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: 7 January 2000

1 - INTRODUCTION

During the 48th cycle the ERS instruments were switched of from 18 UTC 17 November 1999 until 15 UTC 18 November 1999 as a precaution against the Leonid Meteor Storm. An orbital inclination correction manoeuvre took place at 8-14 UTC on 8 December 1999. This resulted in poor quality measurement for that cycle. For the remaining part of the monitoring period the data quality was high. Lower than usual data volumes were received at ECMWF, in addition to the Leonid period, for two cycles: 0 UTC 17 November 1999 and 18 UTC 25 November 1999. 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 two reduced volume cycles.

The ECMWF data assimilation system did not change during cycle 48.

2 - ERS-2 STATISTICS FROM 15 NOVEMBER 1999 TO 20 DECEMBER 1999

The level of the sigma0 biases with respect to the ECMWF model first guess winds are similar to the results from the previous cycle. For descending tracks the fore and aft beam biases are slightly larger than the results from the cycle 47 for incidence angles above 30 degrees. For ascending tracks the fore and aft beam

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biases are slightly larger over the whole incidence angle range. All curves have a nice flat distribution over the whole incidence range.

The distance to the cone history shows the data void periods and a large peak for 12 UTC 8 December 1999 that is due to the orbital manoeuvre. The low data volume cycles are not really visible on the distance to the cone plot. For the whole 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 very stable, except for the negative peak during the orbital manoeuvre case. The directional statistics shows a very uniform result, similar to the previous cycle's.

The UWI winds have an average bias of -0.82 m/s, (-1.16 m/s for nodes 1-2 down to -0.64 m/s for nodes 11-19). This is slightly larger than in the previous cycle, and is quite likely due to seasonal variations. The standard deviations is similar to the values seen in the previous cycle: the standard deviation is on the average 1.52 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 1.61 m/s. The bias is slightly worse than in cycle 47: the average value is now -0.58 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 19.7 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 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 slight increase in bias and a standard deviation similar to the results from 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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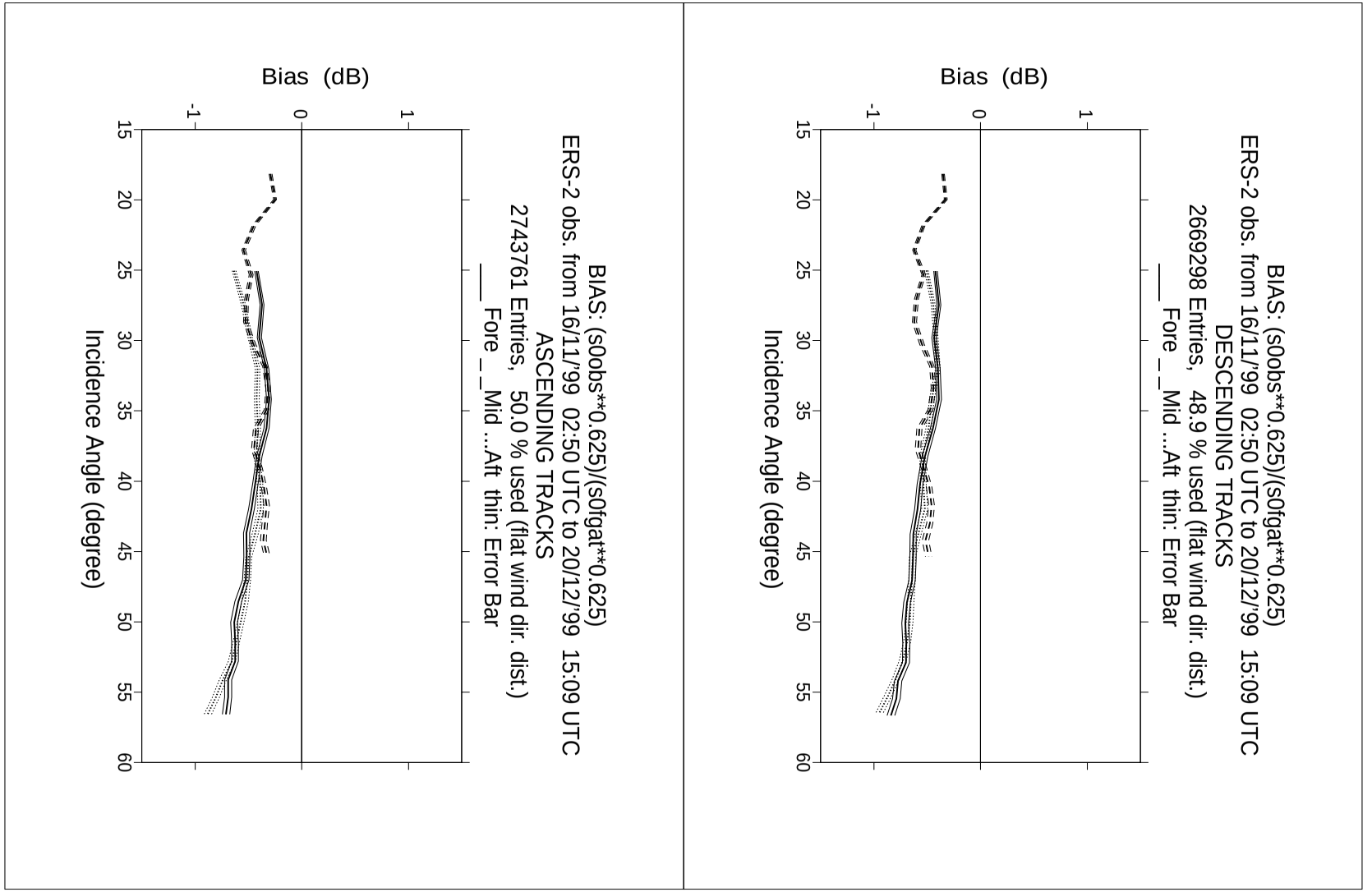

FIGURE 1

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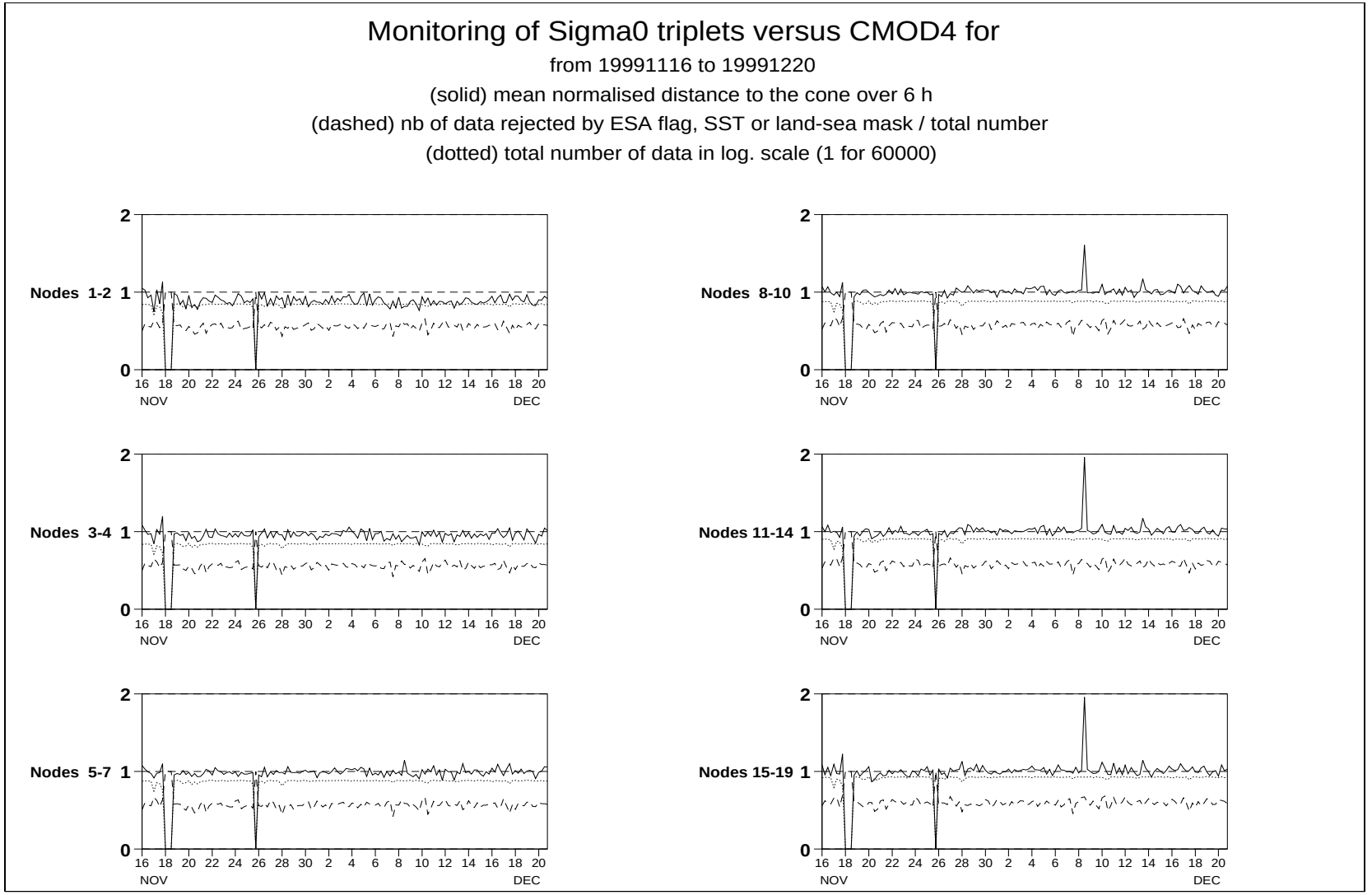

FIGURE 2

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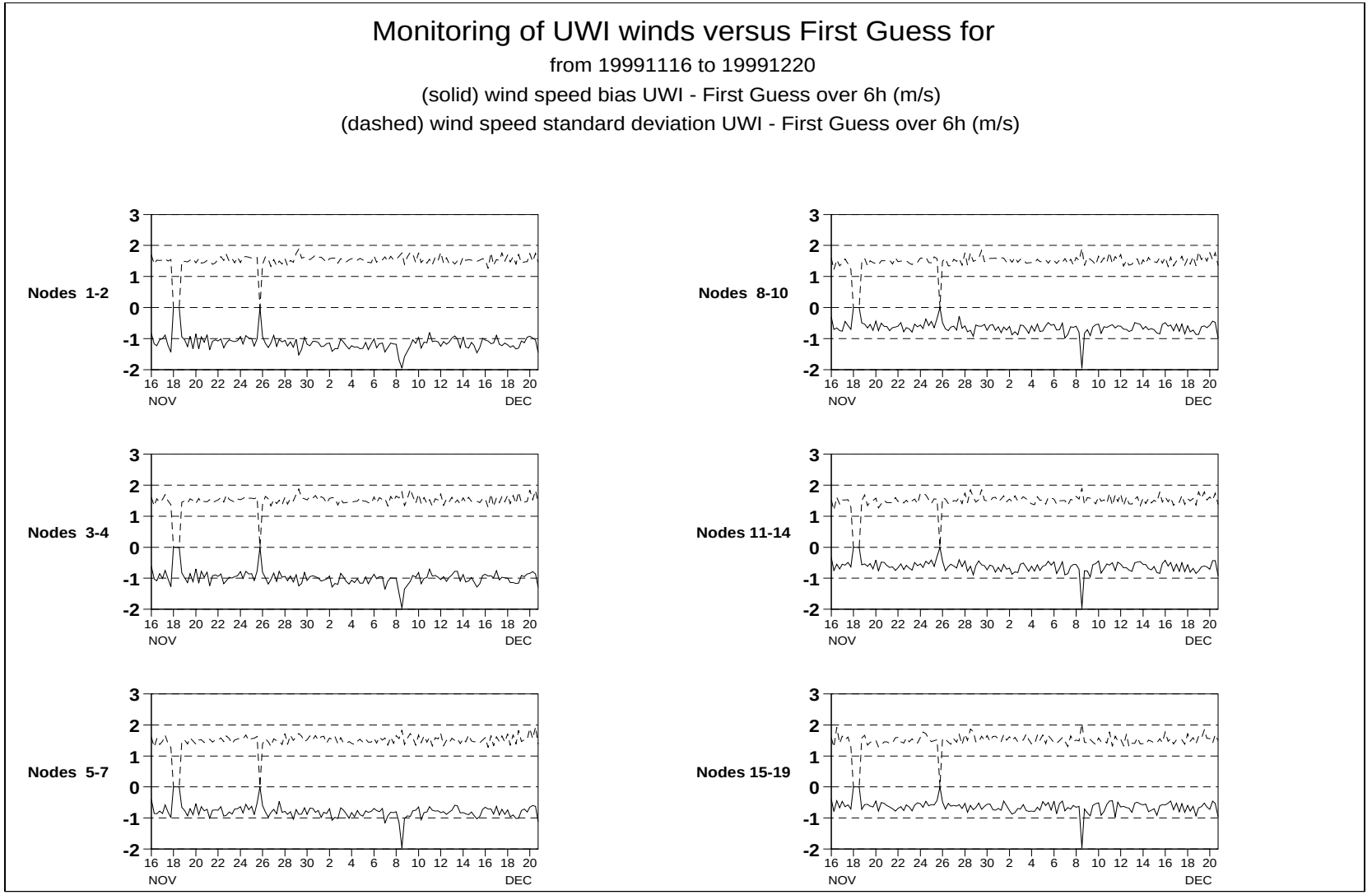

FIGURE 3

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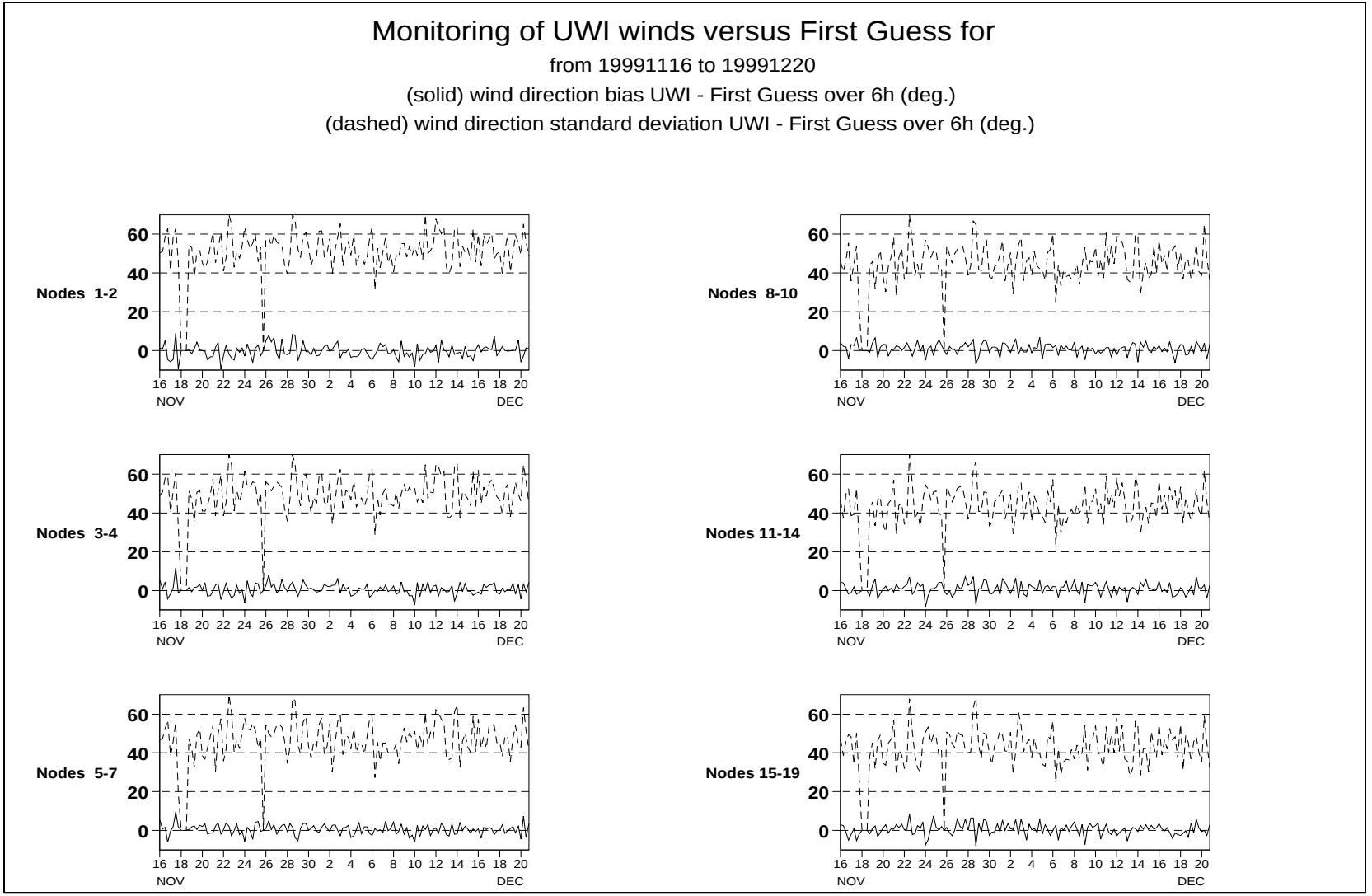

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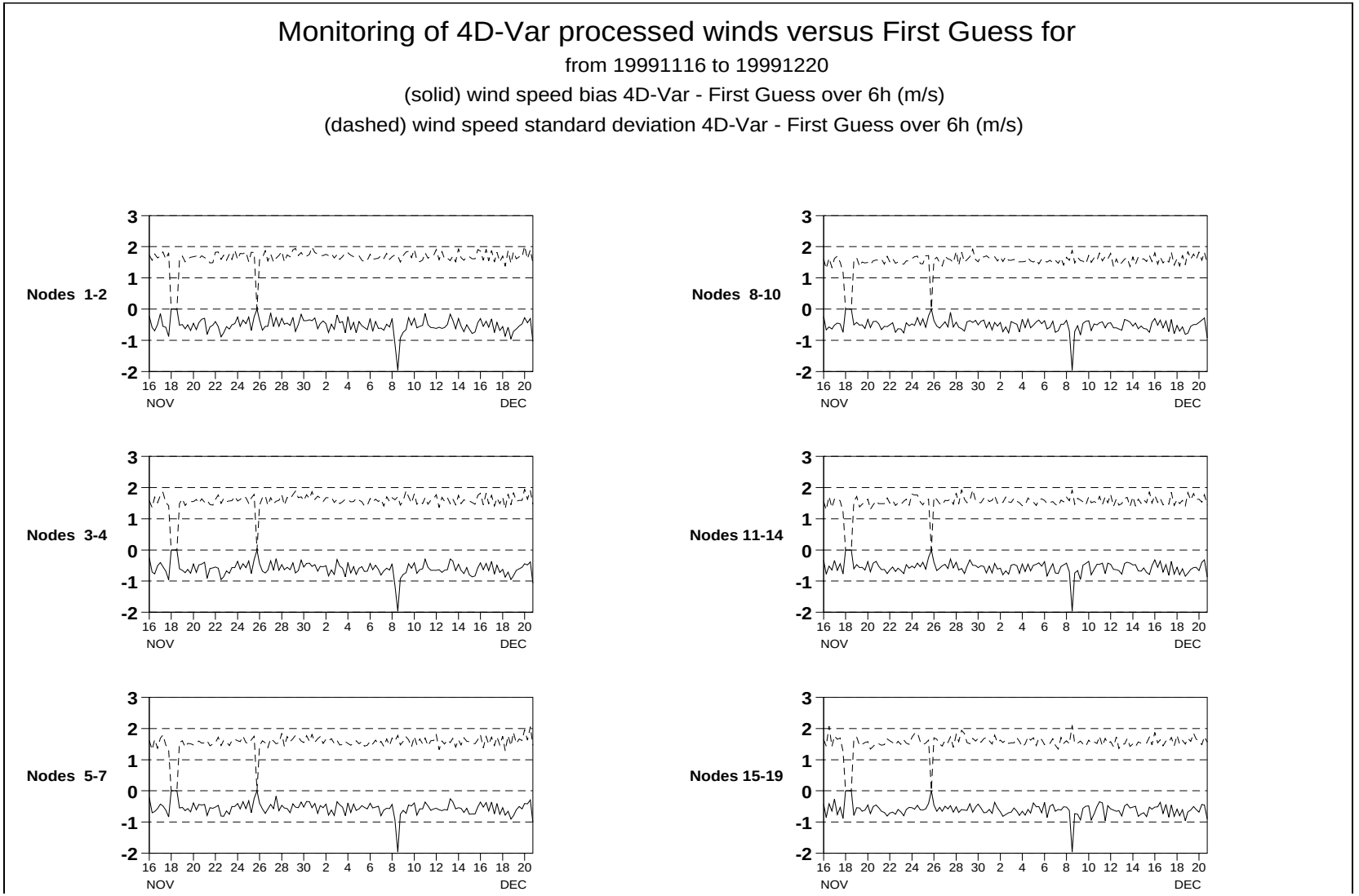

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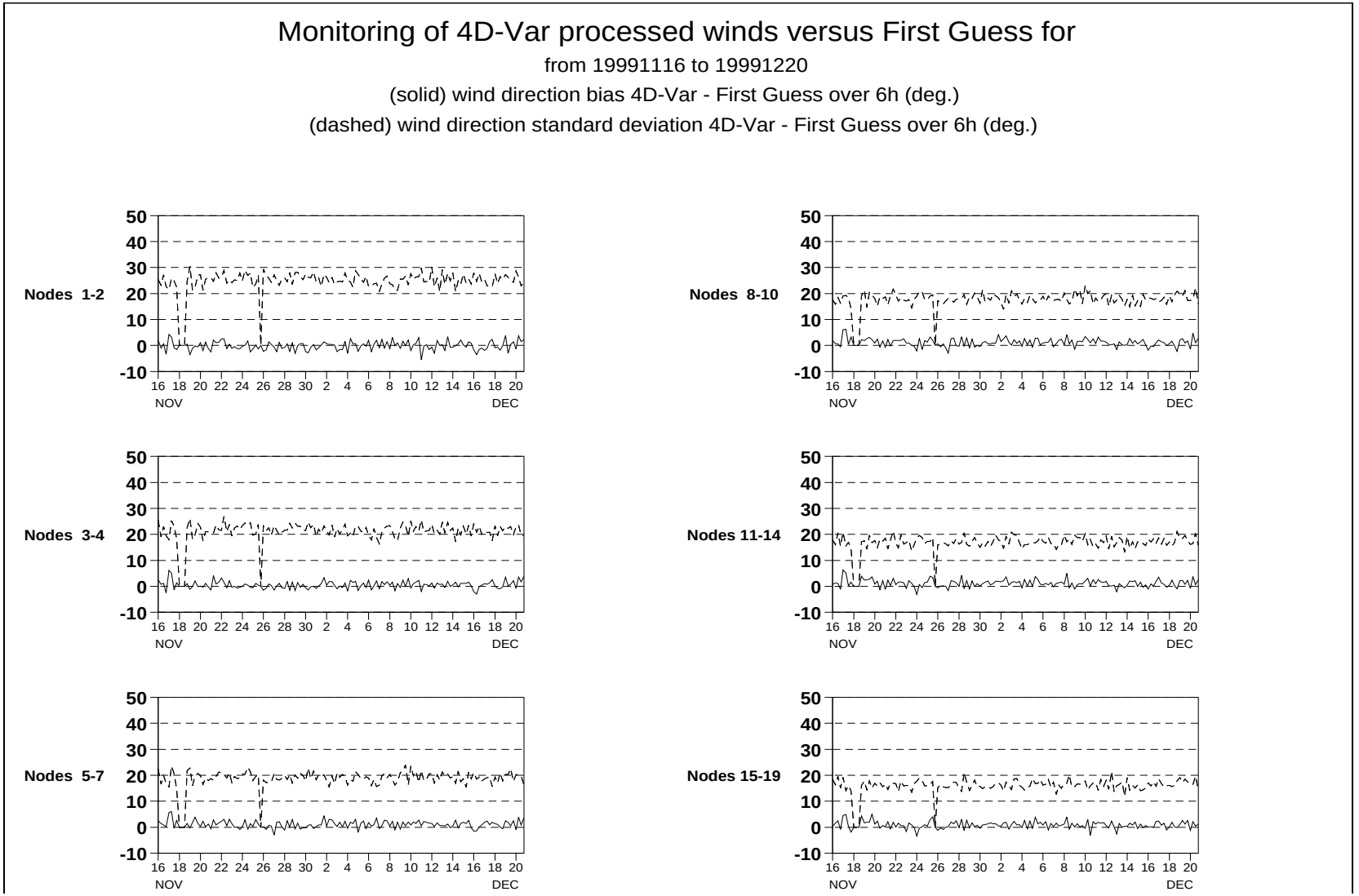

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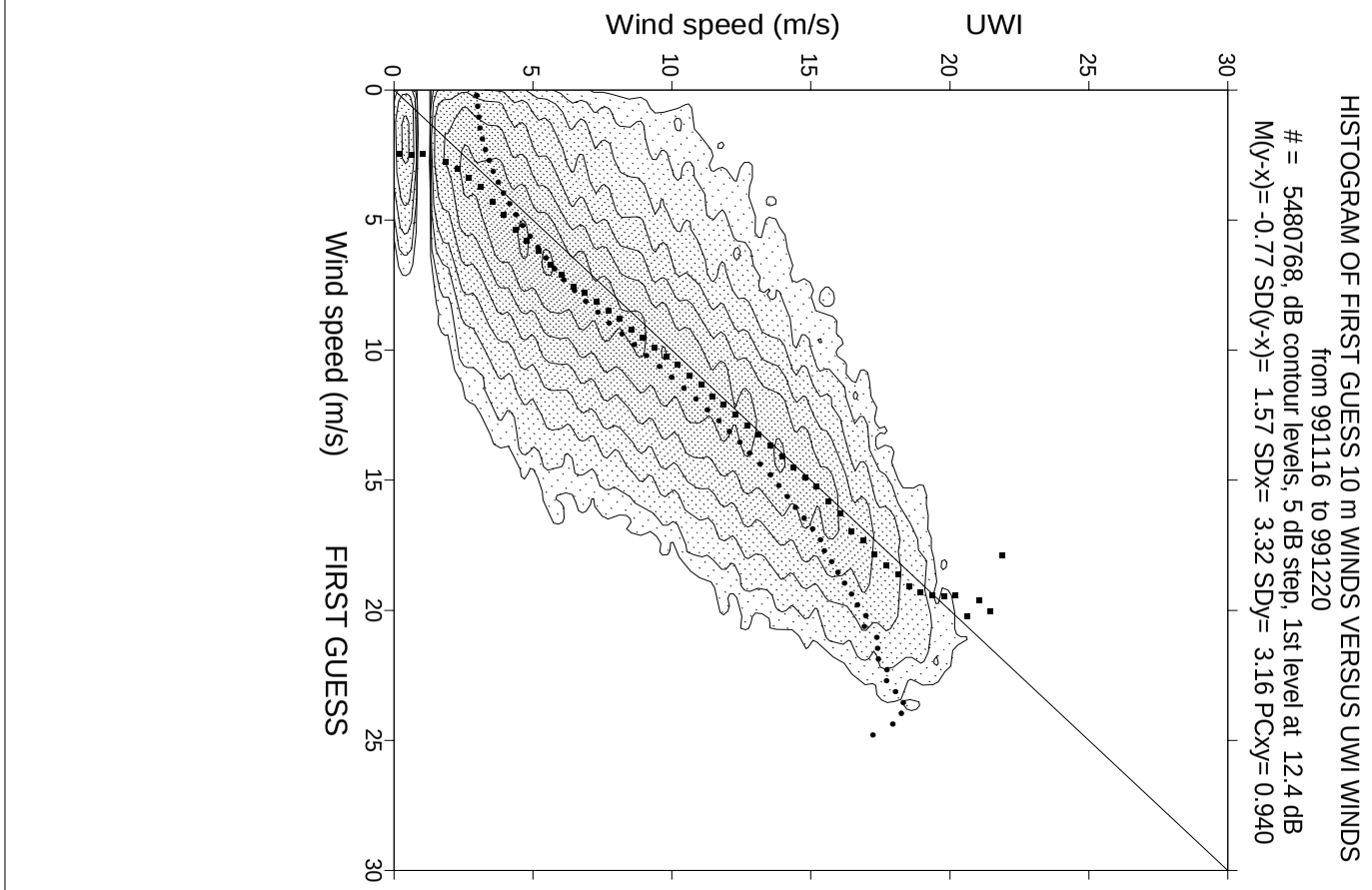

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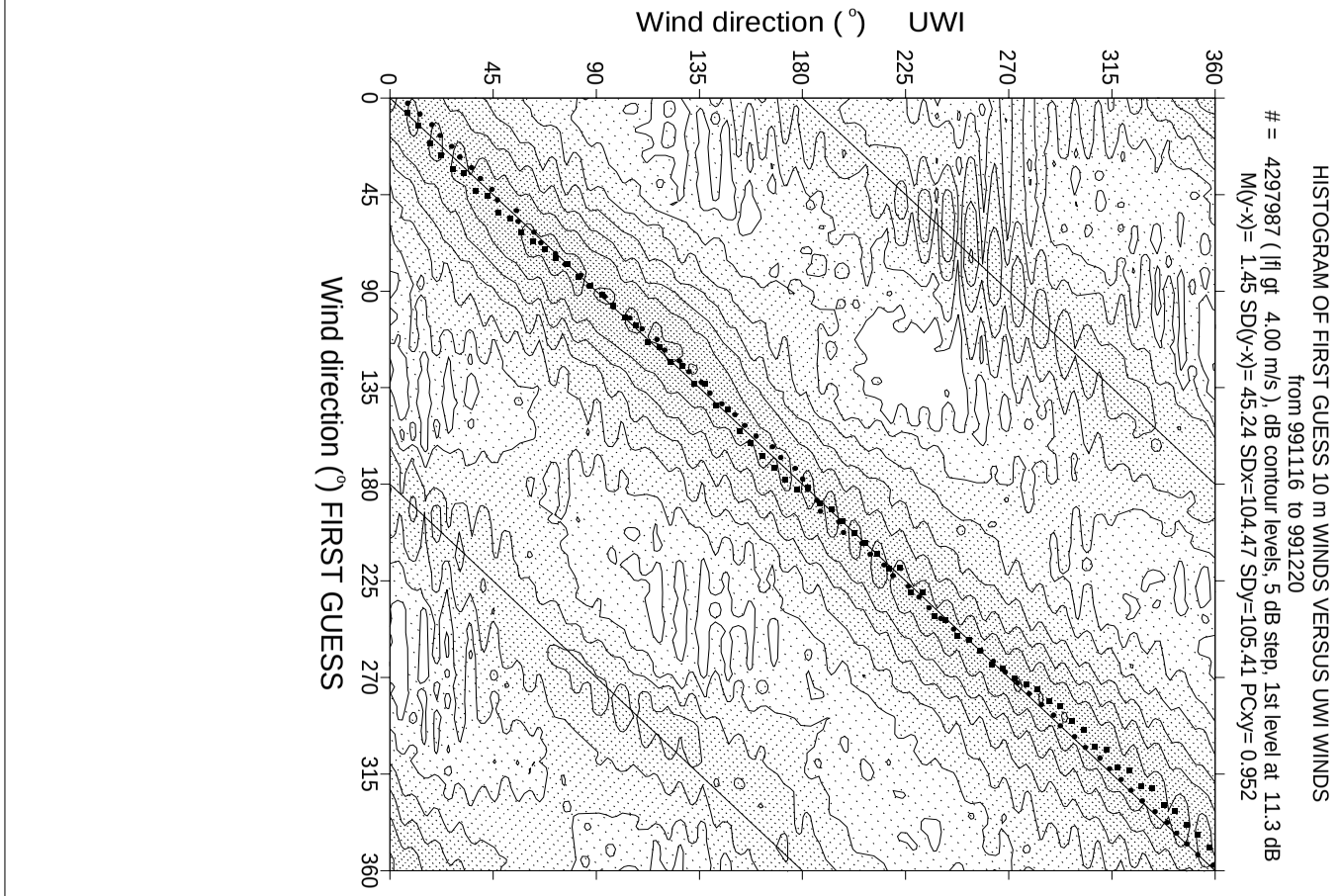

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