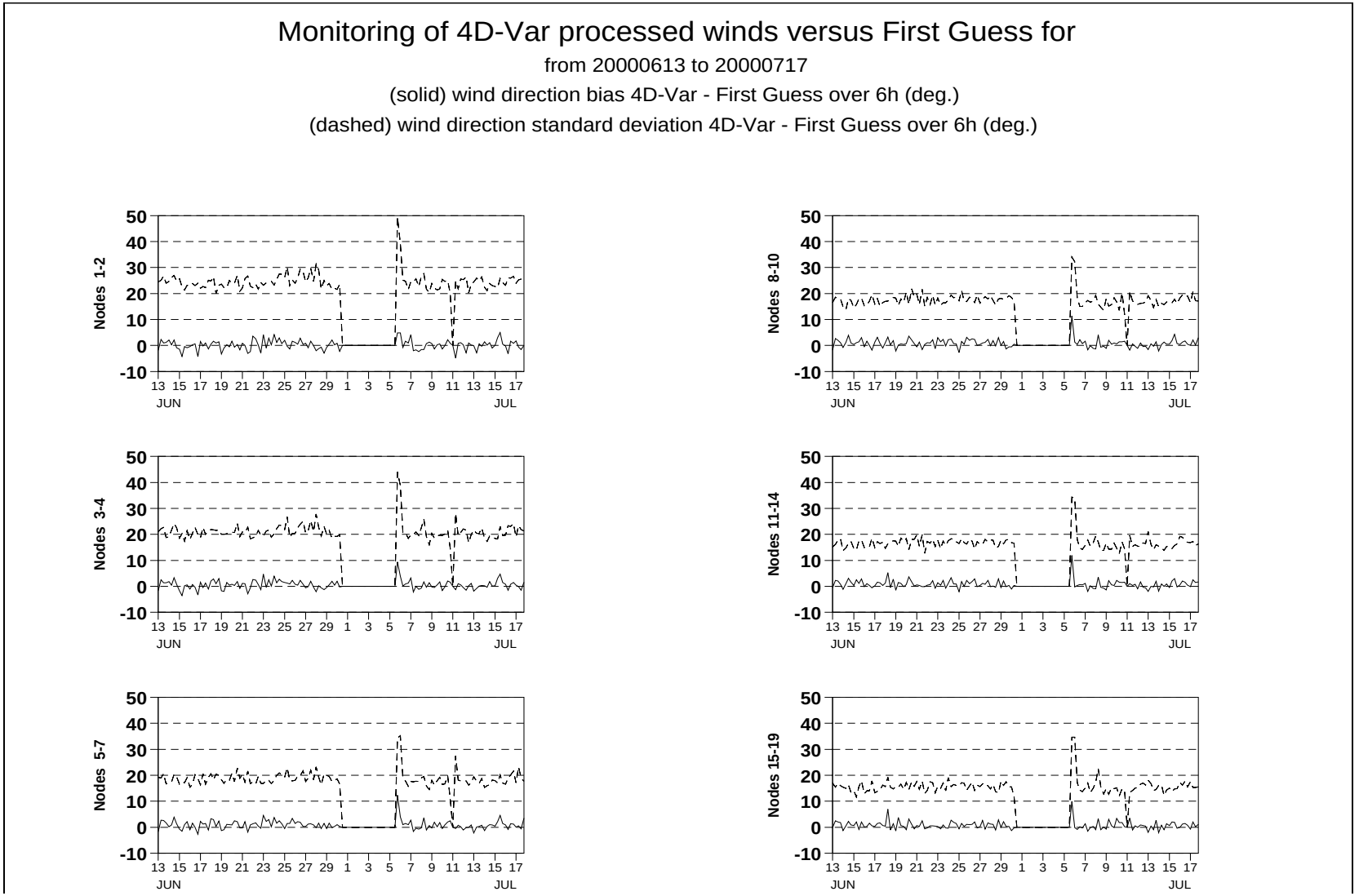

FIGURE 6

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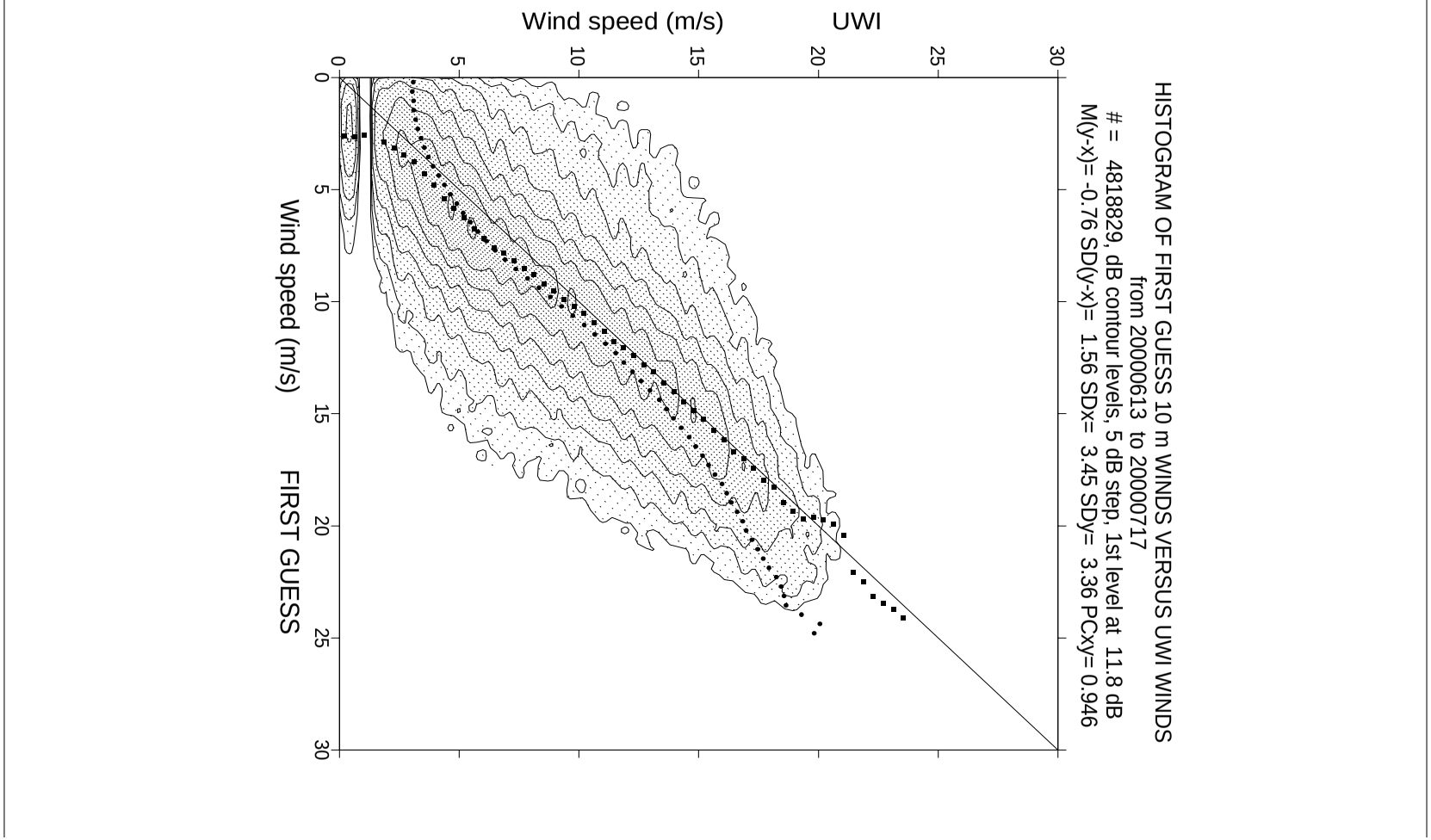

FIGURE 7

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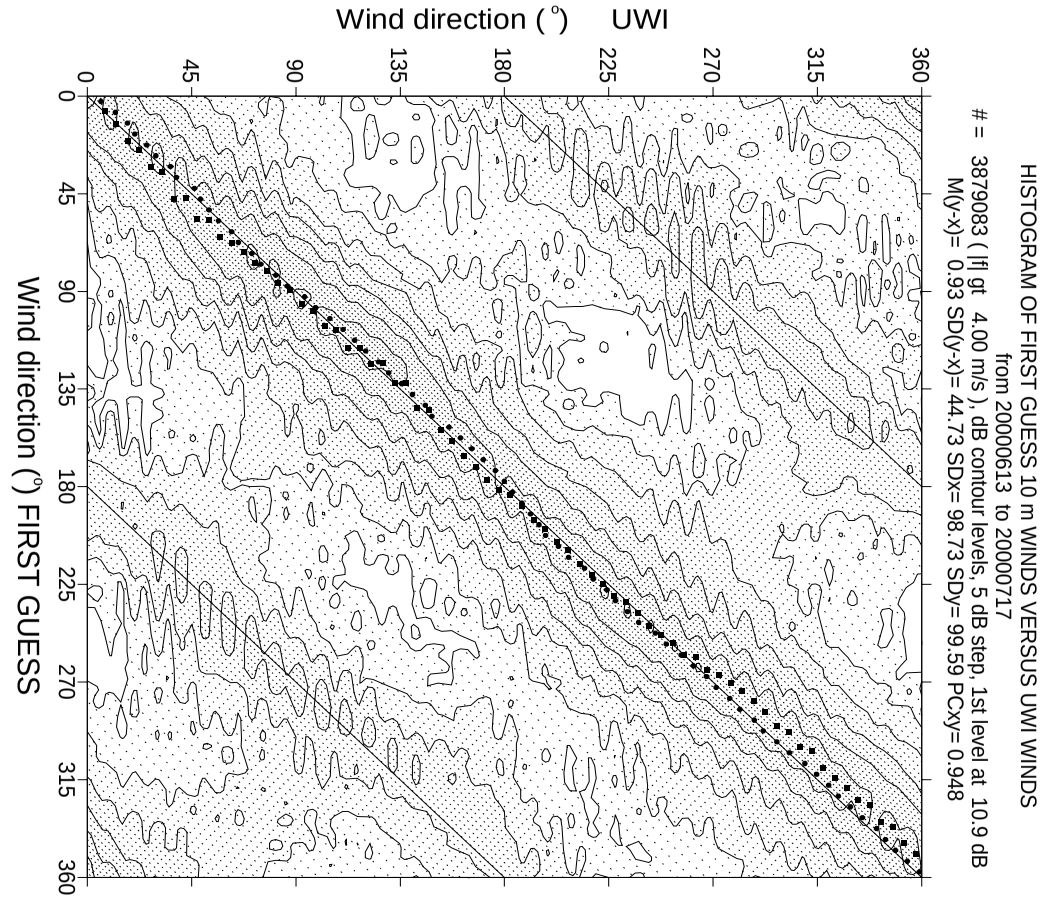

FIGURE 8

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