MONITORING STATISTICS OF ERS-2 SCATTEROMETER FOR ESA (Project Ref. 12893/98/NL/PR)

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•Date: 22 February 2001

1 - INTRODUCTION:

During cycle 60 the ERS-2 scatterometer data was disrupted by a major on-board failure. The following performance was observed:

Up to 02:50 UTC 16 January 2001: high quality data.

For 02:50 UTC 16 January 2001 to 08:01 UTC 17 January 2001: varying quality. The higher nodes were affected most (see e.g. figure 2).

For 08:01 UTC to 15:12 UTC 17 January 2001: no data was received.

For 15:12 UTC to 19:51 UTC 17 January 2001: restart of data flow, initially of good quality, but deteriorating rapidly and then only data was received for the highest nodes.

For 19:51 UTC 17 January 2001 to 13:03 UTC 2 February 2001: no data was received.

For 13:03 UTC to 16:29 UTC 2 February 2001: restart of data flow, which is of poor quality and mainly for the higher nodes only.

For 16:29 UTC 2 February to the end of cycle 60: no data was received.

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Most of the erroneous data in cycle 60 were rejected by the 4D-Var data assimilation system at ECMWF. The ECMWF assimilation system was not modified during cycle 60.

ERS-2 STATISTICS FROM 09 JANUARY 2001 TO 12 FEBRUARY 2001

Results presented in this section (and Figures 1, 7 and 8) are produced for the period in which the received data was stable, i.e. from 21:01 UTC 8 January 2001 to 02:59 UTC 16 January 2001. Although the sample size for this period is much smaller than usual, a comparison with the performance during the previous cycle (59) will be made. Compared to this cycle (59), the sigma0 bias level (compared to simulated sigma0's based on ECMWF model first guess winds) of the descending and ascending tracks has been improved for all three beams. At the moment the reason for this remarkable result is not clear.

The distance to the cone history shows peaks for the two short periods (see introduction) in which the data flow was restarted. The peaks are more profound towards higher nodes. The UWI and 4D-Var processed wind speed and direction monitoring plots also show a peak for these periods. The mean normalised distance to the cone is similar to the previous report cycle for all node ranges.

The UWI winds have an average bias of -0.70 m/s, (-1.02 m/s for nodes 1-2 down to -0.56 m/s for nodes 11-19). It is about 10% lower than the biases from the previous cycle. The standard deviation remained almost the same: on average 1.56 m/s, and similar to all nodes. The same trend applies to the ECMWF (4D-Var) processed data: the bias decreased (from -0.53 m/s to -0.41 m/s) and the standard deviation hardly changed (1.64 m/s). The (scatterometer - model) direction standard deviations were ranging between 40 and 60 degrees for the UWI data (average value 52.2 degrees; was 52.4) and between 15 and 25 degrees (average value 19.0; unchanged) for their 4D-Var counterparts. As usual, the directional bias is close to zero for both UWI and 4D-Var products.

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The scatter plot of model 10 m wind speeds versus UWI wind speeds shows a smaller bias (-0.65 m/s) compared to the plot from the previous cycle (-0.73 m/s). The standard deviation is comparable (1.60 m/s). The direction scatter plot looks similar to the results from the previous cycle, although both the bias (from 2.2 to 1.0 degrees) and the standard deviation (from 50.4 to 49.8 degrees) have been decreased.

2 - 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. 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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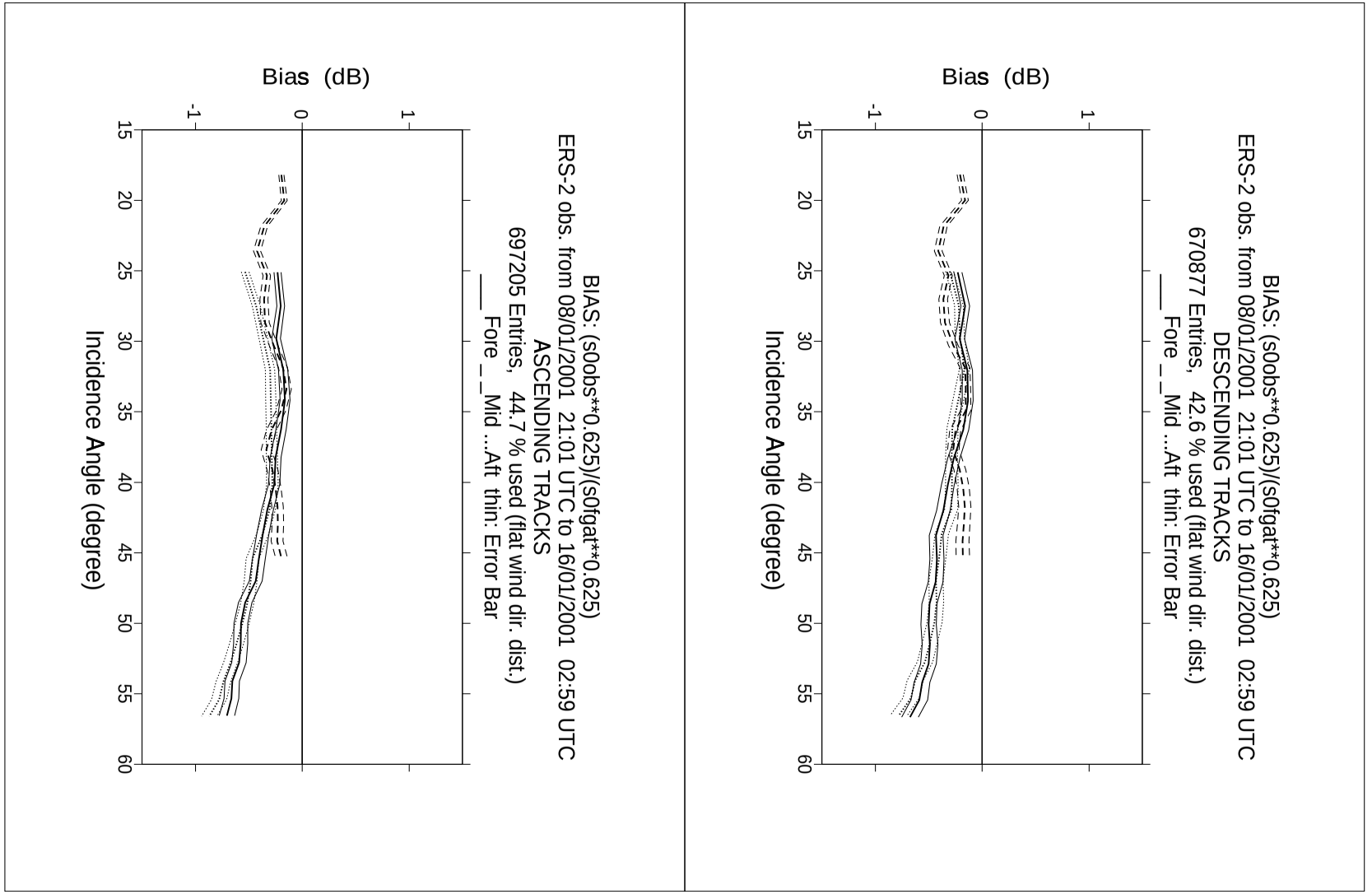

FIGURE 1

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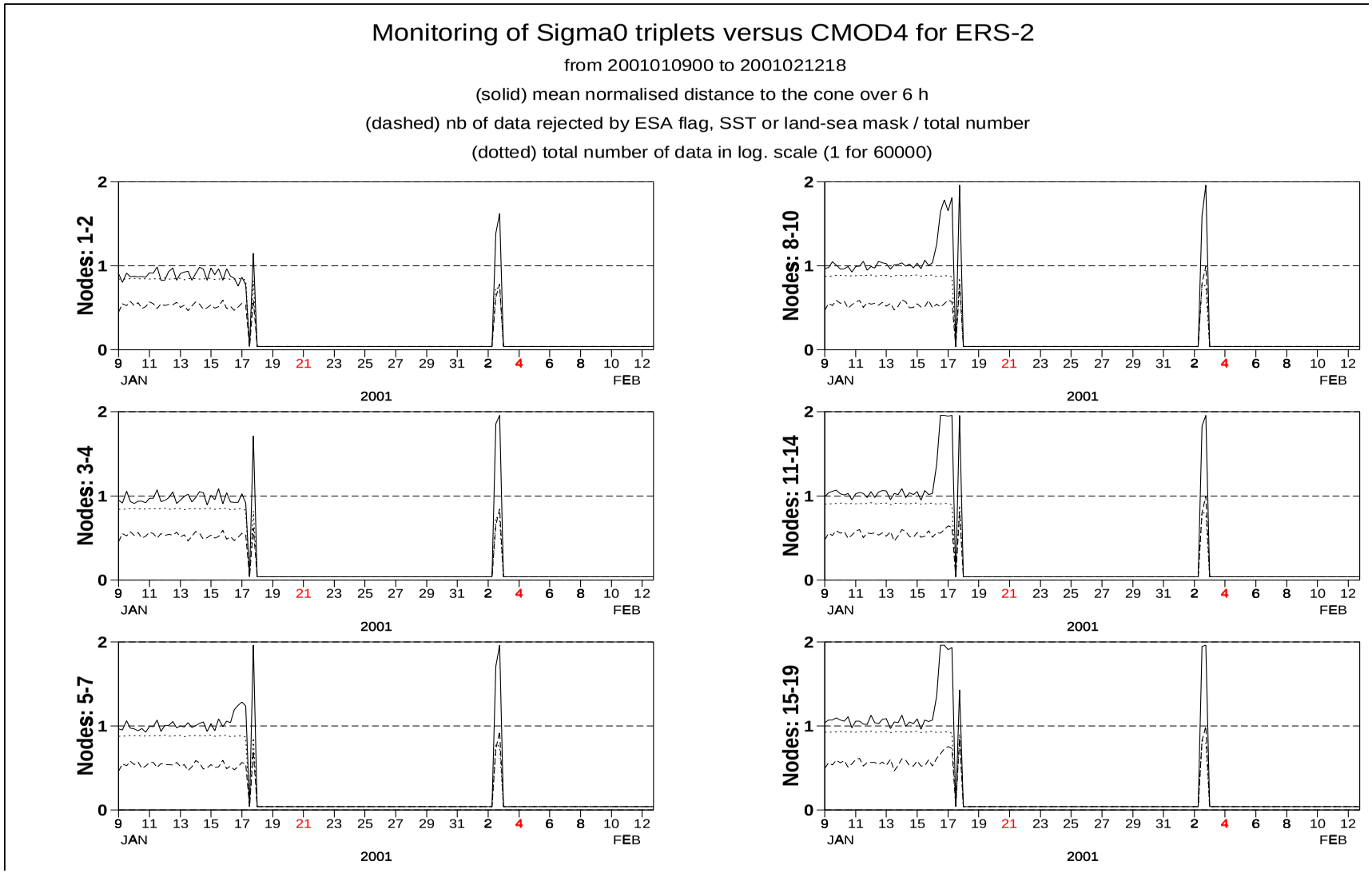

FIGURE 2

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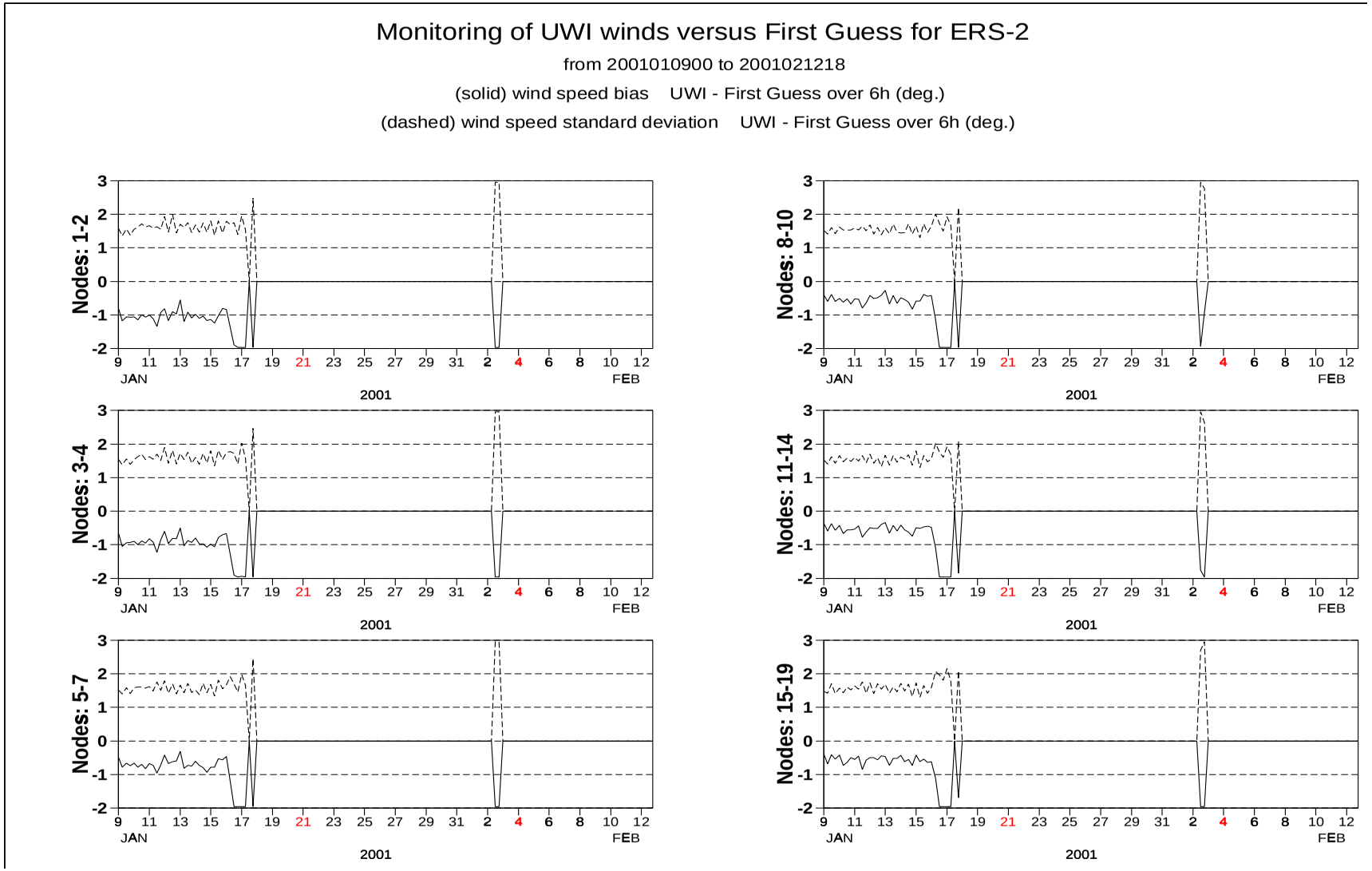

FIGURE 3

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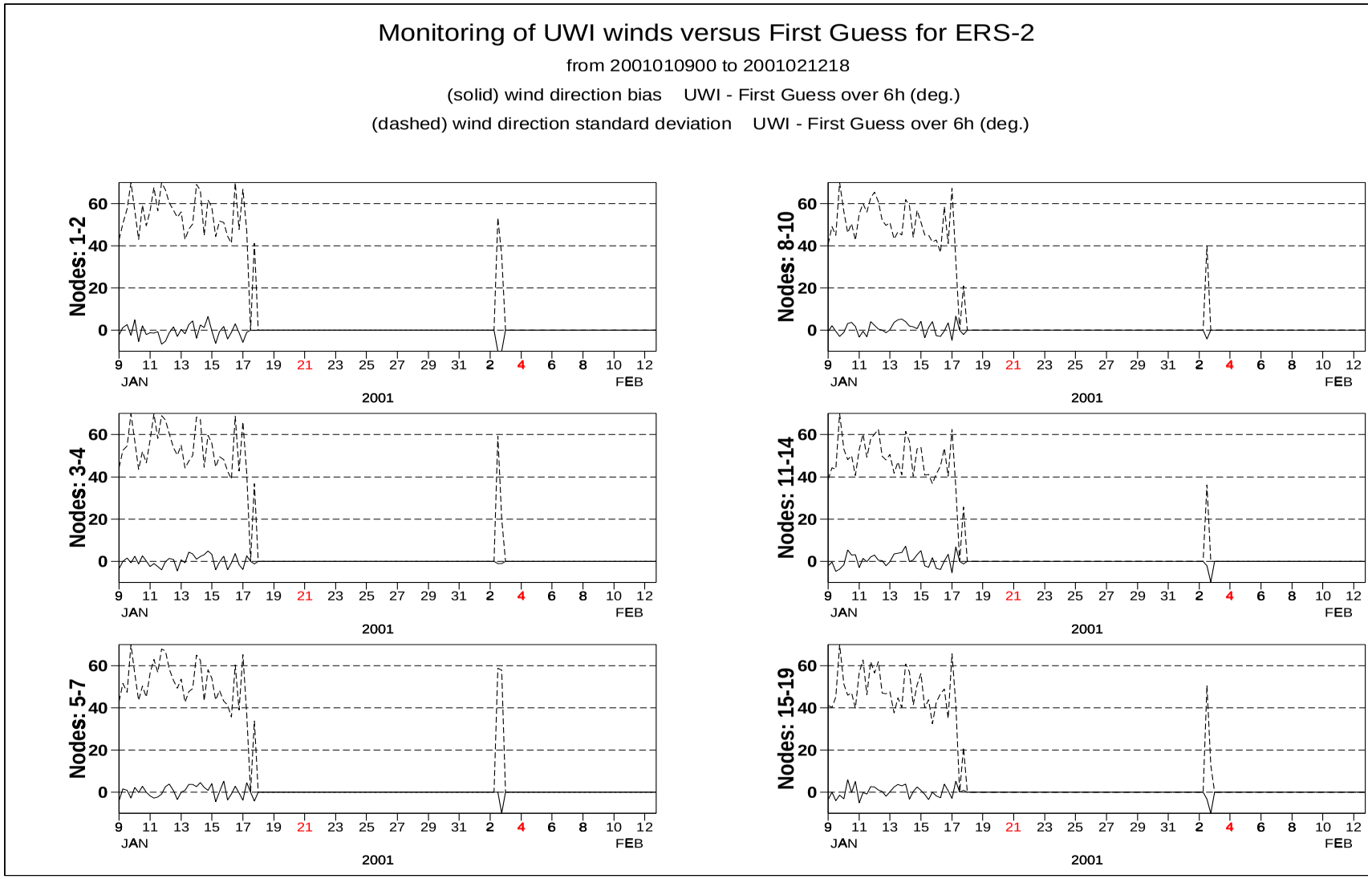

FIGURE 4

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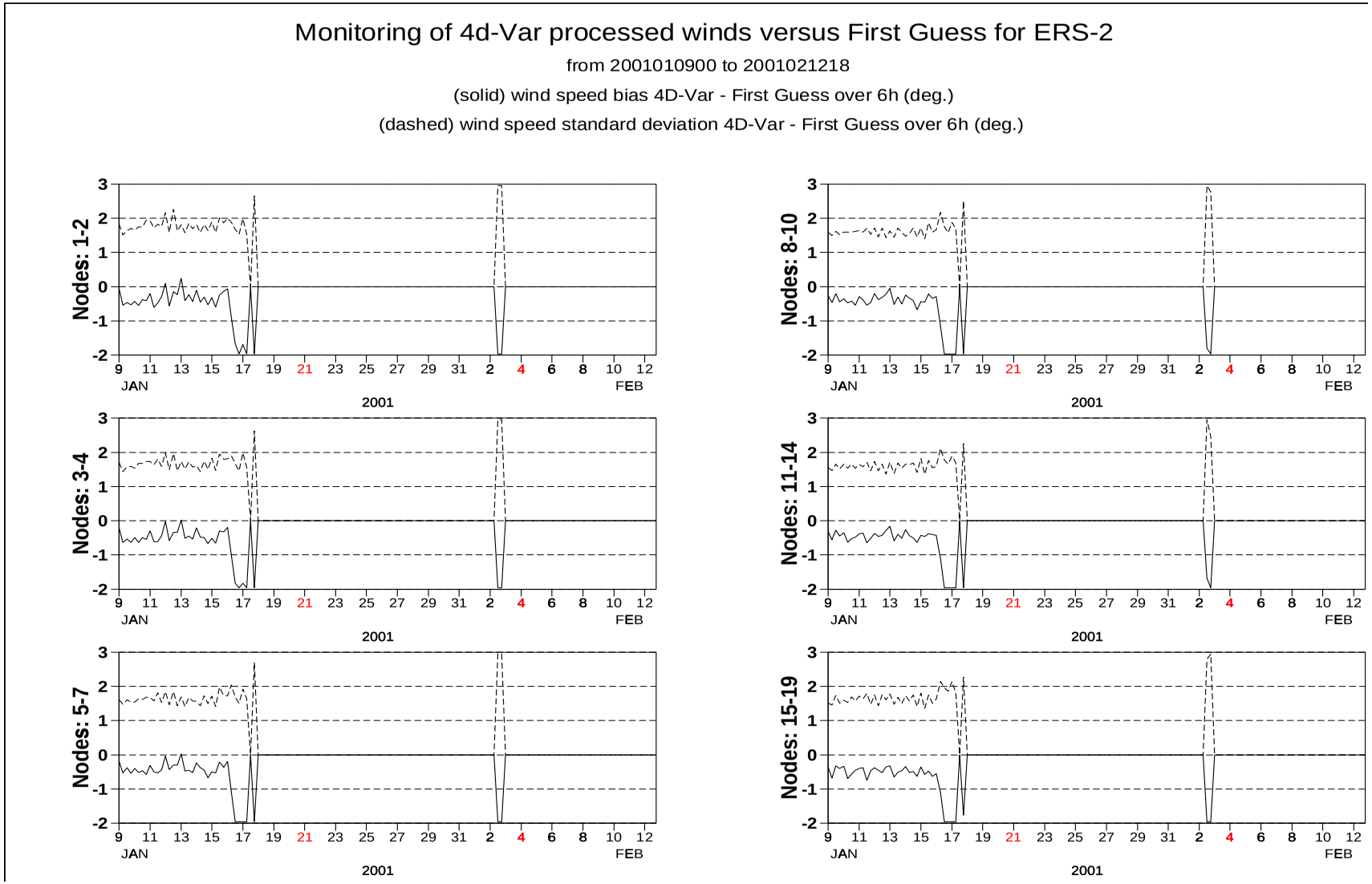

FIGURE 5

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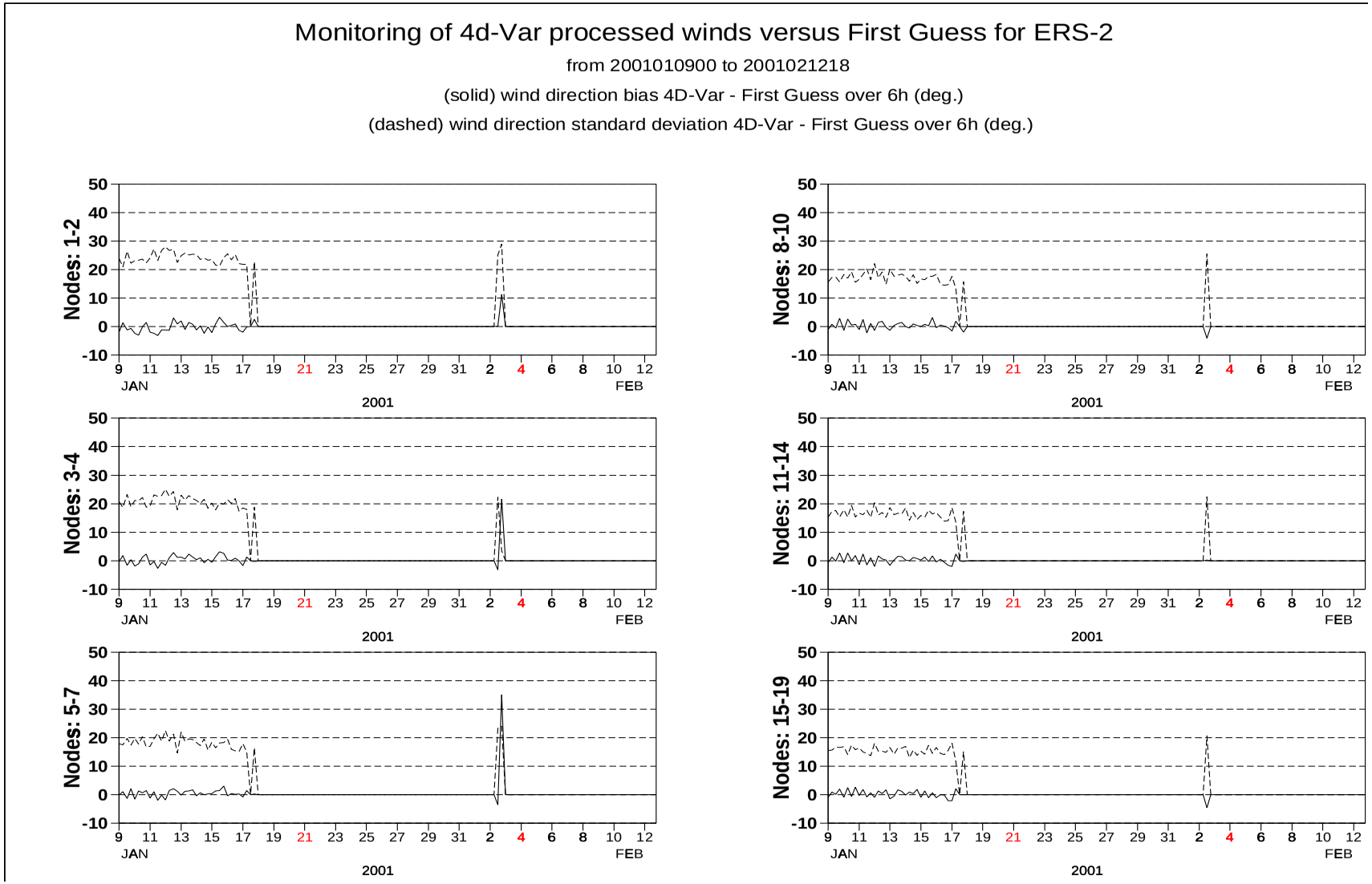

FIGURE 6

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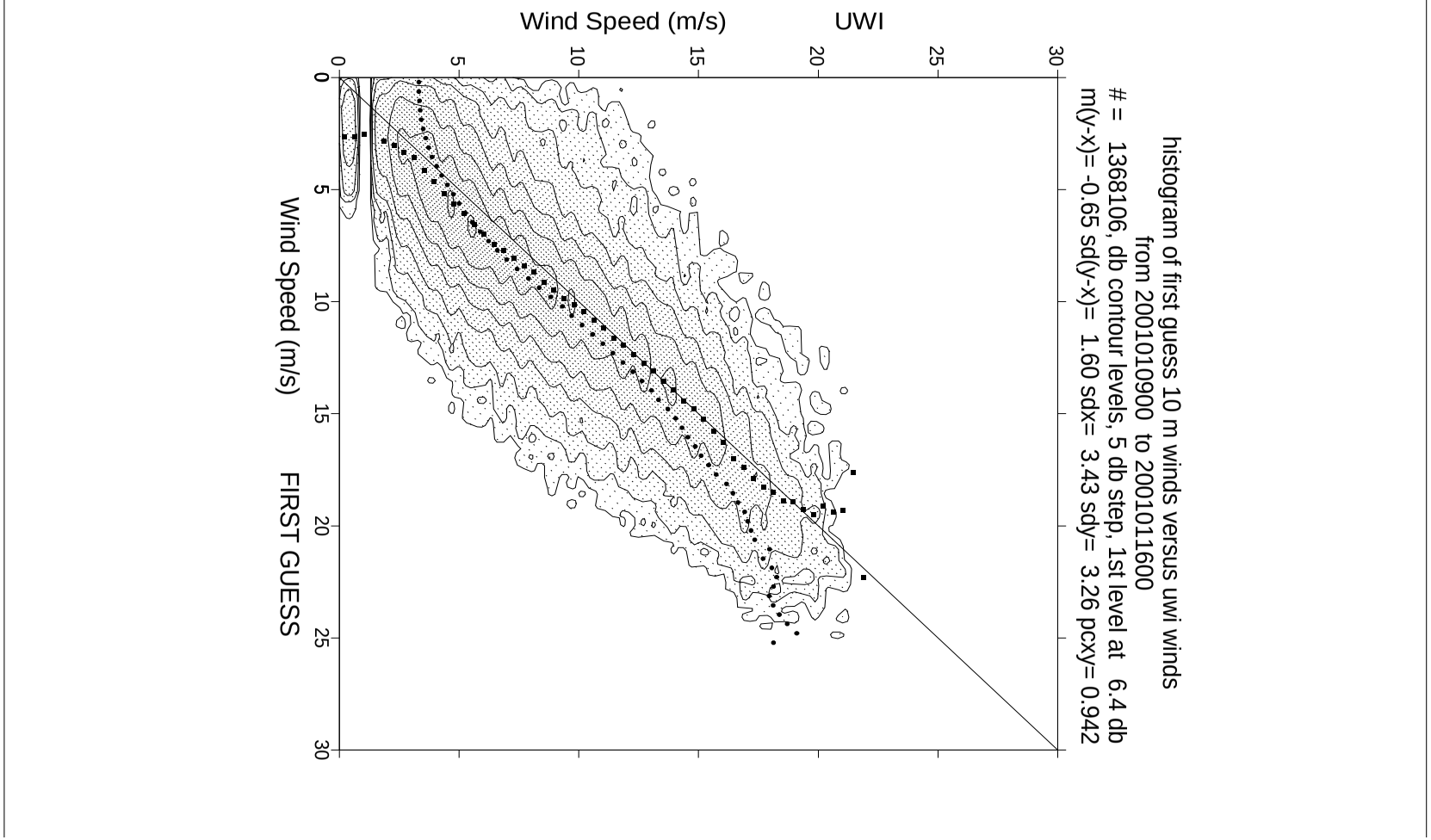

FIGURE 7

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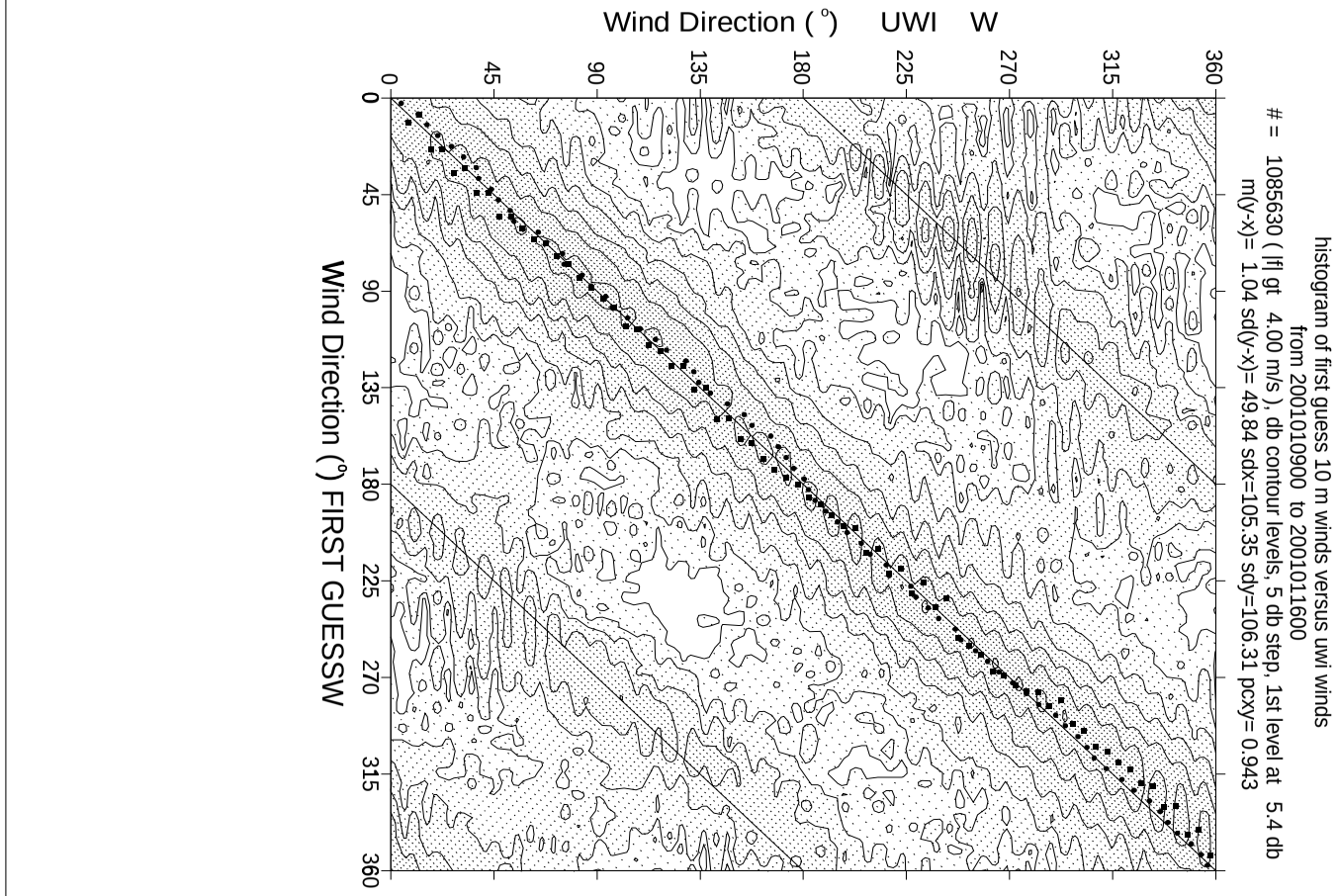

FIGURE 8

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