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: 26 April 2000

1 - INTRODUCTION

Cycle 51 had three periods without data: from 0 UTC to 6 UTC 21 March 2000, from 12 UTC 24 March 2000 until 6 UTC 25 March 2000, and from 18 UTC 27 March 2000 until 0 UTC 30 March 2000. Part of this was due to orbital manoeuvres. For the whole monitoring period the data quality was high. Lower than usual data volumes were received at ECMWF for the cycles just after the data void periods. In addition to that, lower data volumes were received for 12 UTC 19 March 2000. For these cycles the data volume was below 50% of the usual volume. Inspection of the data shows that there were no quality problems with the data received during those reduced volume cycles.

The ECMWF data assimilation system did not change during cycle 51.

2 - ERS-2 STATISTICS FROM 29 FEBRUARY 2000 TO 3 APRIL 2000

Compared to the results from the previous cycle, the level of the sigma0 biases with respect to the ECMWF model first guess winds are reduced quite a bit for all three beams and all incidence angles for descending tracks. For ascending tracks fore and aft beam biases are slightly smaller over the whole incidence angle range, compared to the results from cycle 50. All curves have a fairly flat distribution over the whole incidence range.

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

The distance to the cone history shows most pronounced the three data void periods. In addition, two peaks above normal levels are seen on 12 UTC 19 March 2000 and 12 UTC 25 March 2000. These peaks are due to low data volume for the involved cycles, the data for these cycles look OK. For the remaining part of the period the monitoring results are very stable without any sign of instrument problems. The sigma0 level is generally at the same level as is the previous cycle. The speed monitoring time series are also very stable, except for the anomalies on 12 UTC 19 March 2000 due to low data volume. The directional statistics shows a very uniform result, similar to the previous cycle's. The spike for nodes 1-7 on 12 UTC 19 March 2000 is due to low data volume.

The UWI winds have an average bias of -0.76 m/s, (-1.11 m/s for nodes 1-2 down to -0.59 m/s for nodes 11-19). This is an improvement compared to the results from the previous cycle. The standard deviations are similar to the results from the previous cycle: the standard deviation is on the average 1.55 m/s, and very 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 better than in cycle 50: 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 48 degrees) and between 15 and 30 degrees (average value 19.7 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 improved bias and standard deviation compared to the previous cycle. The direction scatter plot is in close agreement with the results from the previous cycle.

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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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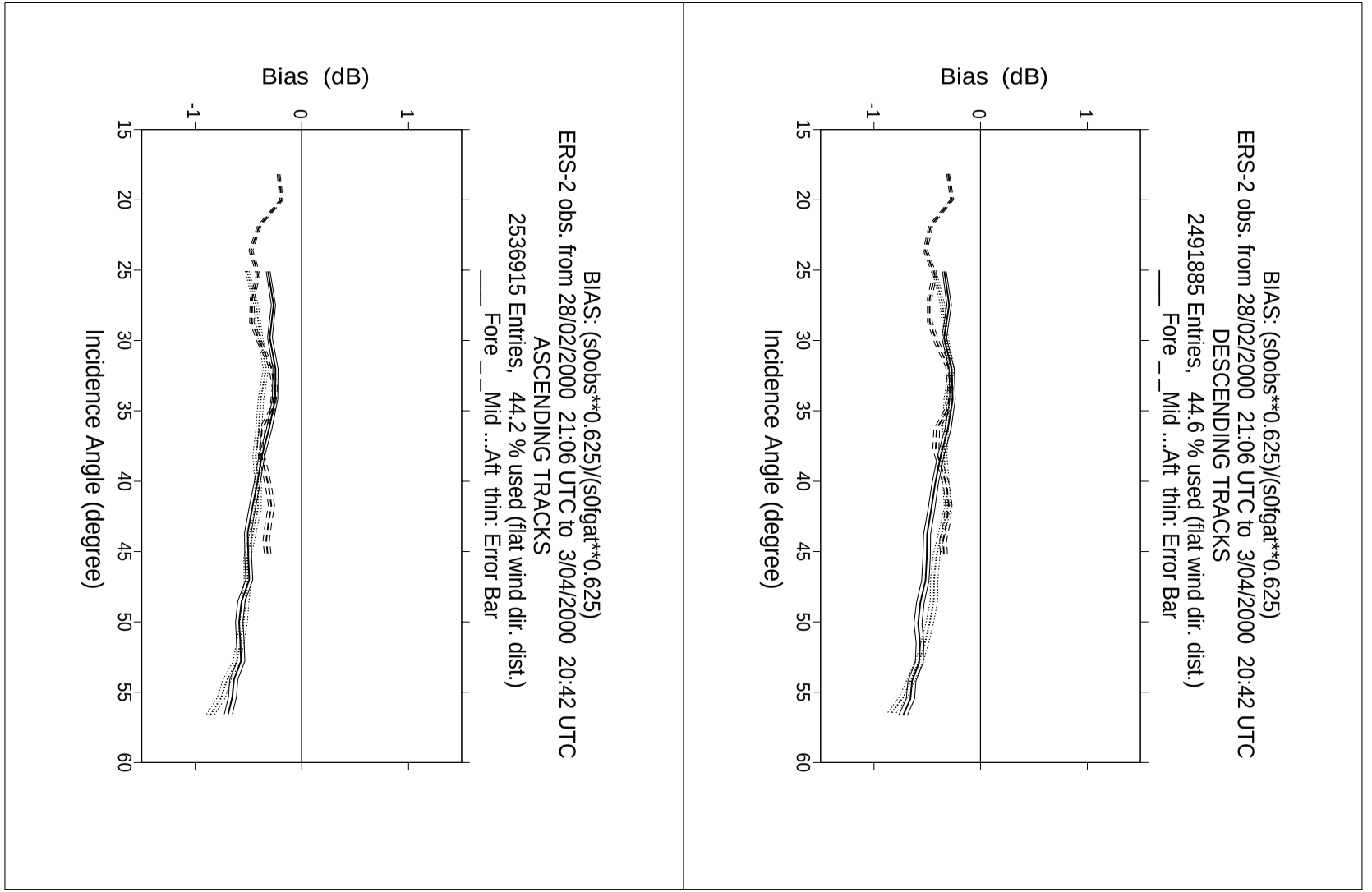

FIGURE 1

Lars Isaksen
European Centre for Medium Range Weather Forecasts
Shinfield Park, Reading, Berkshire RG2 9AX, England
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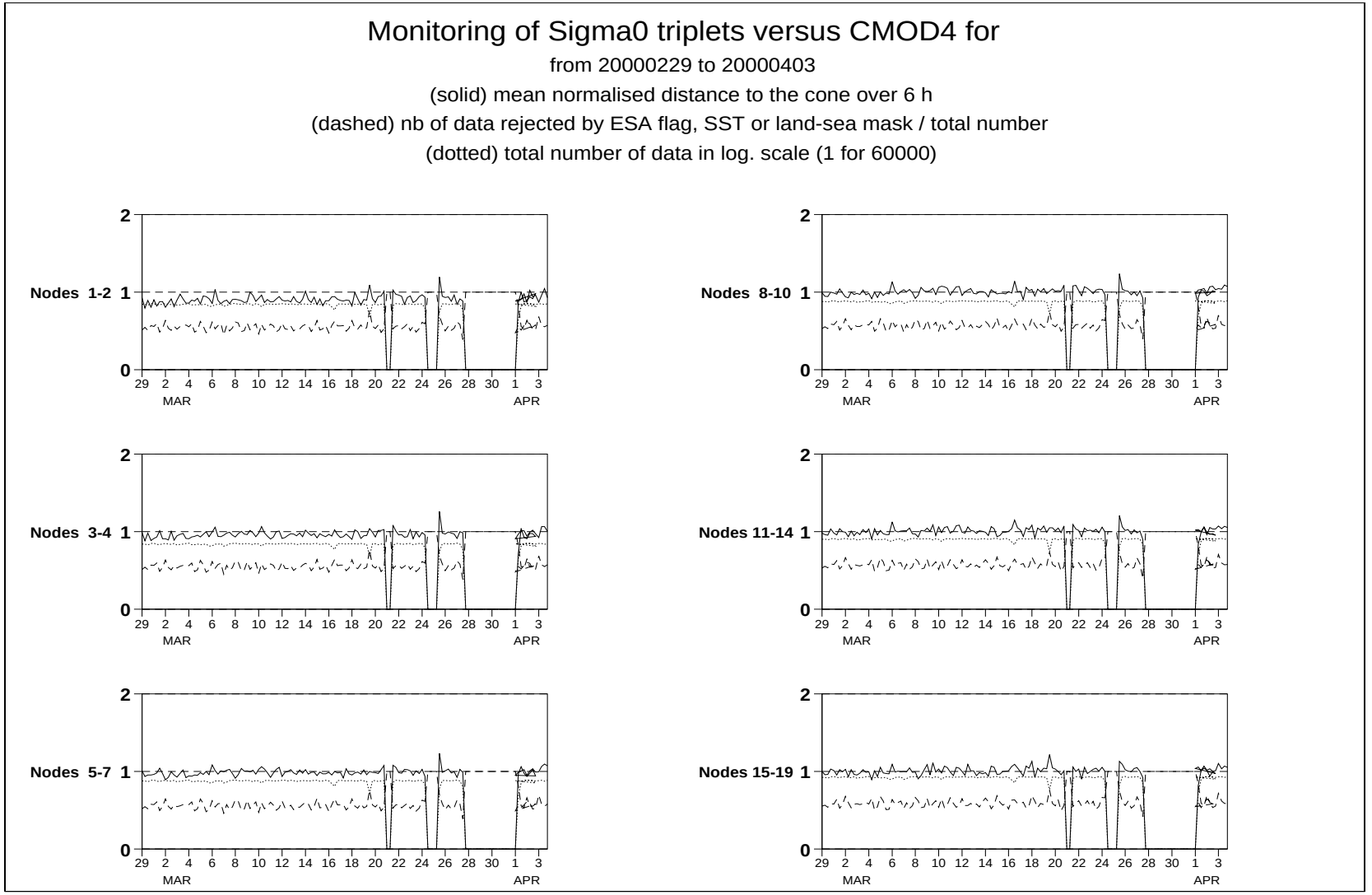

FIGURE 2

Lars Isaksen
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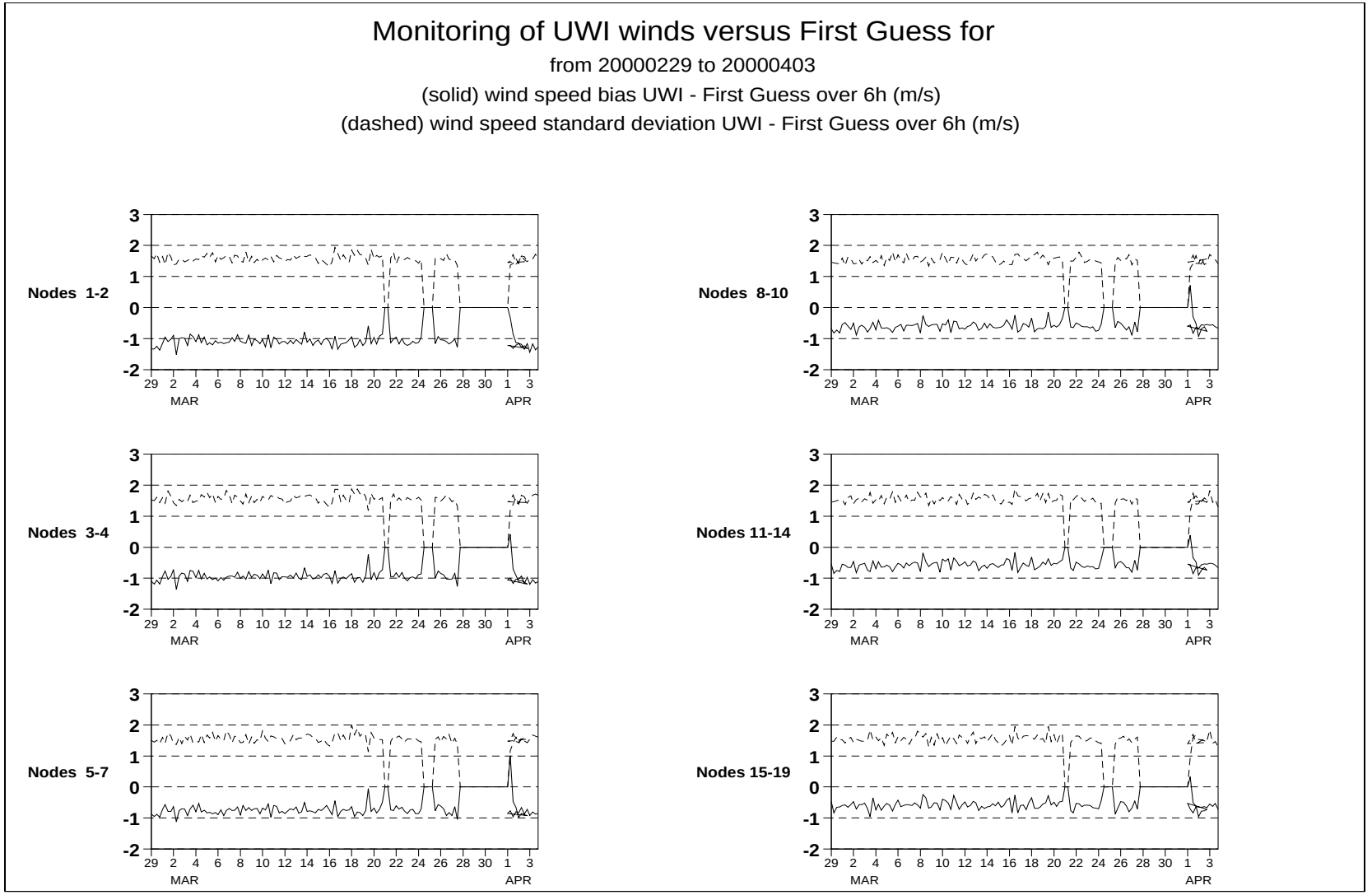

FIGURE 3

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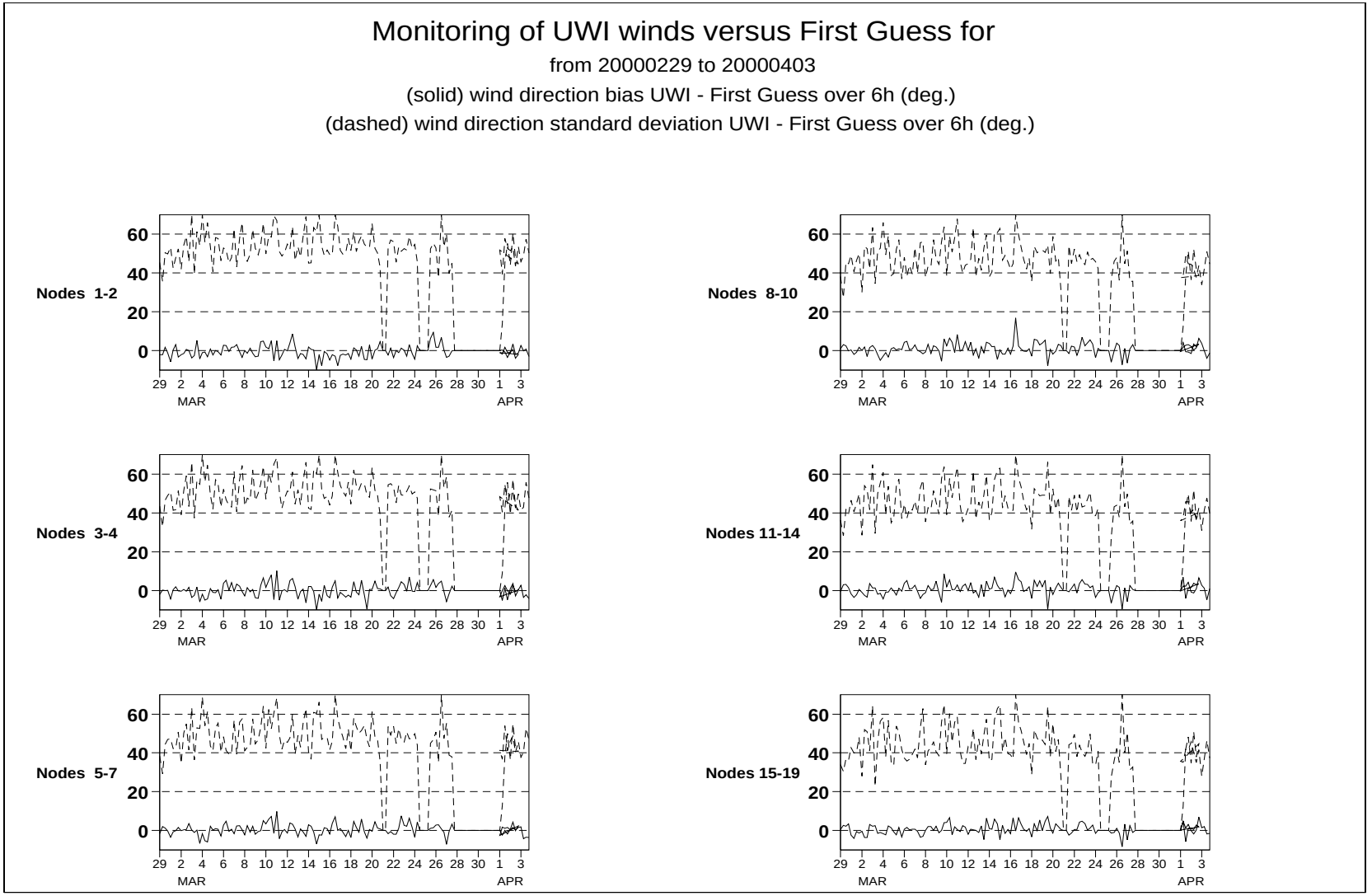

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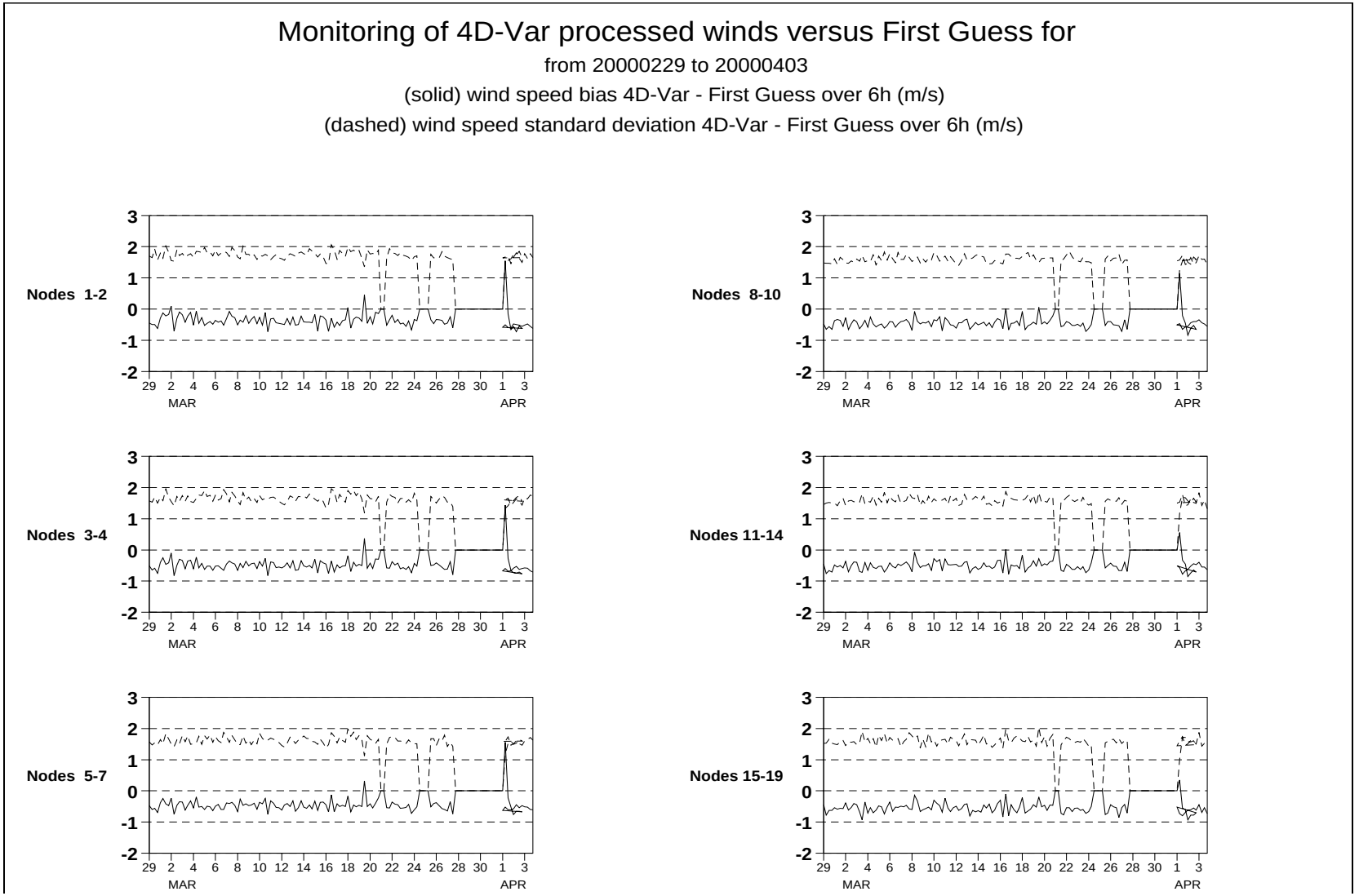

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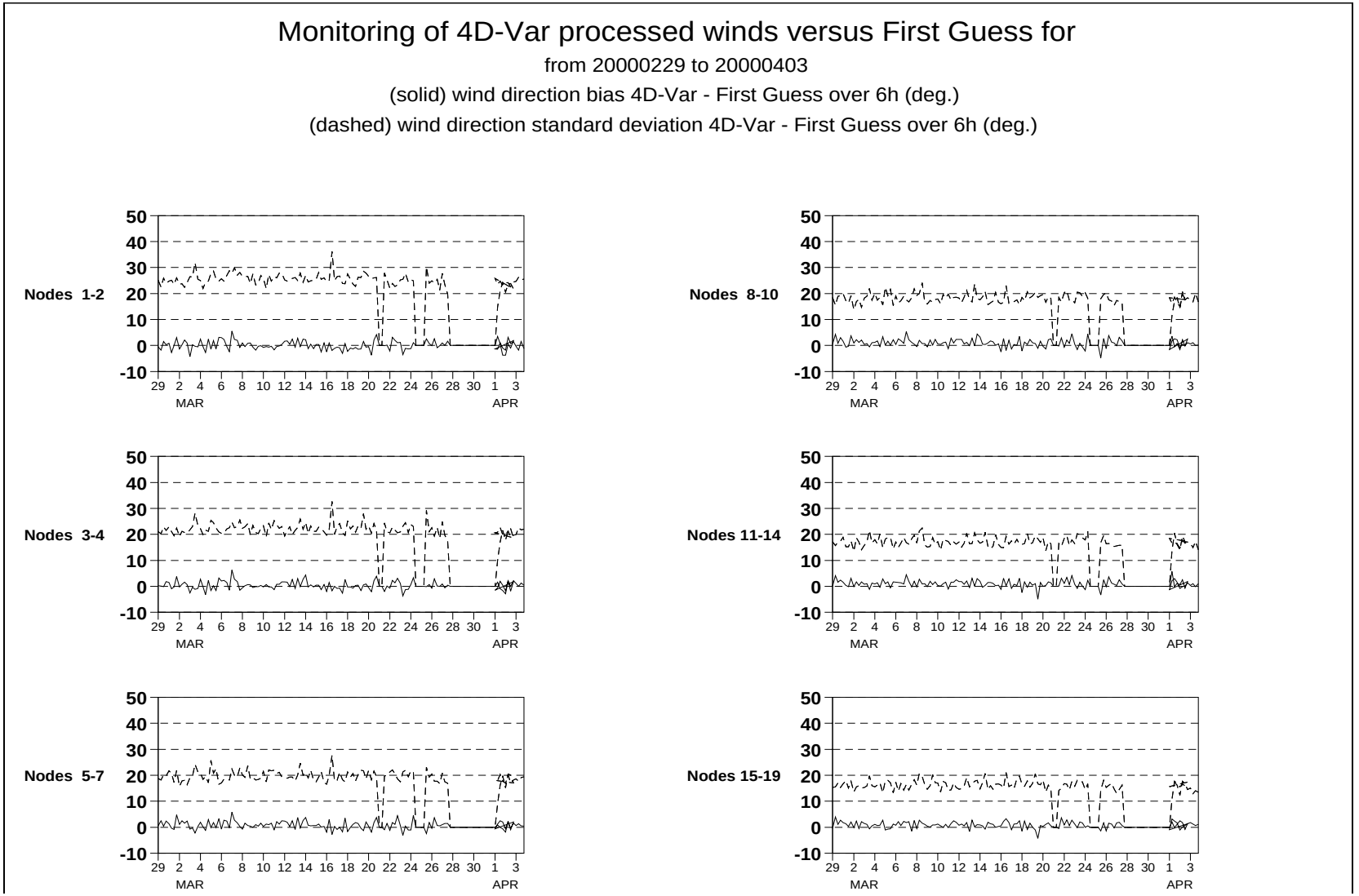

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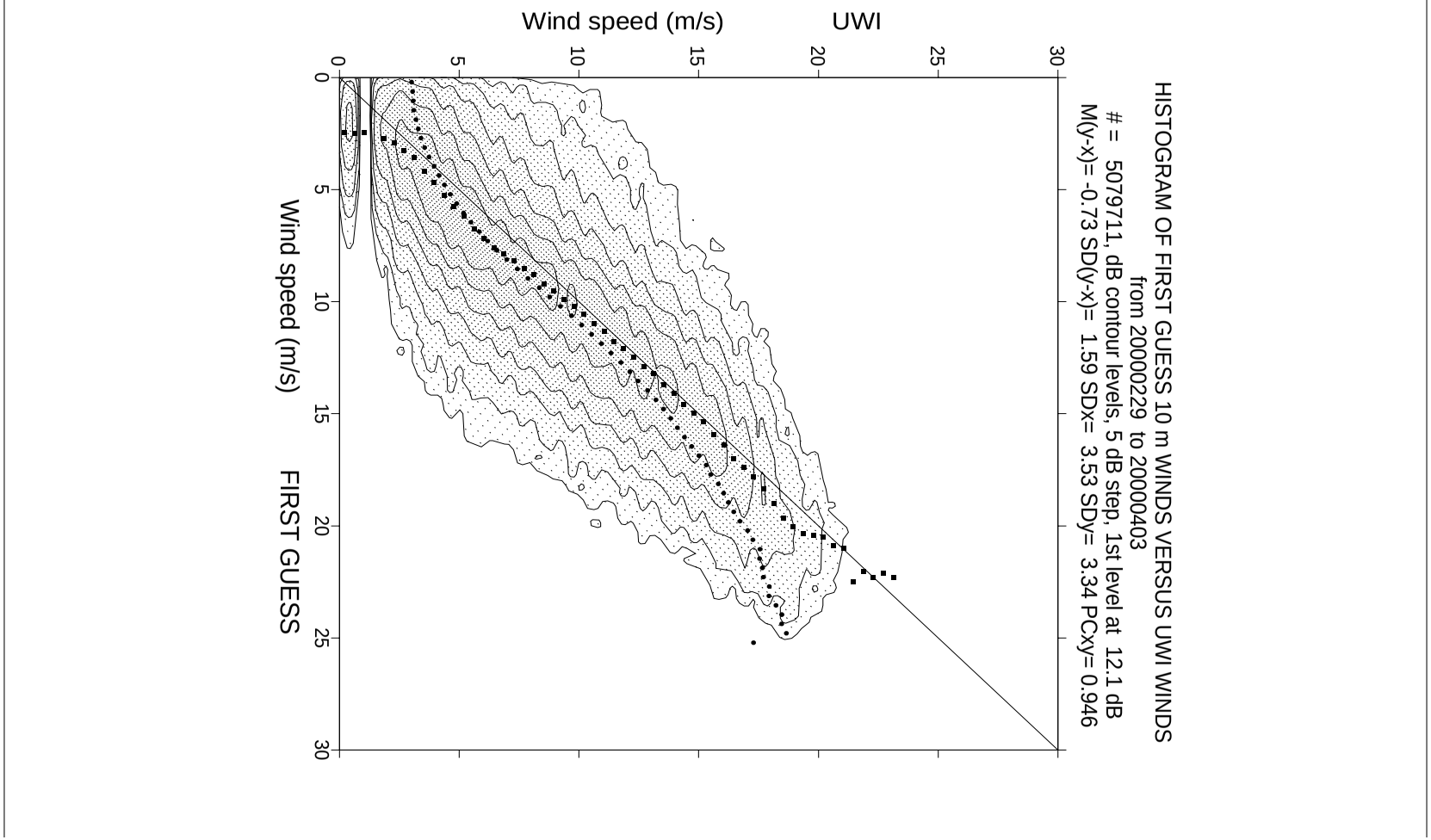

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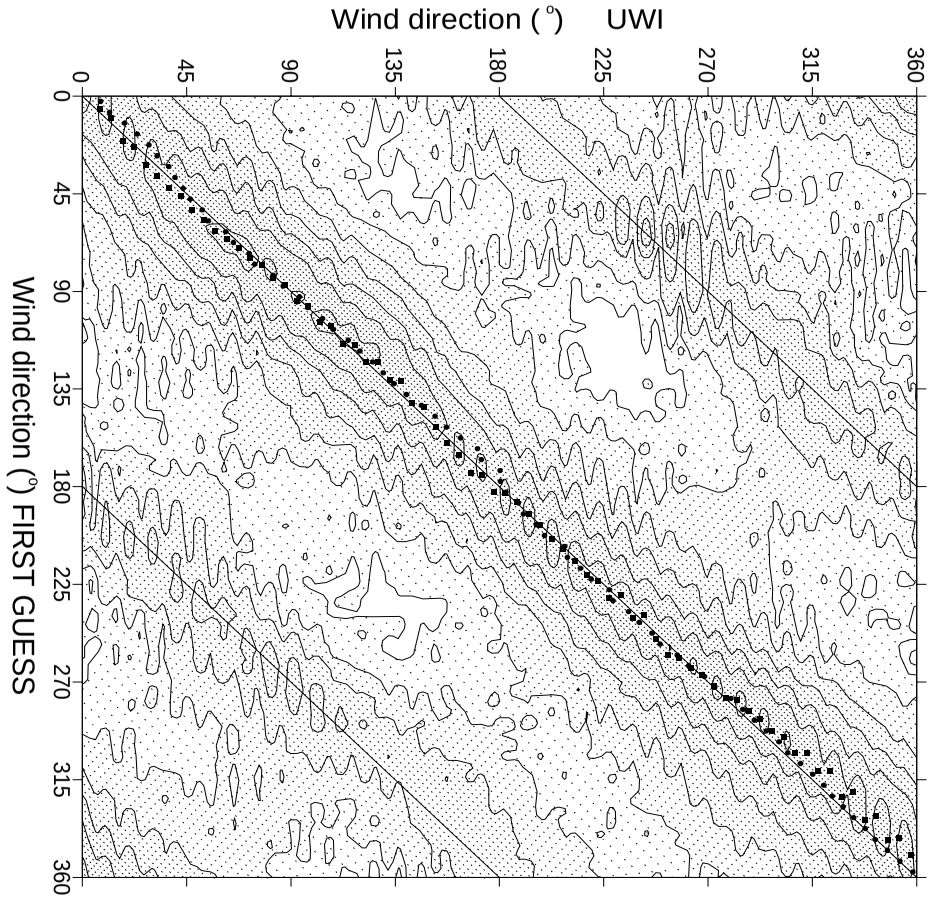

FIGURE 8

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