

■ 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: 10 June 1999

1 - INTRODUCTION

No ERS scatterometer data problems were encountered during the 42th cycle. The data was generally of high quality for the whole period. Lower than usual data volumes were available at ECMWF for three six hour cycles: 12 UTC 4 May 1999, 6 UTC 15 May 1999, and 6 UTC 19 May 1999. The data received for these lower volume cycles had the normal high quality.

The ECMWF data assimilation system was changed on 5 May 1999. The use of TOVS radiances was changed and more care was taken not to use scatterometer data over land. The changes are expected to give slightly better analyses. The scatterometer change will avoid using land-contaminated ERS data. This was only a problem for very few data point, so no significant impact is expected.

2 - ERS-2 STATISTICS FROM 20 APRIL 1999 TO 24 MAY 1999

The sigma0 biases with respect to the ECMWF model first guess winds were very similar to the results from the previous monitoring cycle. The descending tracks fore antenna measurements had a slightly higher bias in the 40-50 degree incidence angle range. Descending tracks fore antenna measurements were slightly higher in the incidence angle range above 50 degrees compared to last monitoring period. The scatterometer



Lars Isaksen

■ ECMWF - Report on the ERS-2 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.

The distance to the cone history shows that there were no problems during this report period. Even during the low data volume cycles, mentioned above, the distance to the cone stayed at its normal level. The monitoring gives results very similar to last report period's. There is no indication that the model change on 5 May 1999 has affected the results.

The UWI winds have an average bias of -0.42 m/s, (-0.78 m/s for nodes 1-2 down to -0.25 m/s for nodes 11-19). This is an improvement compared to the results from earlier cycles. The standard deviations has also improved compared to the previous cycle's values: all nodes standard deviations are close to 1.54 m/s.

The standard deviation for ECMWF (4D-Var) processed data have also improved compared to results from the last monitoring cycle, the average value is 1.64 m/s. The bias is slightly better than the results seen in cycle 41, the average value is now -0.18 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 20.0 degrees) for their 4D-Var counterparts. The direction standard deviations are similar to the ones in the previous report period. There might be some indications that the standard deviations are smaller in the period after the model change on 5 May 1999. 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 improved performance compared to 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. 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. 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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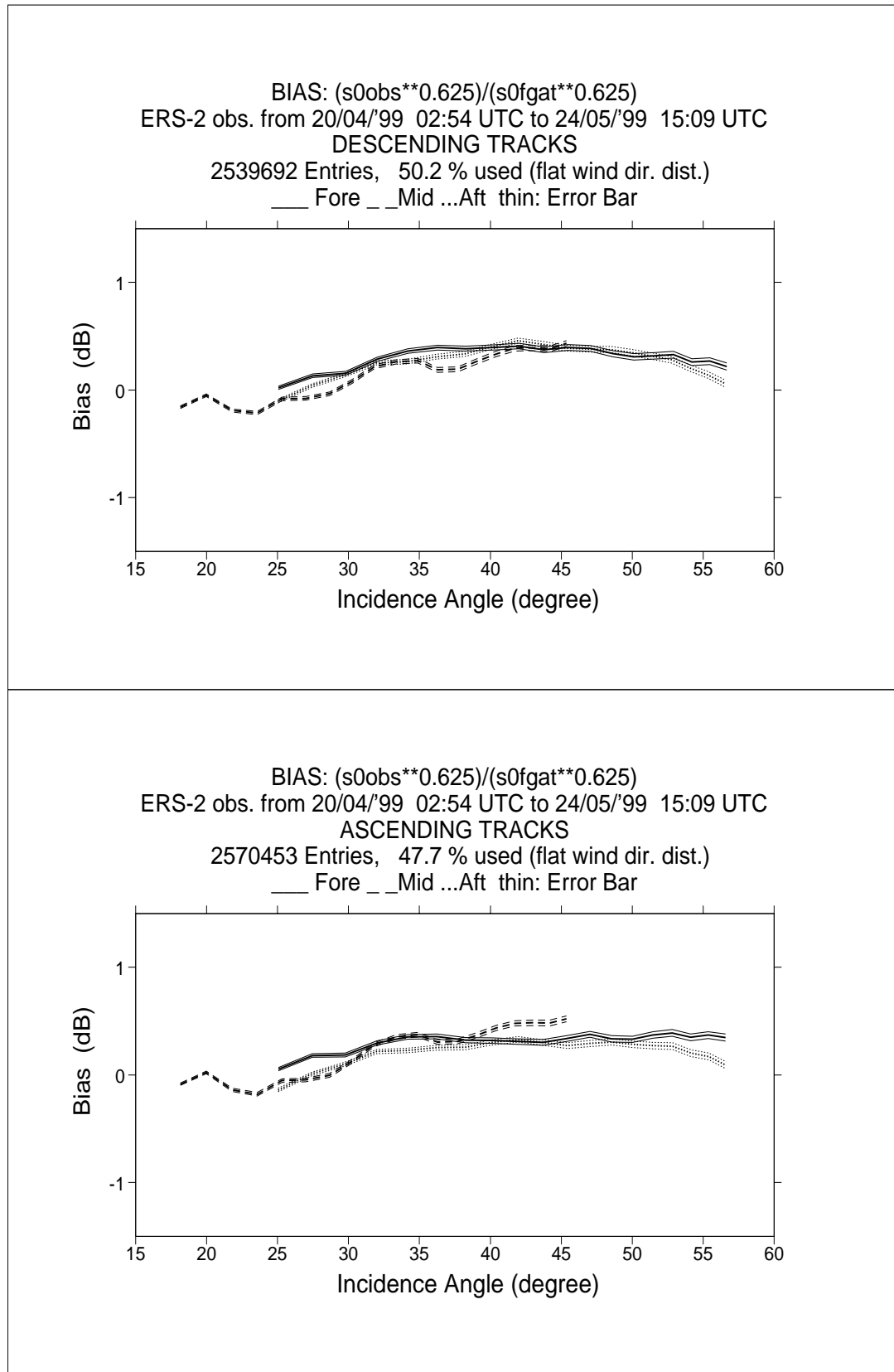


FIGURE 1

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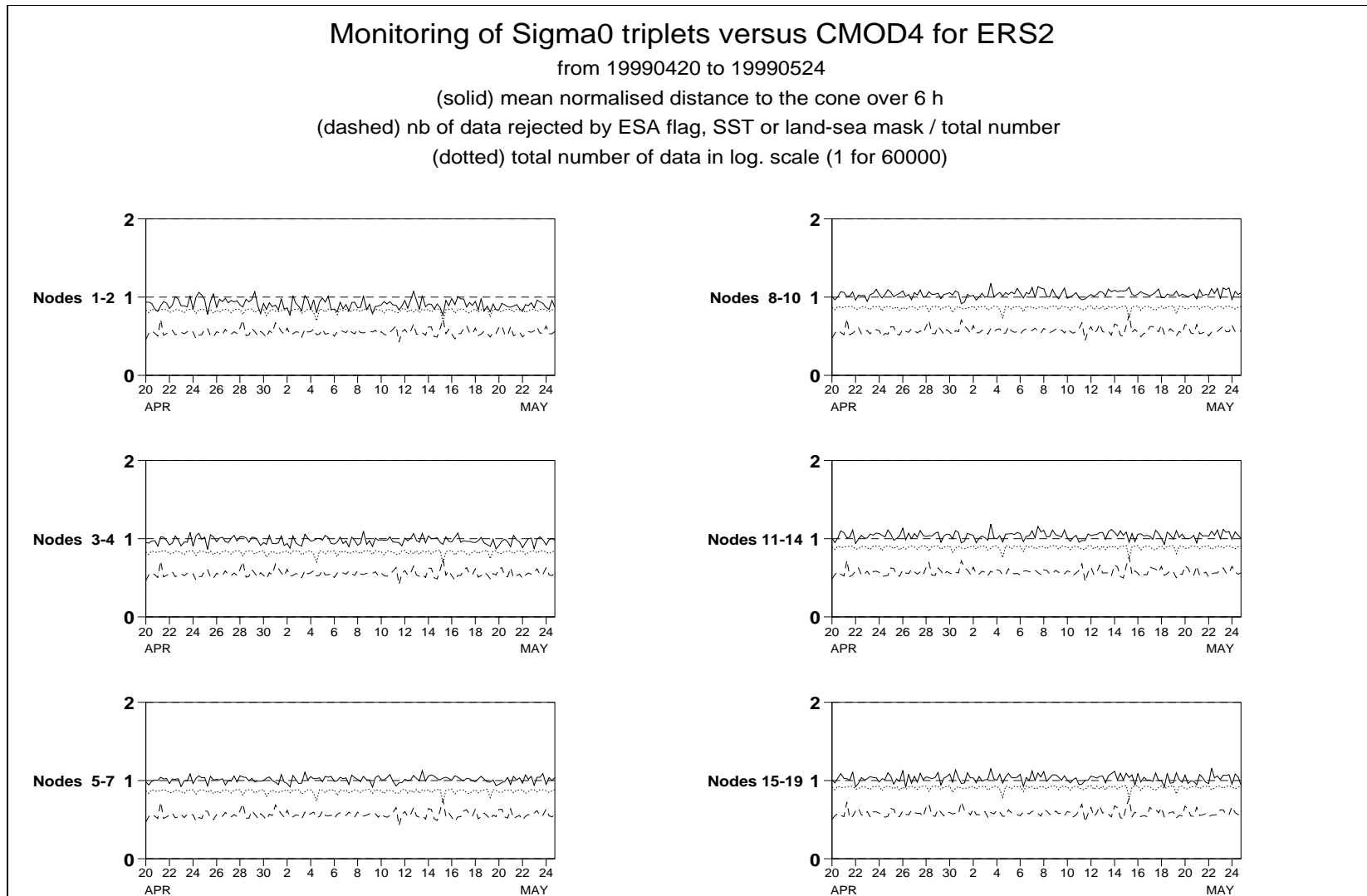


FIGURE 2

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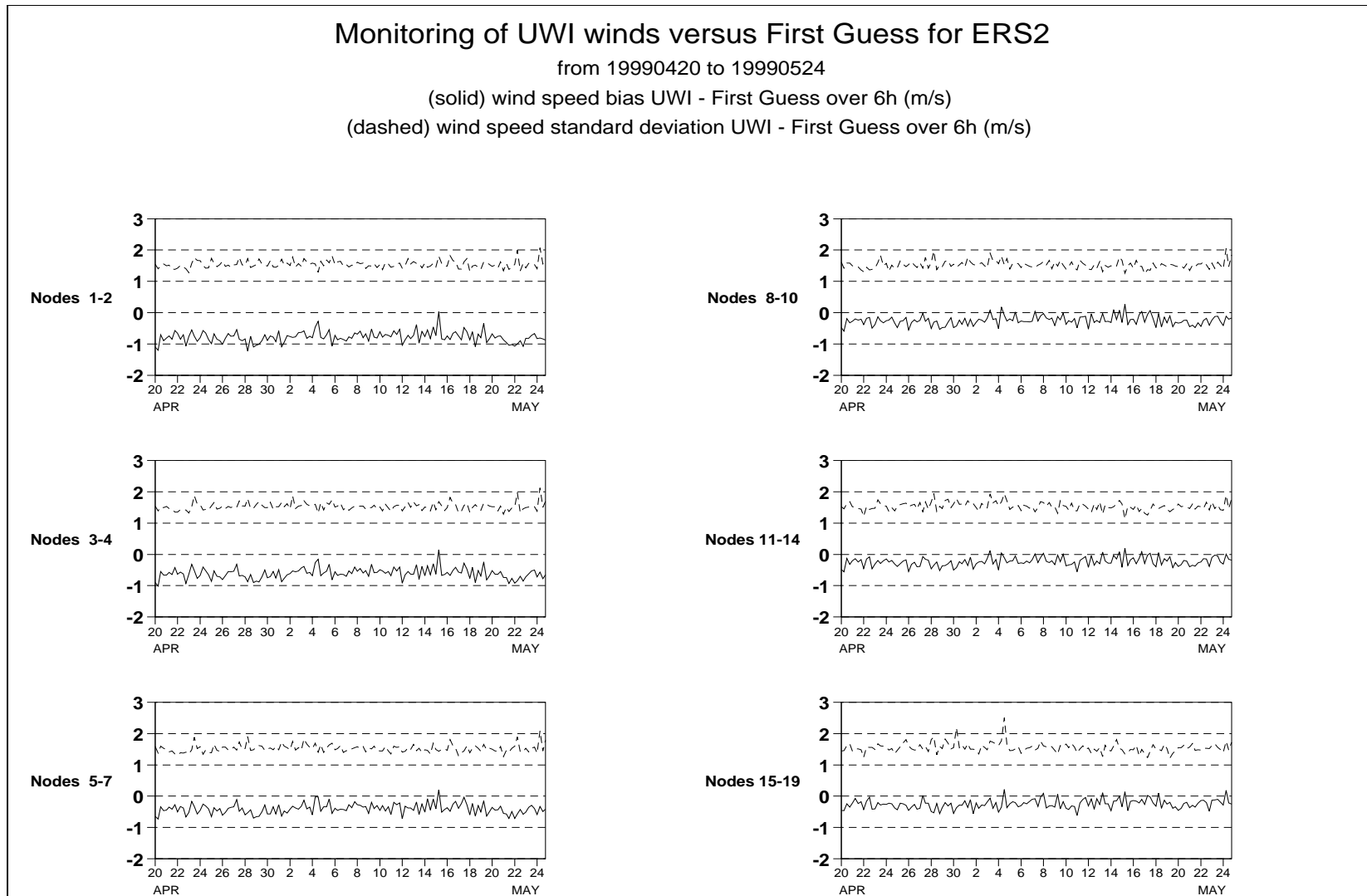


FIGURE 3

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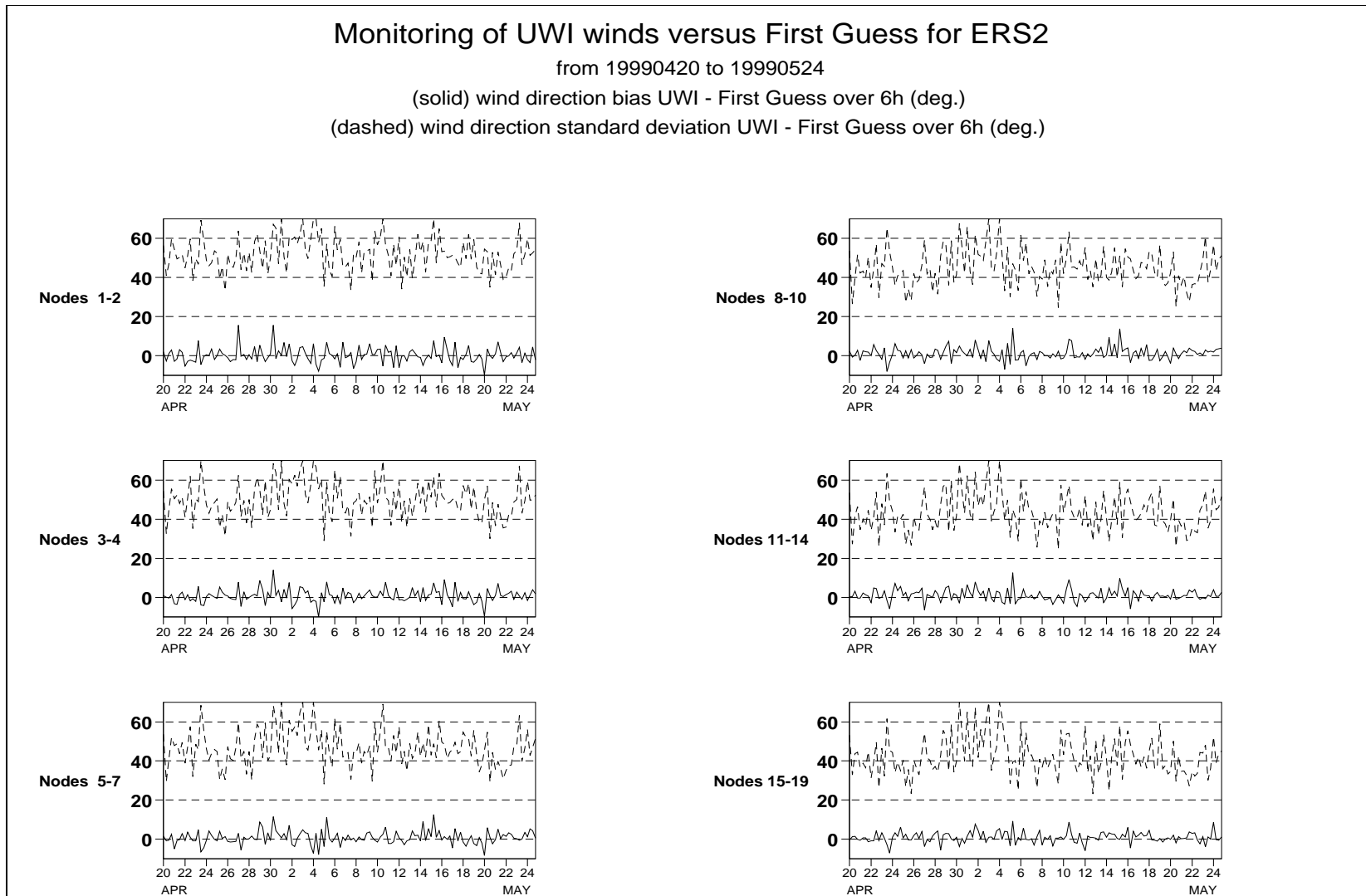


FIGURE 4

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

from 19990420 to 19990524

(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)

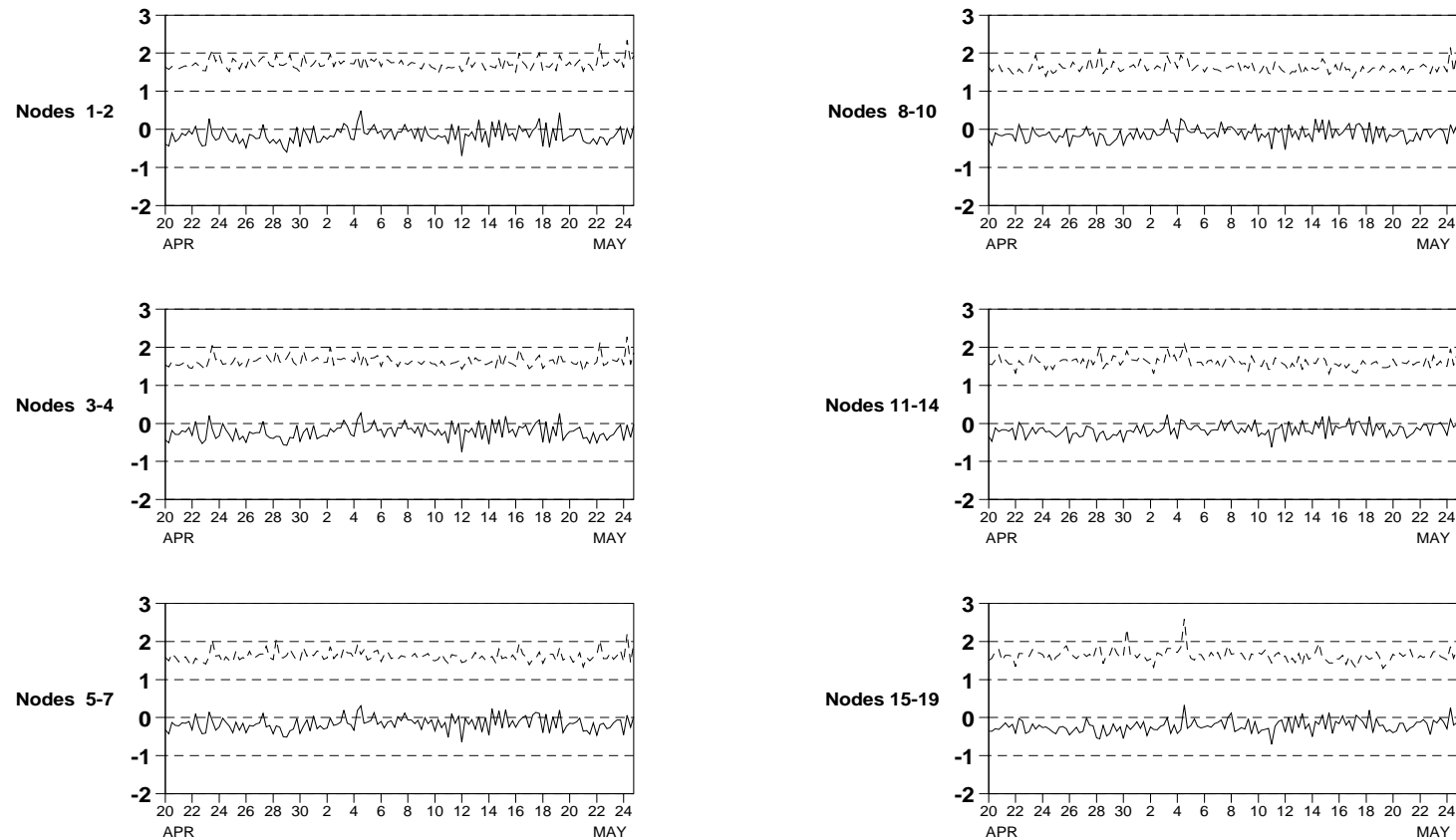


FIGURE 5



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

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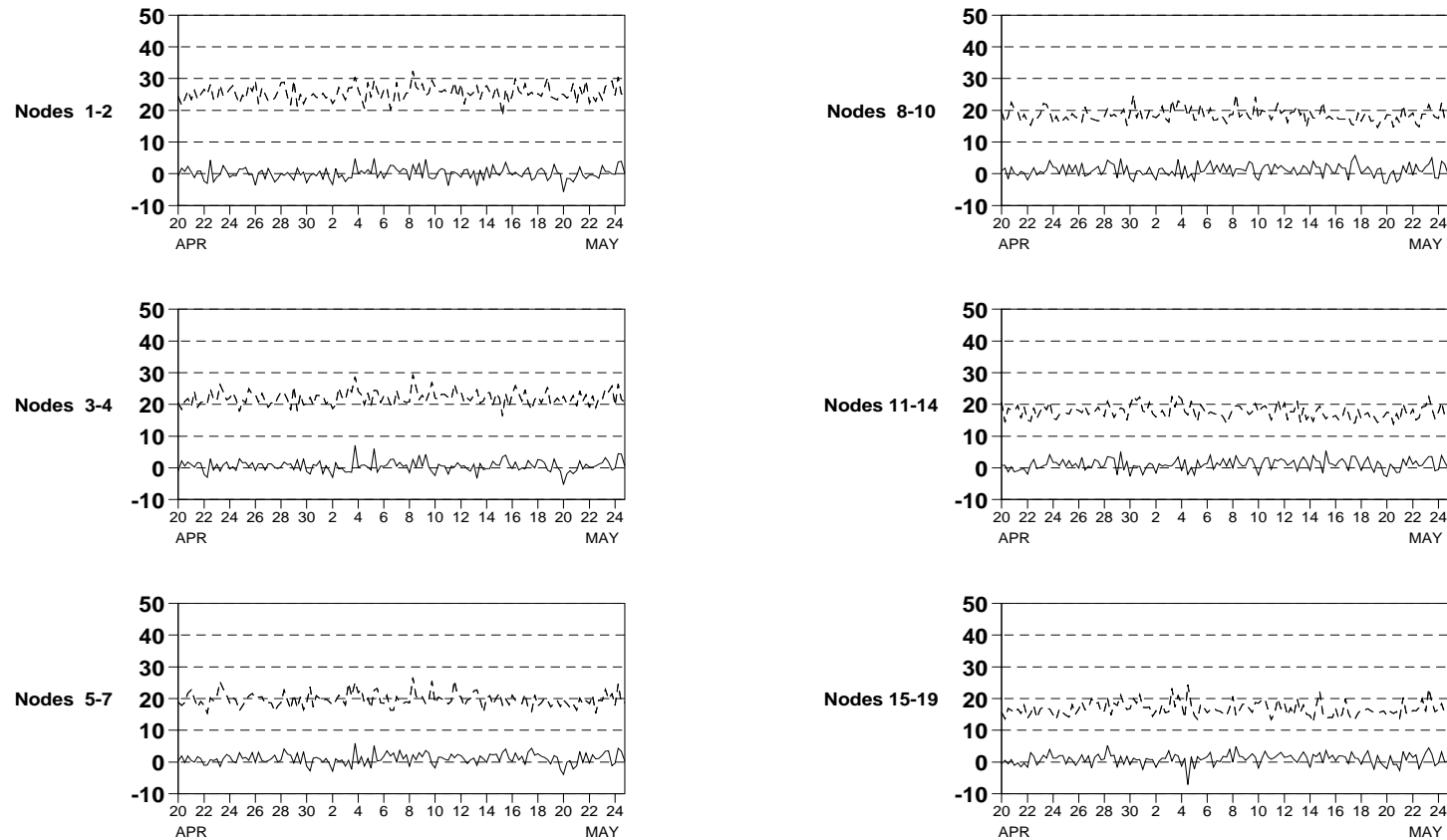
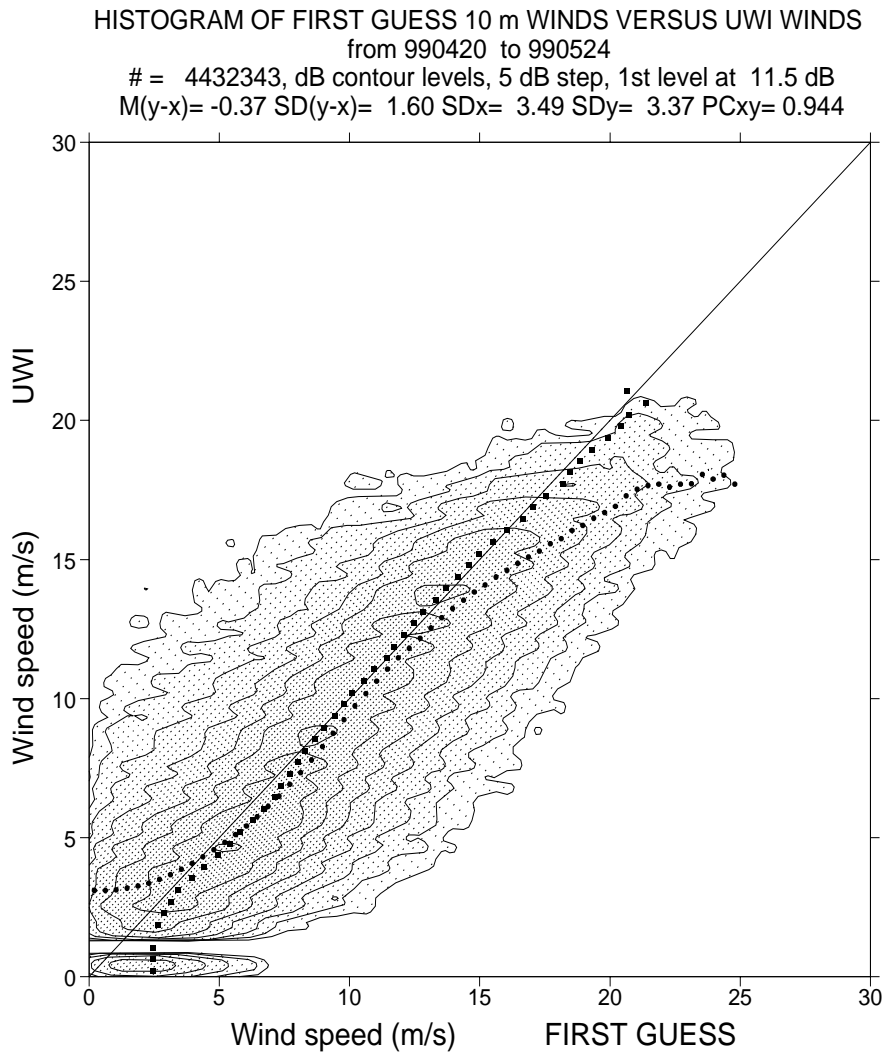


FIGURE 6

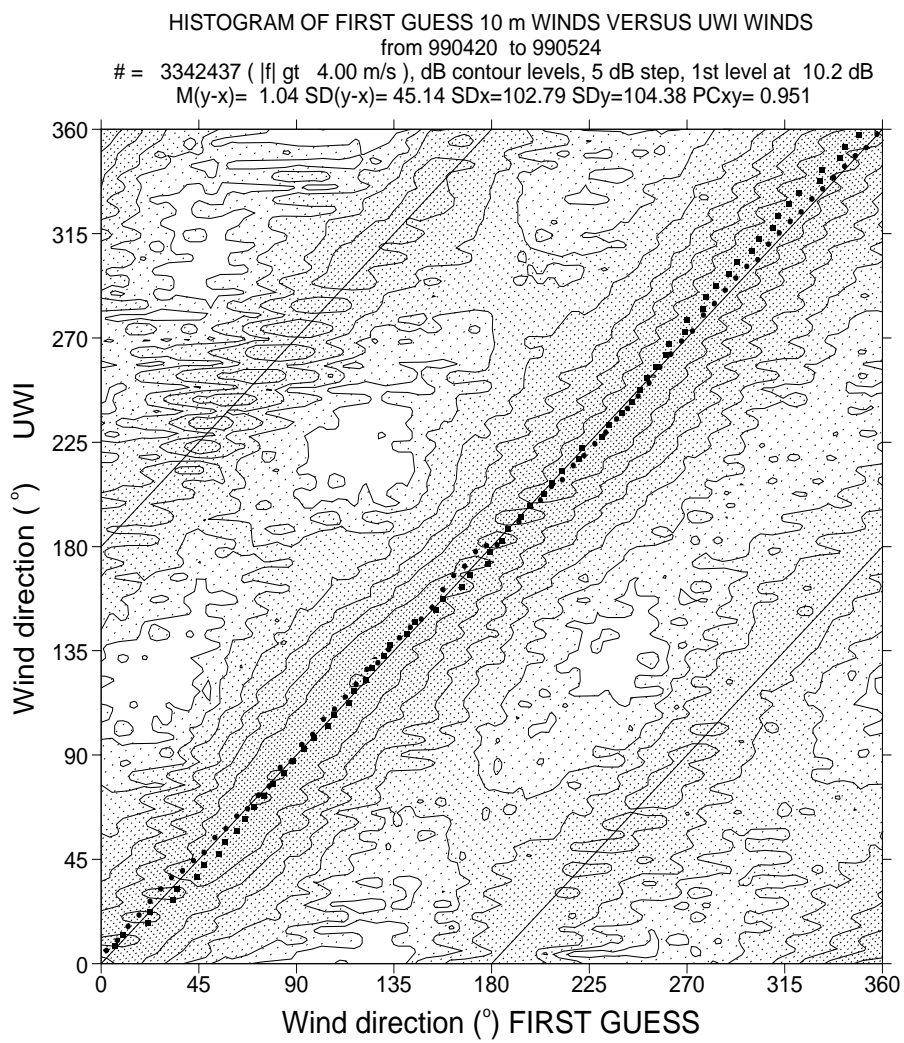


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■ **FIGURE 7**



■ **FIGURE 8**