

■ 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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1 - INTRODUCTION

The 44th cycle for ERS-2 had very few problems. The data quality was high and only for one cycle (6 UTC 2 August 1999) no data was received at ECMWF. A few periods saw lower than usual data volumes: 6 UTC 30 June 1999, 0-6 UTC 20 July 1999, 0 UTC 2 August 1999, and 31 July 1999. For all these cycles the data volume was 35-45% of the usual volume. There were no data quality problems with the data received during those reduced volume cycles.

The ECMWF data assimilation system was not changed during cycle 44.

2 - ERS-2 STATISTICS FROM 29 JUNE 1999 TO 2 AUGUST 1999

The sigma0 biases with respect to the ECMWF model first guess winds were virtually identical to the results from the previous cycle. The scatterometer measurements are still generally overestimated by 0.2 dB to 0.3 dB for incidence angles above 32 degrees, most pronounced for the ascending tracks. A question from Raffaele Crapolicchio initiated an investigation of the sigma0 bias correction plot. Dating back to 1996 an inverse speed bias correction has been applied to the first guess winds used in the sigma0 bias correction to bring the first guess more in agreement with the CMOD4 winds. This correction has been kept fixed for the whole period to make a consistent intercomparison from cycle to cycle possible. A plot showing the true

■ ECMWF - Report on the ERS-2 Scatterometer ■

comparison of observed sigma0 versus pure ECMWF first guess wind have been included as figure 1a. This more appropriate plot with a proper comparison will be used in future monitoring reports.

The distance to the cone history shows the cycle, 6 UTC 2 August 1999, without any data. The other low volume data cycle do not result in any visible performance problems. The sigma0 level is generally at the same level as usual. The wind speed plots has a higher than usual negative speed bias for 0 UTC 31 July 1999. This is due to a relative low data volume for that cycle and has not been linked to poor quality data.

The UWI winds have an average bias of -0.49 m/s, (-0.87 m/s for nodes 1-2 down to -0.29 m/s for nodes 11-19). This is higher than seen in the results from last cycle. The standard deviations is on the hand smaller than in the previous cycle: the standard deviation is close to 1.51 m/s for all nodes.

The standard deviation for ECMWF (4D-Var) processed data is also better than in the last monitoring cycle, the average value is 1.61 m/s. The bias is similar to the results seen in cycle 43, the average value is now -0.19 m/s.

The (scatterometer - model) direction standard deviations were ranging between 30 and 65 degrees for the UWI data (average value 47 degrees) and between 15 and 30 degrees (average value 18.9 degrees) for their 4D-Var counterparts. The direction standard deviations are similar to the ones in the previous report period. As usual, the directional bias is still 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 above mentioned slightly larger bias compared to the results from the previous cycle. The direction scatter plot is in close agreement with the results from the previous cycle.

■ ECMWF - Report on the ERS-2 Scatterometer ■

3 - FIGURE CAPTION

- Fig. 1:* Ratio of $\langle \sigma_0^{*0.625} \rangle$ over $\langle \text{CMOD4}(\text{First Guess})^{*0.625} \rangle$ 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.

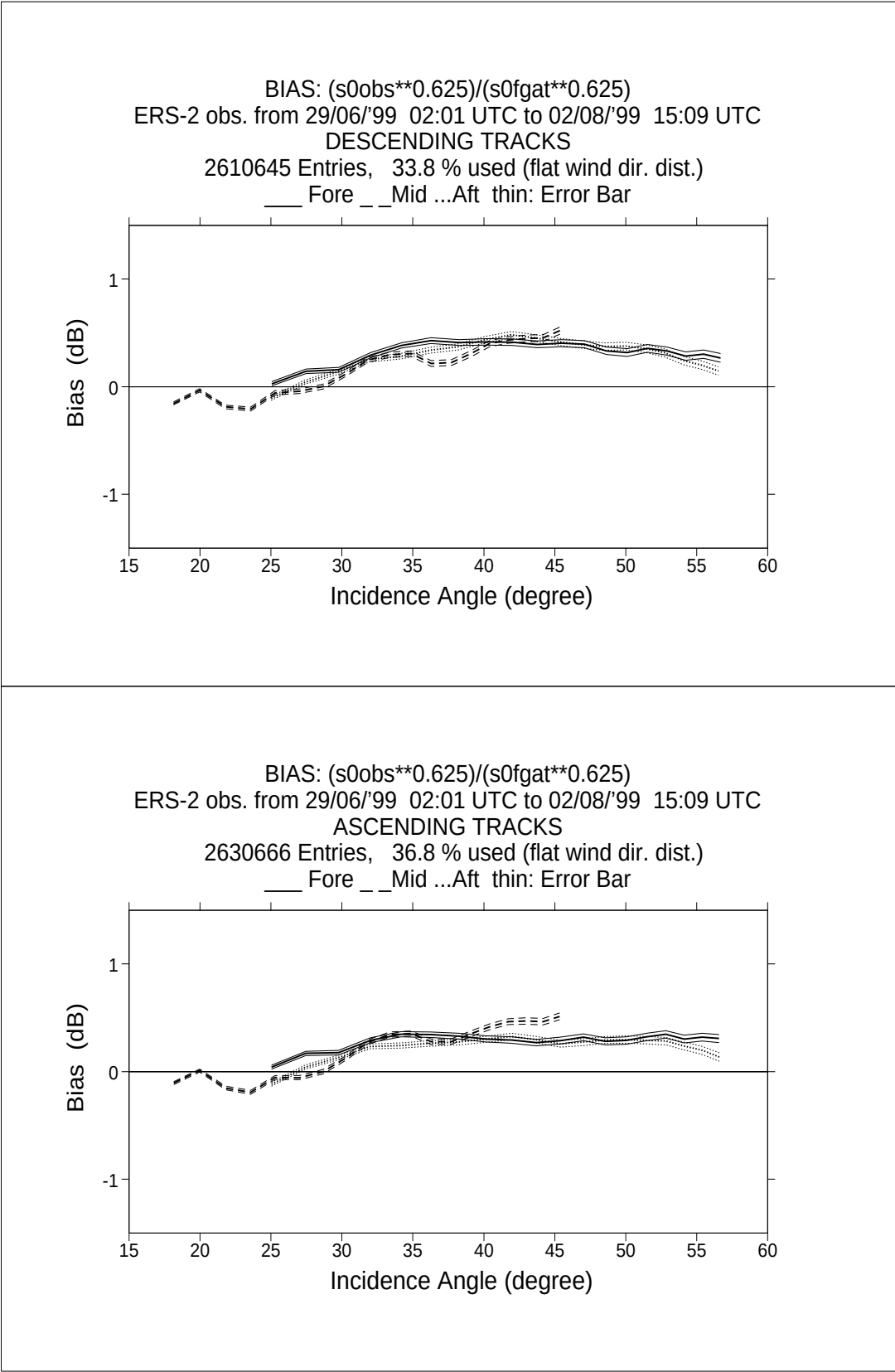
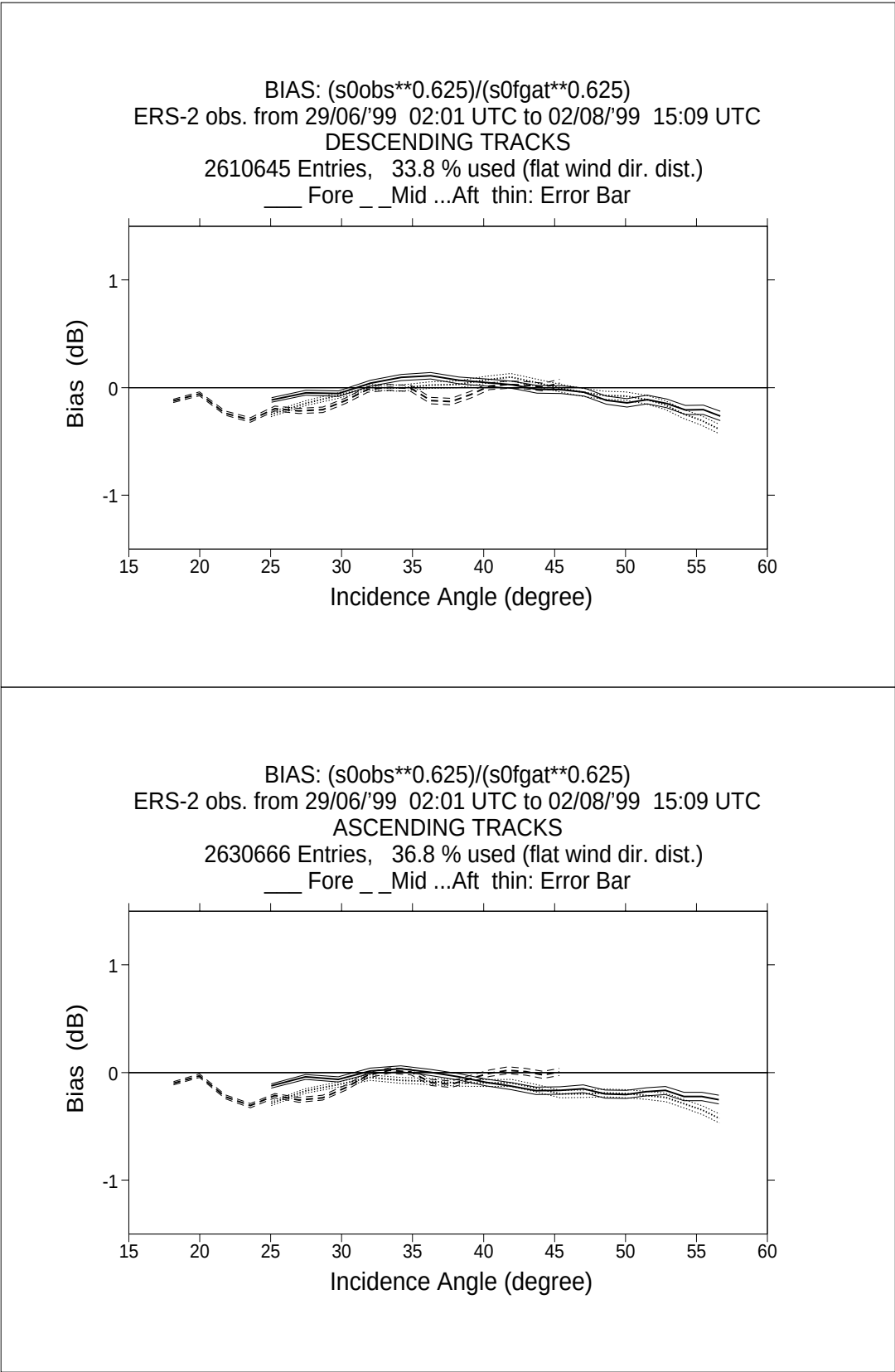


FIGURE 1



■ ECMWF - Report on the ERS-2 Scatterometer ■

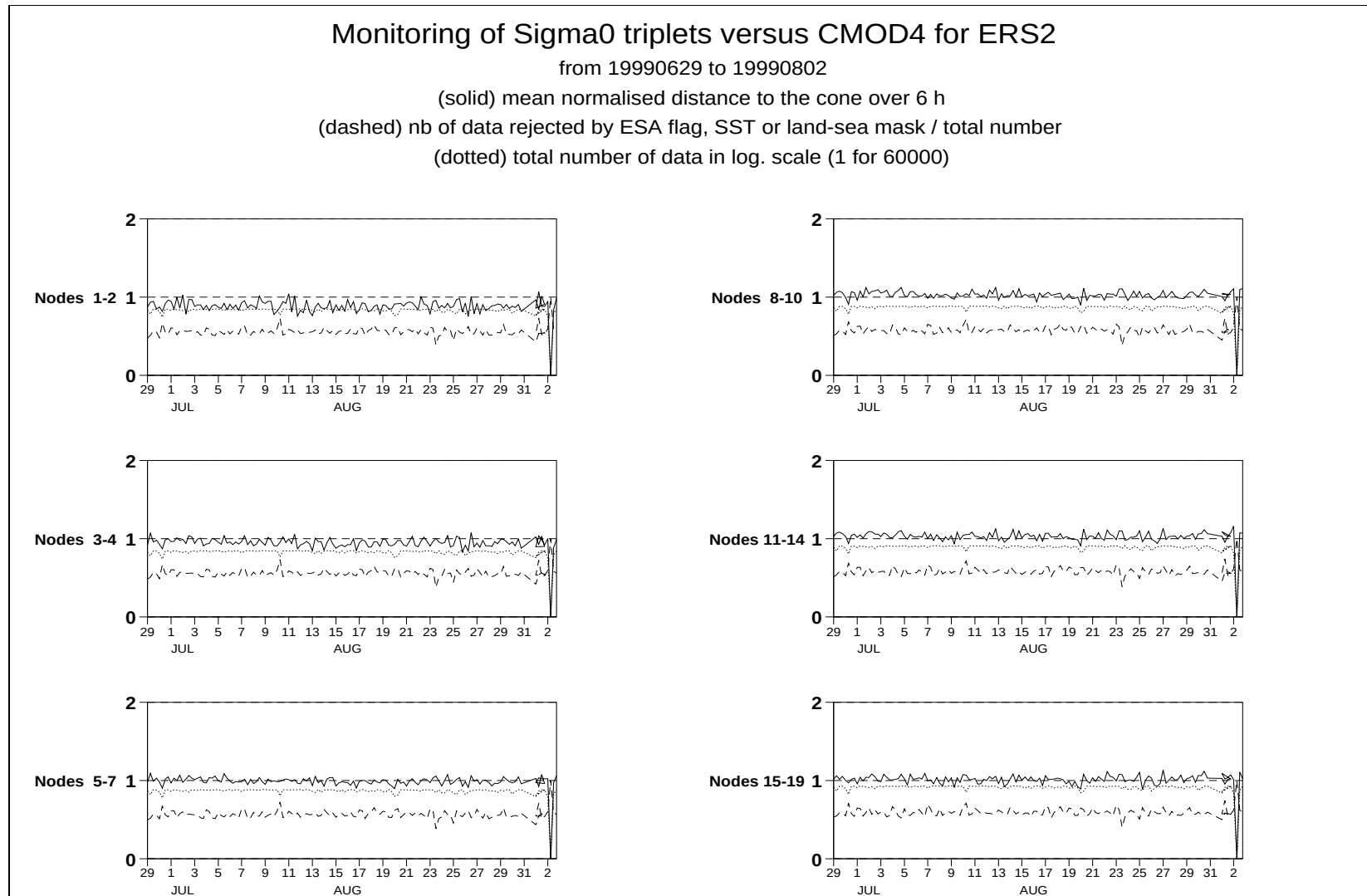


FIGURE 2

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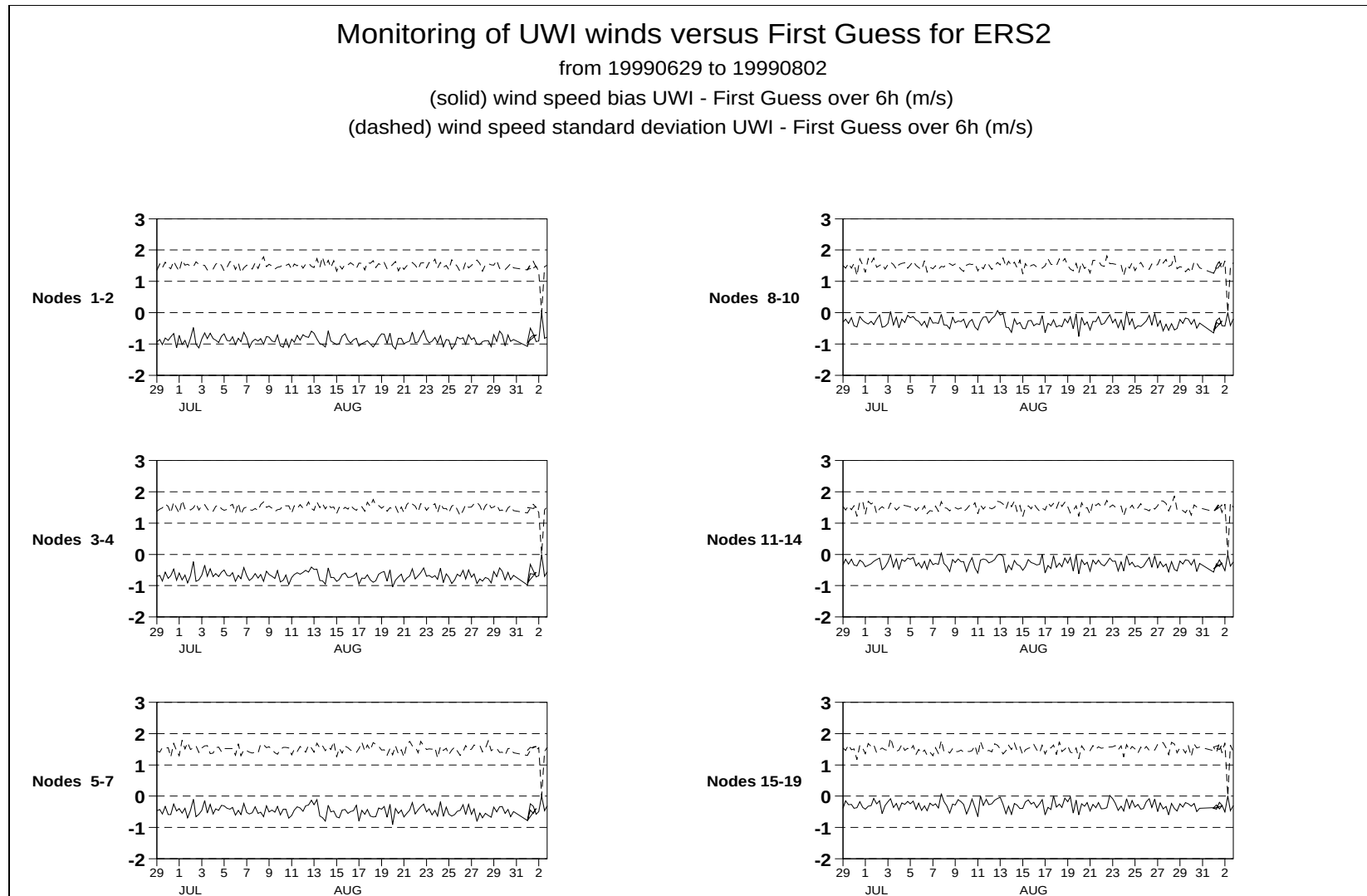


FIGURE 3

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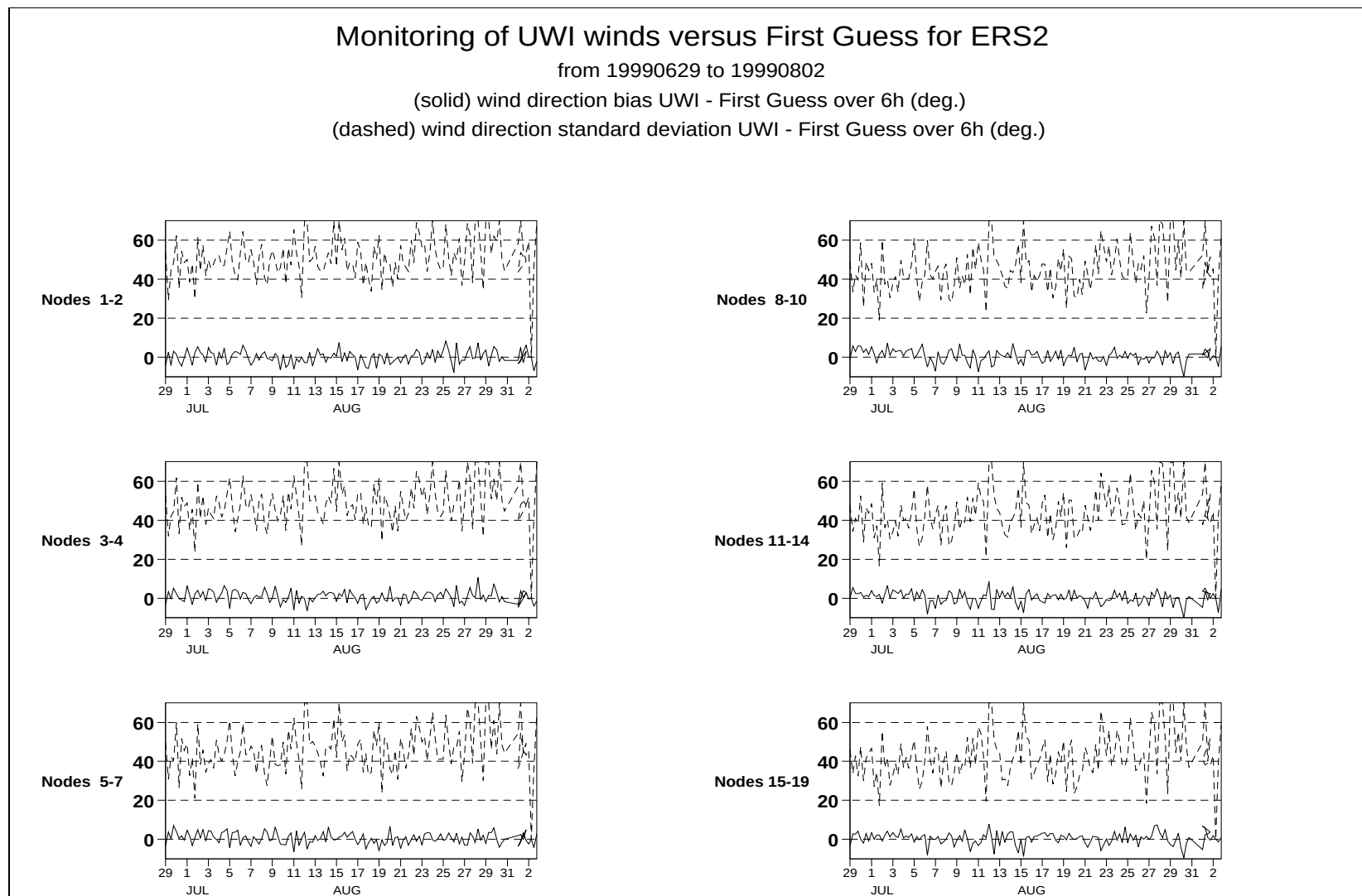


FIGURE 4

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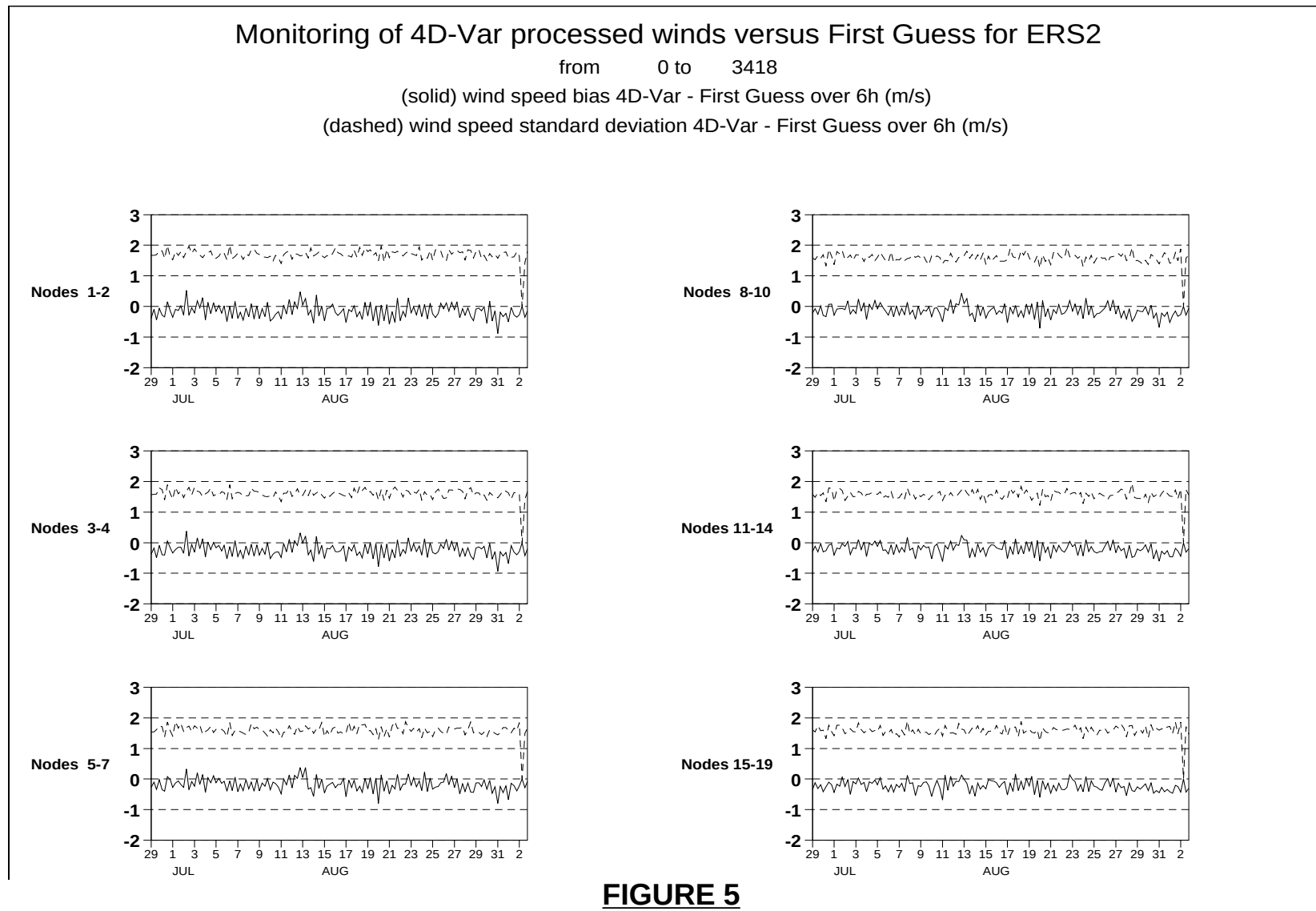


FIGURE 5

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Monitoring of 4D-Var processed winds versus First Guess for ERS2

from 19990629 to 19990802

(solid) wind direction bias 4D-Var - First Guess over 6h (deg.)

(dashed) wind direction standard deviation 4D-Var - First Guess over 6h (deg.)

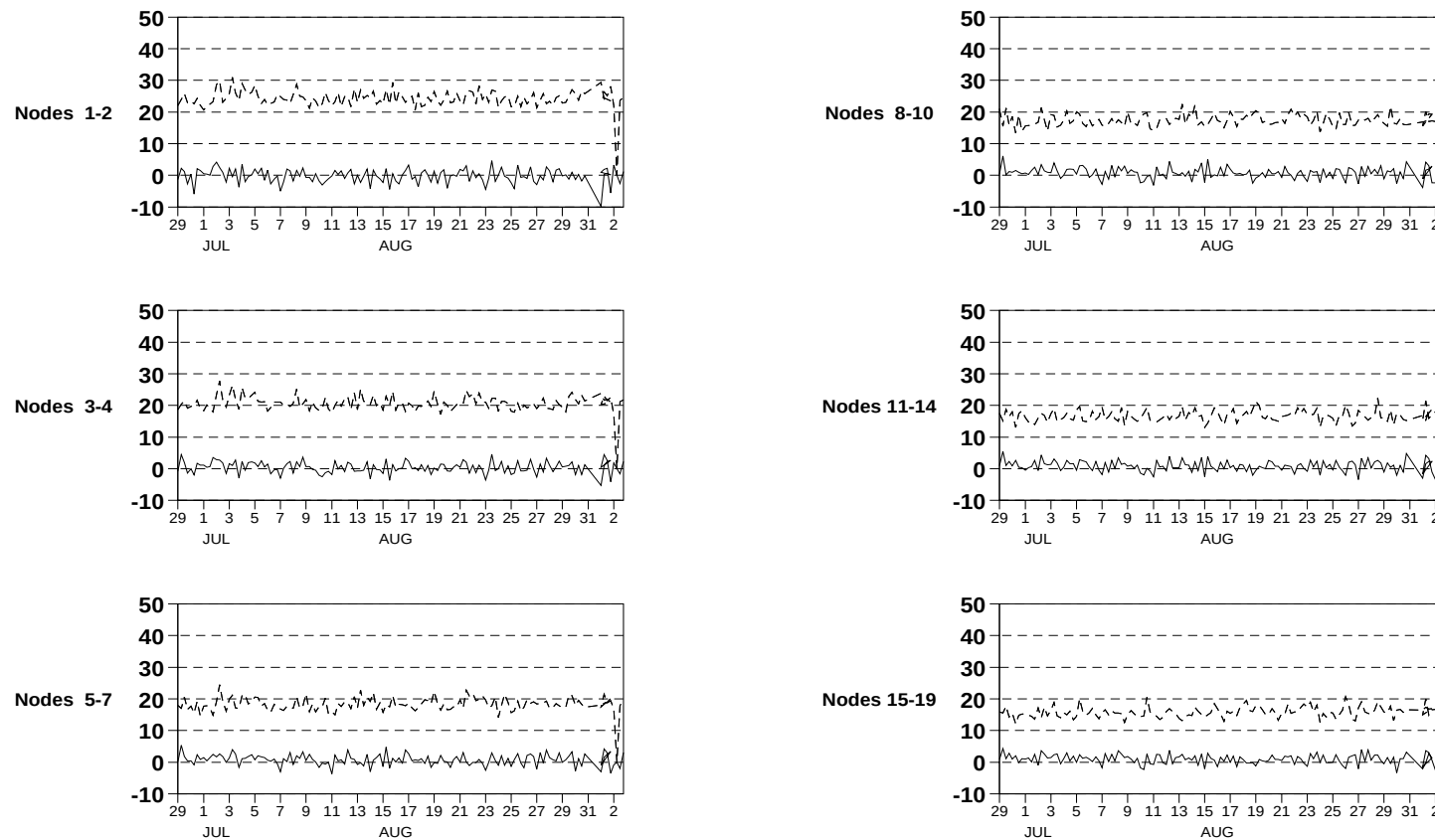


FIGURE 6



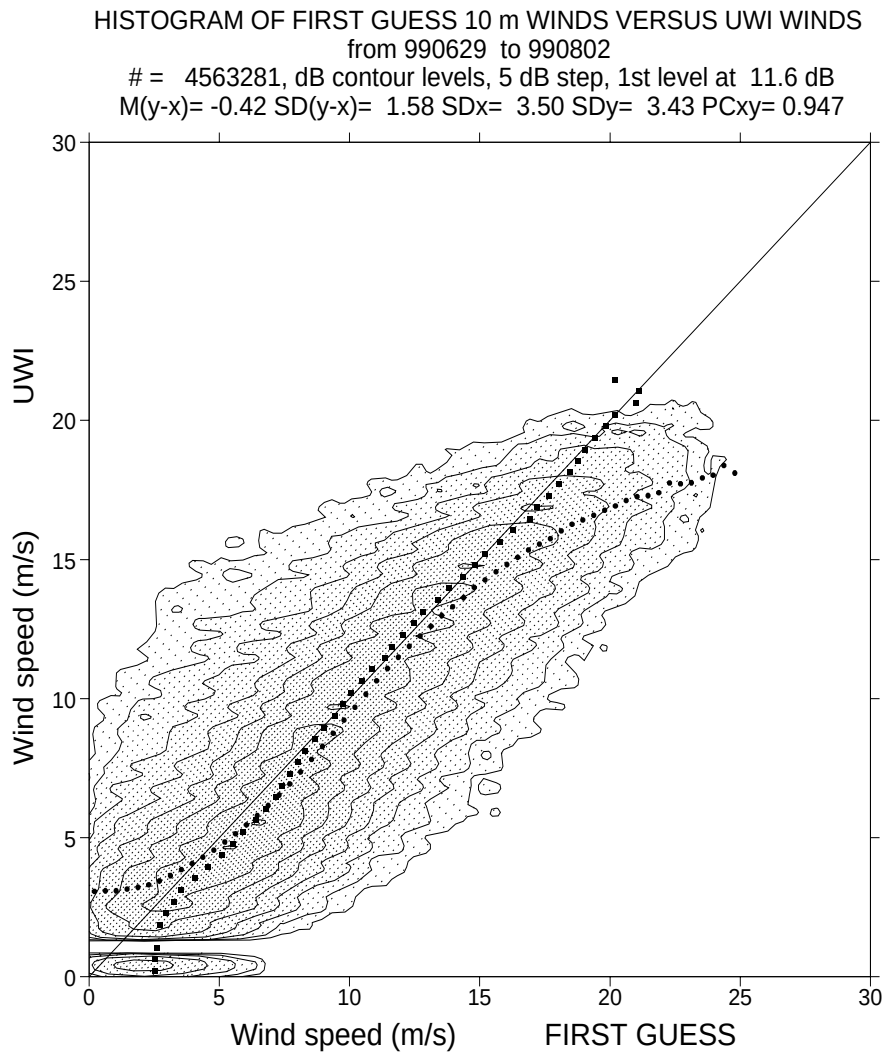
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■ **FIGURE 7**

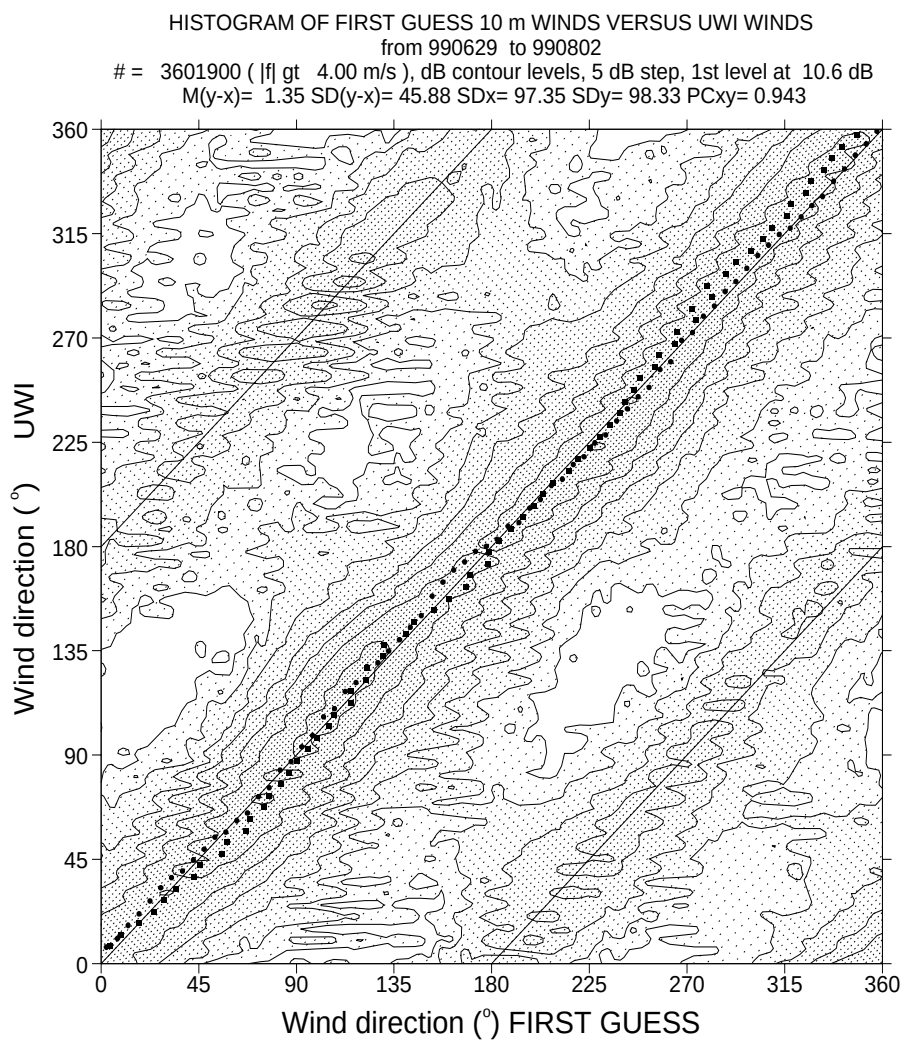


FIGURE 8