

■ ECMWF - Report on the ERS-2 Scatterometer ■

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

•By: Lars Isaksen

•Date: 18 September 2000

1 - INTRODUCTION

During cycle 55 ERS-2 was stable and delivered good quality data. No data was received at ECMWF from 21 UTC 22 July 2000 until 12 UTC 23 July 2000. For the remaining part of the monitoring period ERS-2 was very stable with high data volumes received for almost all cycles. There are no indications of any instrument problems during cycle 55.

The ECMWF data assimilation system was not changed during cycle 55. But from 27 July until 10 August 2000 substantially lower amounts of GOES cloud motion winds were received at ECMWF. This may have reduced the surface wind speeds in the analyses and forecasts a little bit.

2 - ERS-2 STATISTICS FROM 18 JUNE TO 21 AUGUST 2000

Compared to the results from the previous cycle, the bias level have been reduced quite a lot (~0.1 dB) for the descending track Fore, Mid and Aft beam sigma0 biases over the whole incidence angle range with respect to the ECMWF model first guess winds. For ascending tracks there is a smaller bias for Fore and Aft measurements over the whole incidence angle range. The reduction is most pronounced for the Mid beam high incidence angle measurements. For ascending tracks a smaller reduction in the biases is found over the whole

■ ECMWF - Report on the ERS-2 Scatterometer ■

incidence angle range. This is most visible for the Fore and Aft beam measurements. 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 period on the 23 July 2000 (described above) without data. The mean normalised distance to the cone level for all node ranges is similar to the last part of the previous report cycle. 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 -0.75 m/s, (-1.13 m/s for nodes 1-2 down to -0.59 m/s for nodes 11-19). This is a rather large improvement from the previous report cycle. The standard deviations are similar to the results from the previous cycle: the standard deviation is on the average 1.52 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 1.62 m/s. The bias has improved since the results from the cycle 54 report: the average value is now -0.48 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 18.9 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 smaller 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 reduced speed biases are larger than would be expected due to seasonal variations or the reduced use of satellite data in the assimilation system (mentioned above)

■ 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.

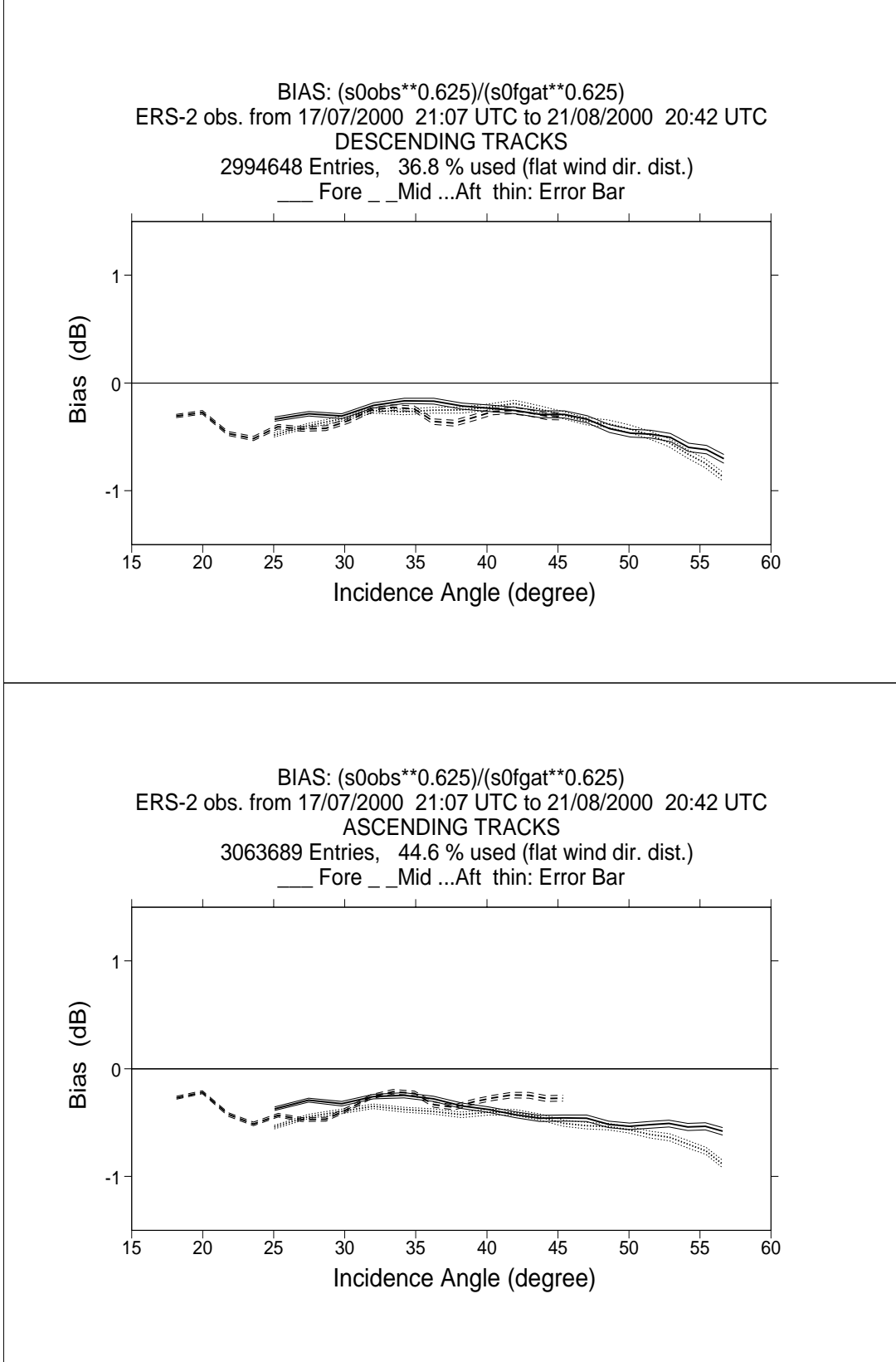


FIGURE 1

■ ECMWF - Report on the ERS-2 Scatterometer ■

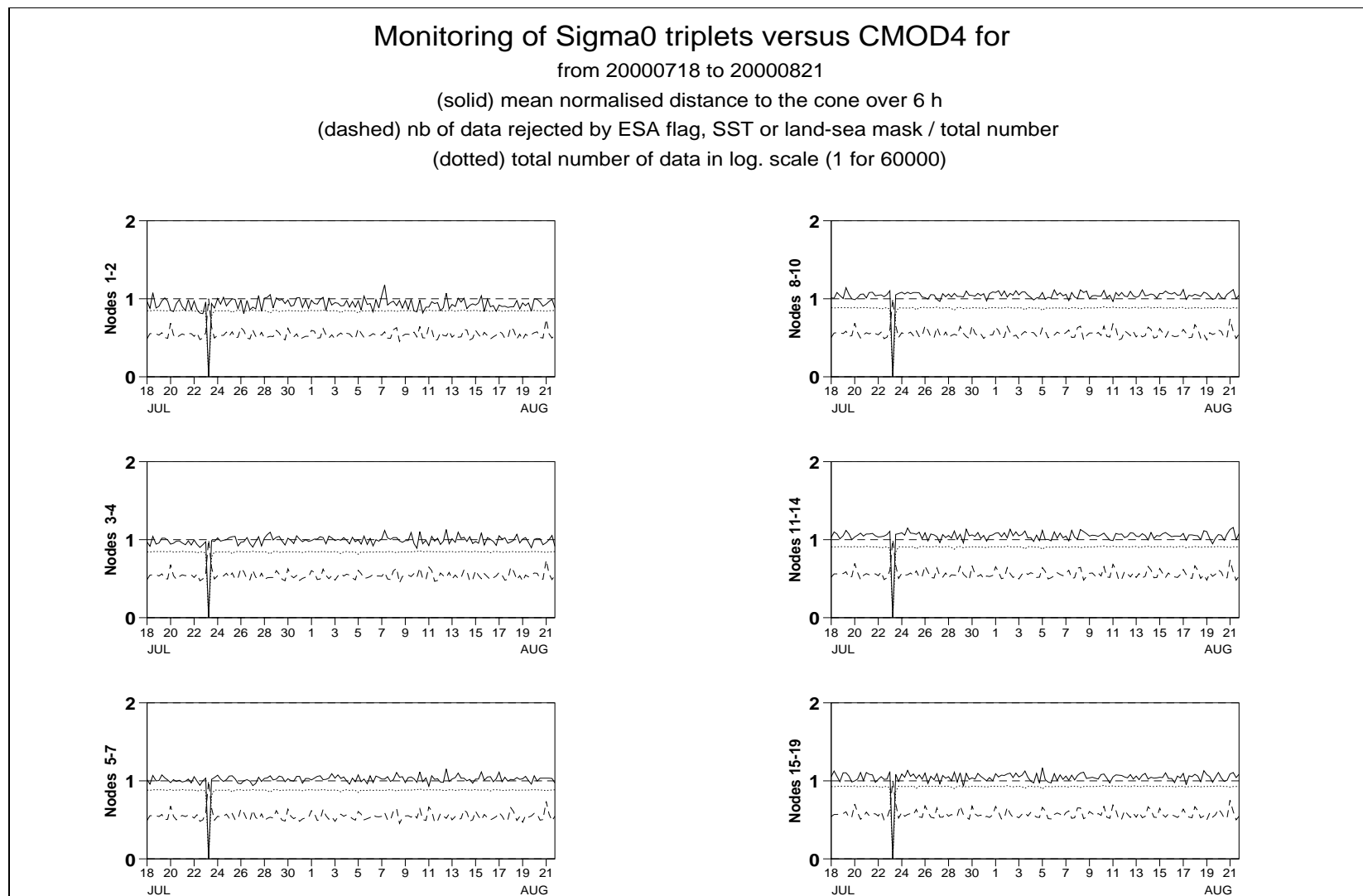


FIGURE 2

■ ECMWF - Report on the ERS-2 Scatterometer ■

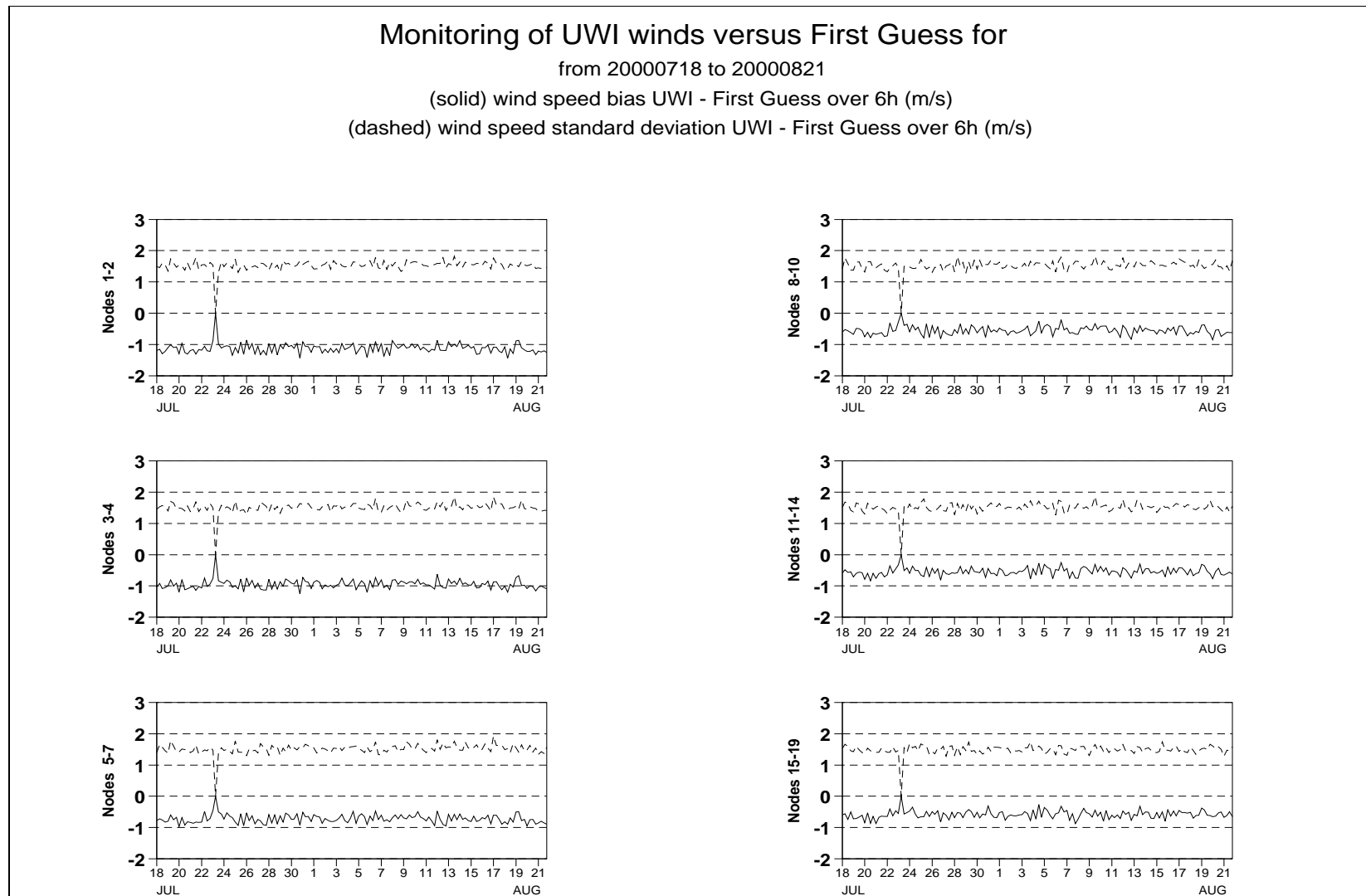


FIGURE 3

■ ECMWF - Report on the ERS-2 Scatterometer ■

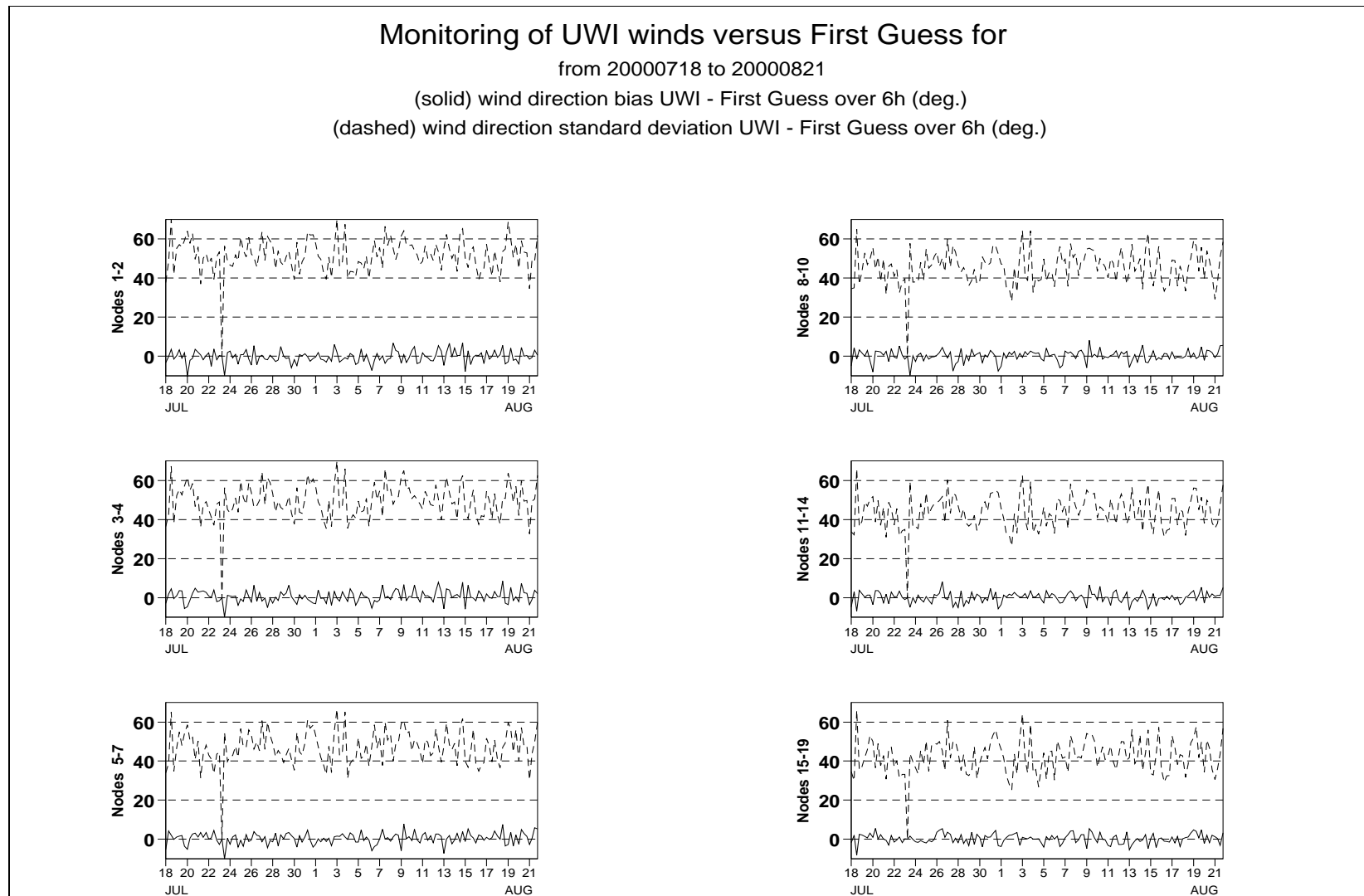


FIGURE 4

■ ECMWF - Report on the ERS-2 Scatterometer ■

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

from 20000718 to 20000821

(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)

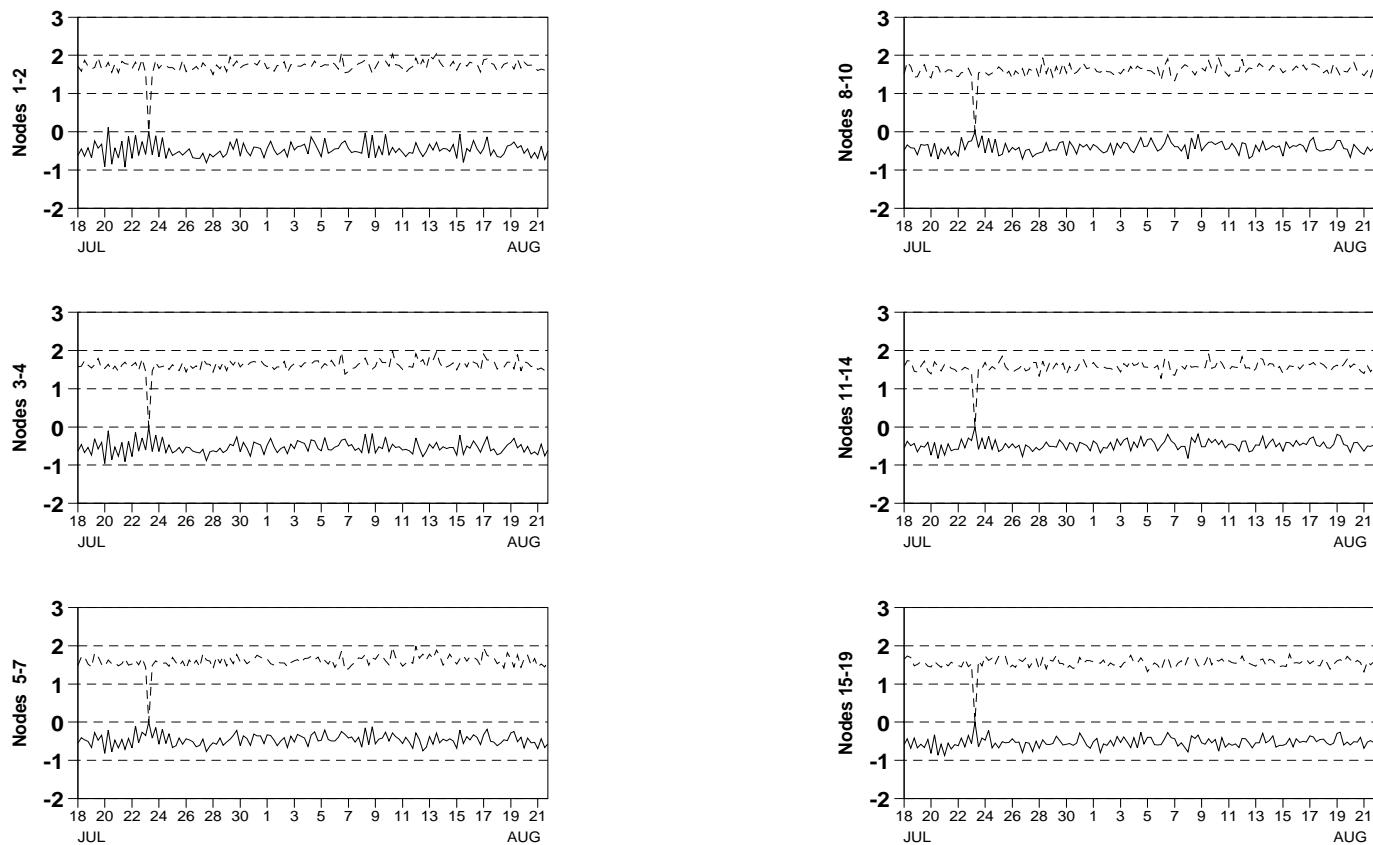


FIGURE 5



Lars Isaksen

European Centre for Medium Range Weather Forecasts

Shinfield Park, Reading, Berkshire RG2 9AX, England

Telephone: U.K. (0118) 9499852, International (+44 118) 9499852

Telex 847908 ECMWF G, Telefax (01189) 869450, e-mail mpi@ecmwf.int

■ ECMWF - Report on the ERS-2 Scatterometer ■

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

from 20000718 to 20000821

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

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

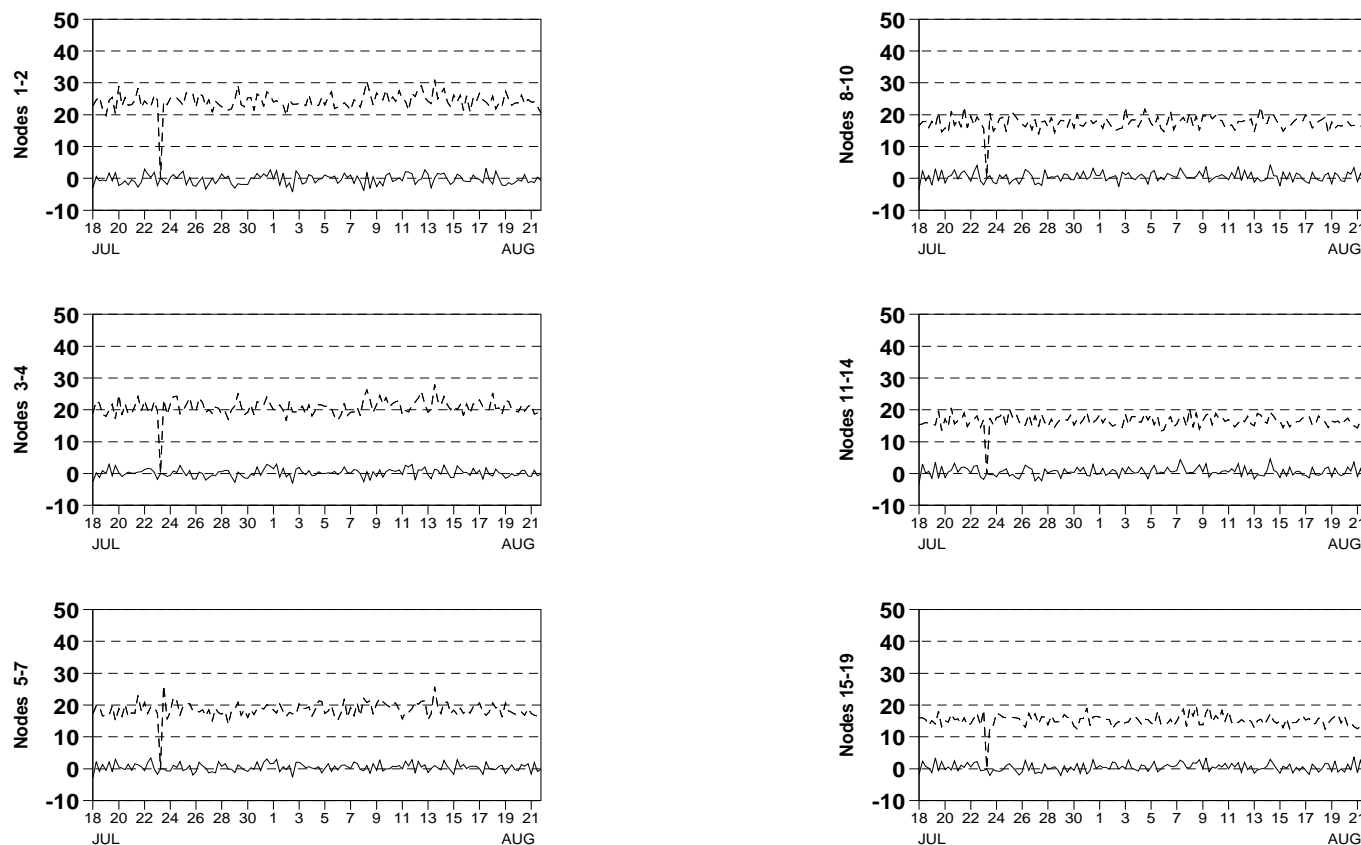


FIGURE 6

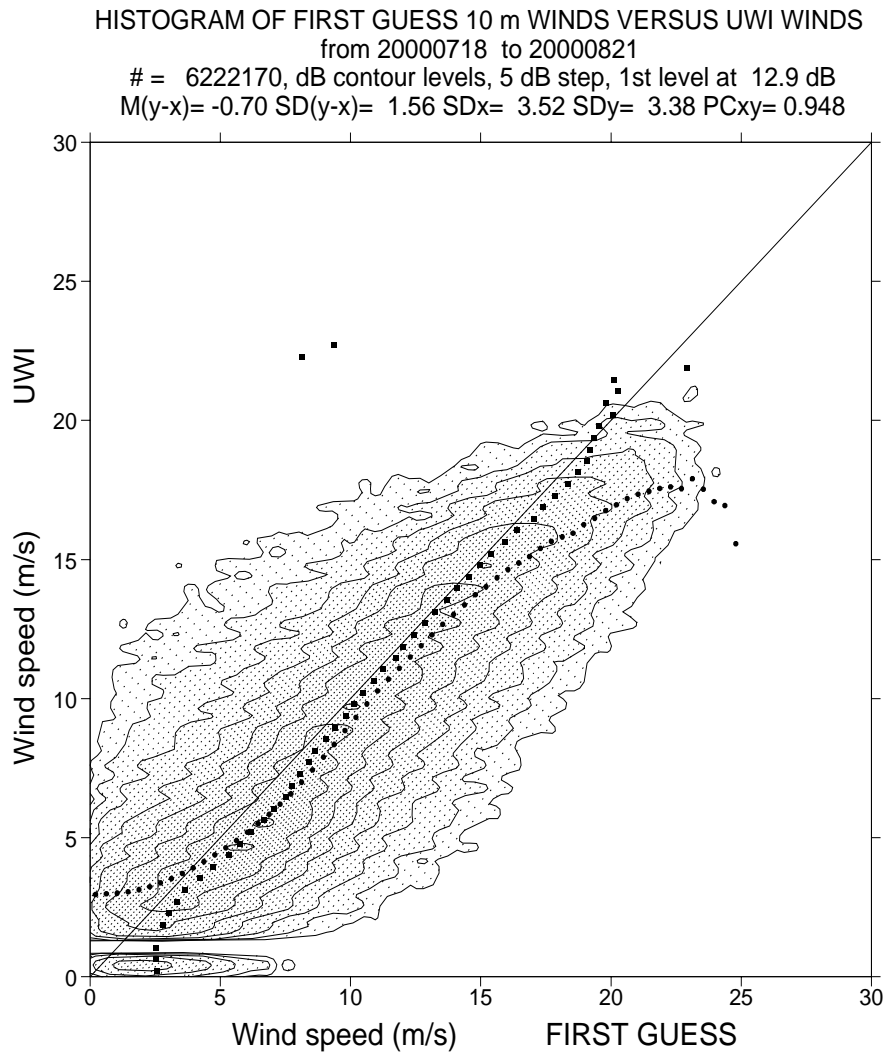


FIGURE 7

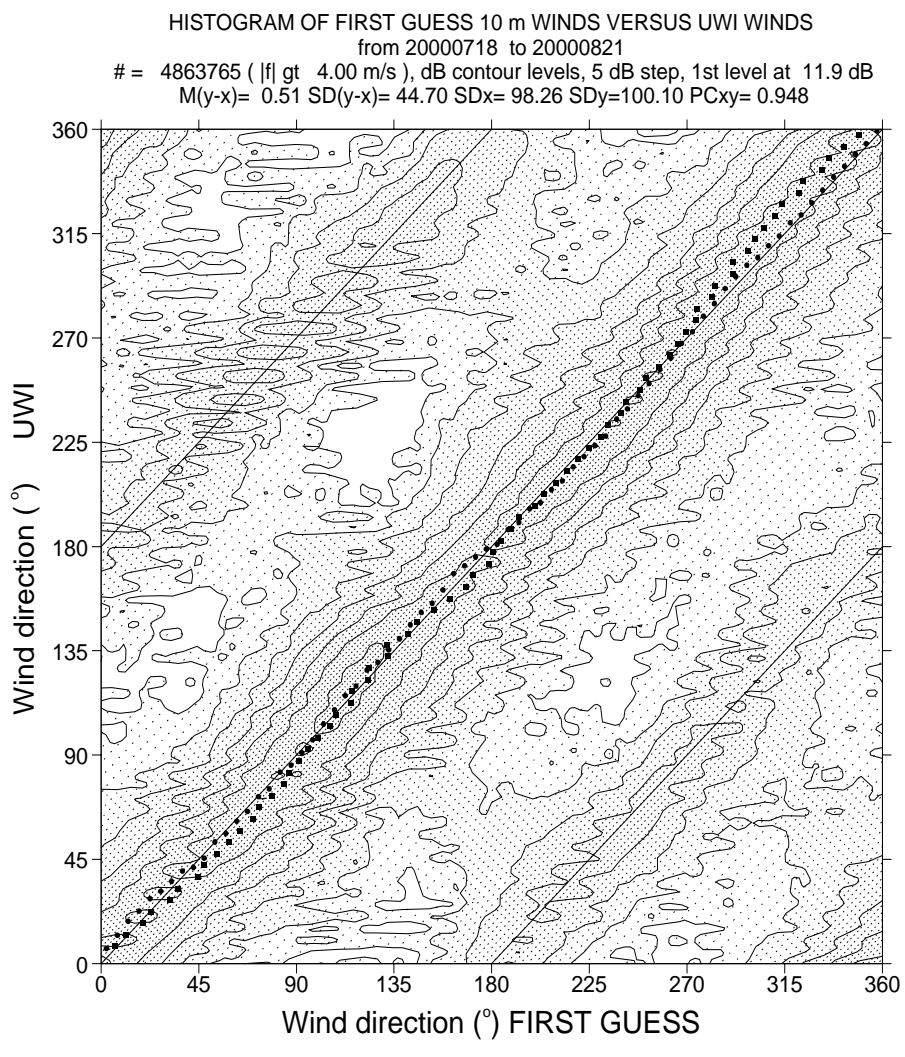


FIGURE 8