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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1 - INTRODUCTION

During cycle 53 ERS-2 delivered high quality data except for a one day period where ERS was piloting in Fine Pointing Mode. This happened from 21 UTC 29 May 2000 until 0 UTC 31 May 2000. For the remaining part of the monitoring period ERS-2 was very stable with only a few cycles that delivered below average data volume to ECMWF: 6 UTC 12 May 2000 and 0-6 UTC 2 June 2000 had below 50% of normal volume. For the whole monitoring period the data quality was high, except for the Fine Point Mode period mentioned above.

The ECMWF data assimilation system was not changed during cycle 53.

2 - ERS-2 STATISTICS FROM 9 MAY 2000 TO 12 JUNE 2000

Compared to the results from the previous cycle, the level of the descending track Fore beam sigma0 biases with respect to the ECMWF model first guess winds for incidence angles between 25 and 40 are slightly larger. For ascending tracks there is a systematic larger negative bias than in cycle 52 (by approximately 0.1 dB) for all three beams. It cannot be attributed to model changes and seems too large just to be due to seasonal variations. All curves still have a fairly flat distribution over the whole incidence range.

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The distance to the cone history shows the very uniform high data volume during this monitoring cycle and the low volumes on 2 June 2000. The Fine Pointing Mode period with poor quality data from 29-31 May 2000 is clearly visible for nodes 8-19.

The UWI winds have an average bias of -0.78 m/s, (-1.15 m/s for nodes 1-2 down to -0.63 m/s for nodes 11-19). This is an very comparable to the results from the previous cycle. The standard deviations are also similar to the results from the previous cycle: the standard deviation is on the average 1.51 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 1.60 m/s. The bias is like seen in the previous report for cycle 52: the average value is now -0.51 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 19.3 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 are almost identical 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. So the changes in the ascending tracks beam biases does not affect the wind monitoring statistics.

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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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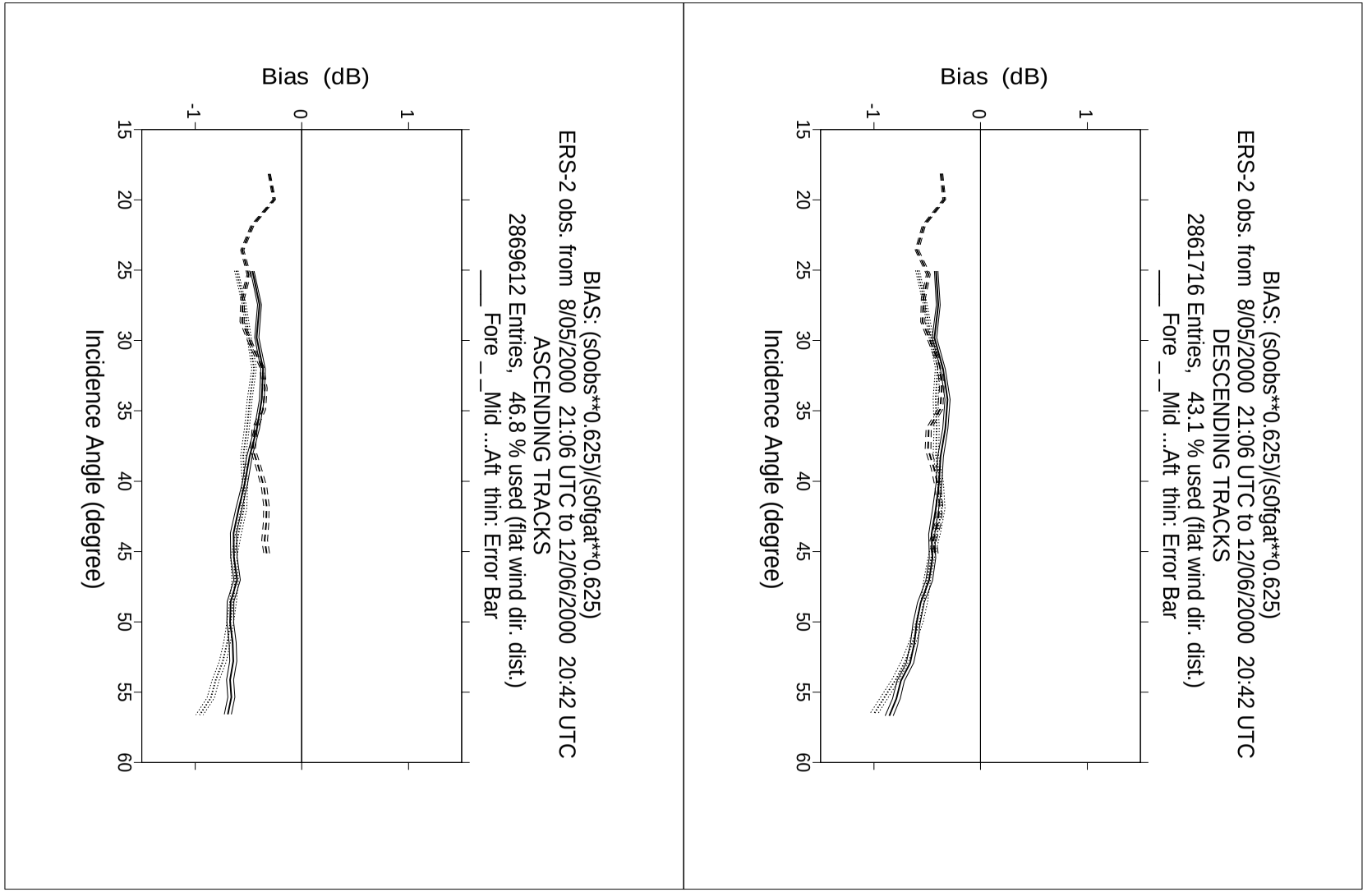

FIGURE 1

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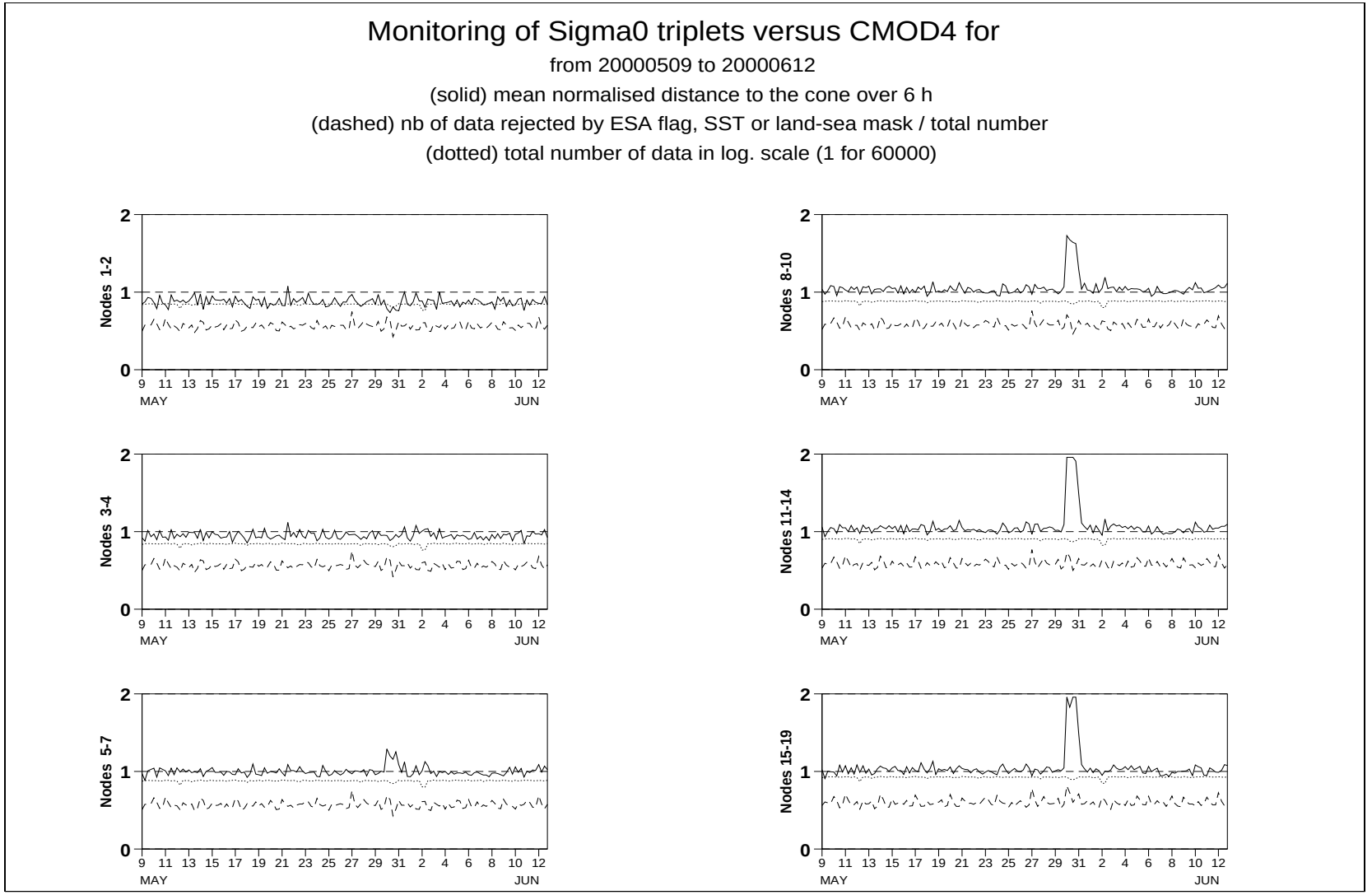

FIGURE 2

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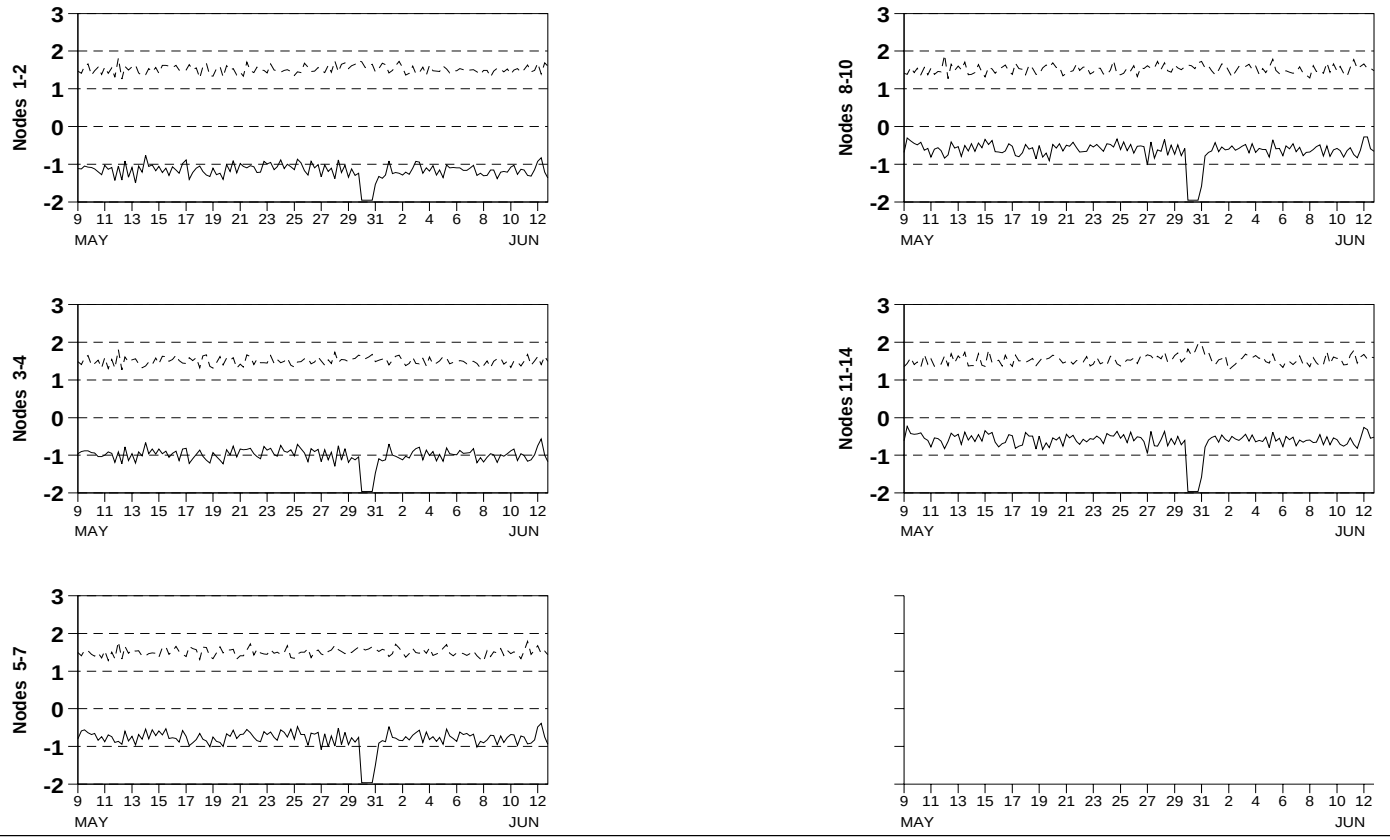
Monitoring of UWI winds versus First Guess for

from 20000509 to 20000612

(solid) wind speed bias UWI - First Guess over 6h (m/s)

(dashed) wind speed standard deviation UWI - First Guess over 6h (m/s)



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