

■ ECMWF Report on ERS-2 RA for May 2001 ■

Title: Report on ERS-2 Radar Altimeter wave height and wind speed data.

By: Saleh Abdalla

Date: 5 June 2001

Overview:

Based on the data received during the full month, on average, 14452 observations arrived at ECMWF every 6 hours of which 79.8% passed the quality control. The data coverage, which was rather good, can be seen in Figure 1. Data were missed at 00:00 UTC '6-hour' time slot on 13 May, from 00:00 UTC on 22 to 06:00 UTC on 24 May, and from 18:00 UTC on 31 May to 18:00 UTC on 1 June. Furthermore, data reception was significantly reduced during the '6-hour' time slots 00:00 UTC on both 13 and 14 May. Note that we are talking about the raw data which have arrived at ECMWF before they were processed. The quality of the received data is as good as usual. It seems that all recent data-quality problems are no longer exist.

Backscatter:

ESR-2 $\langle \sigma_0 \rangle = 10.98$ dB (with a main peak at 11.1 dB)



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Wind Speed Comparison with ECMWF wind speeds (bias):

ERS-2 global: 0.285 m/s

ERS-2 northern hemisphere: -0.130 m/s

ERS-2 tropics: 0.104 m/s

ERS-2 southern hemisphere: 0.634 m/s

Wind Speed Comparison with buoy wind speeds (bias):

ERS-2 global: -0.567 m/s

ERS-2 northern hemisphere: -0.541 m/s

ERS-2 tropics: -0.779 m/s

Wave Height Comparison with ECMWF wave heights (bias):

ERS-2 global: -0.027 m (lowest waves measured: 0.6m)

ERS-2 northern hemisphere: 0.021 m

ERS-2 tropics: -0.073 m

ERS-2 southern hemisphere: -0.021 m

Wave Height Comparison with buoy wave heights (bias):

ERS-2 global: -0.00 m

ERS-2 northern hemisphere: 0.01 m

ERS-2 tropics: -0.10 m



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Remarks:

- The quality of Altimeter data is as good as they used to be.

Comparison Method:

The Altimeter wave height and wind speed data, as received by ECMWF from ESA through GTS, are the so-called fast delivery products. At ECMWF these data are subject to a quality control method, the details of which are described by Janssen et al. (1989) and Bauer et al. (1992). Consequently, superobservations are formed by averaging 30 consecutive data in order to match the spatial scales of the operational WAM model. Therefore, the collocation statistics are based on the comparison between these superobservations and operational wavemodel products.

In addition, since also wave observations from buoys are received through the GTS, the Altimeter products are also compared against buoy observations. Again, in order to have matching scales, the buoy observations are averaged over a six hour time window. Apart from this, also a height correction is applied to the wind speed observations, since not all buoys observe the winds at the standard height of 10 m. A default observation height of 5 m is assumed, and when available the actual observation height is used. In order to interpolate from the observation height to the standard height a logarithmic wind profile with a roughness length as given by the Charnock relation is assumed, where the Charnock parameter is given the constant value of 0.018.



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Figure 1: Time series of data reception for ERS-2 Altimeter data for May 2001.

Figure 2: Distribution of the ERS-2 Altimeter Backscatter after QC for May 2001.

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Figure 6: Comparison of ECMWF wind speed results with ERS-2 Altimeter wind speed data for May 2001 (global).

Figure 7: Comparison of ECMWF wind speed results with ERS-2 Altimeter wind speed data for May 2001 (northern hemisphere)

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Figure 24: ERS-2 Altimeter wave heights: Timeseries of bias (ERS-2 - model) and scatter index (SI) for May 2001.

Figure 25: ERS-2 Altimeter wave heights: Timeseries of bias (ERS-2 - model) and scatter index (SI) from December 1996 to May 2001

Figure 26: ERS-2 Altimeter wind speeds: Timeseries of bias (ERS-2 - model) and scatter index (SI) from December 1996 to May 2001



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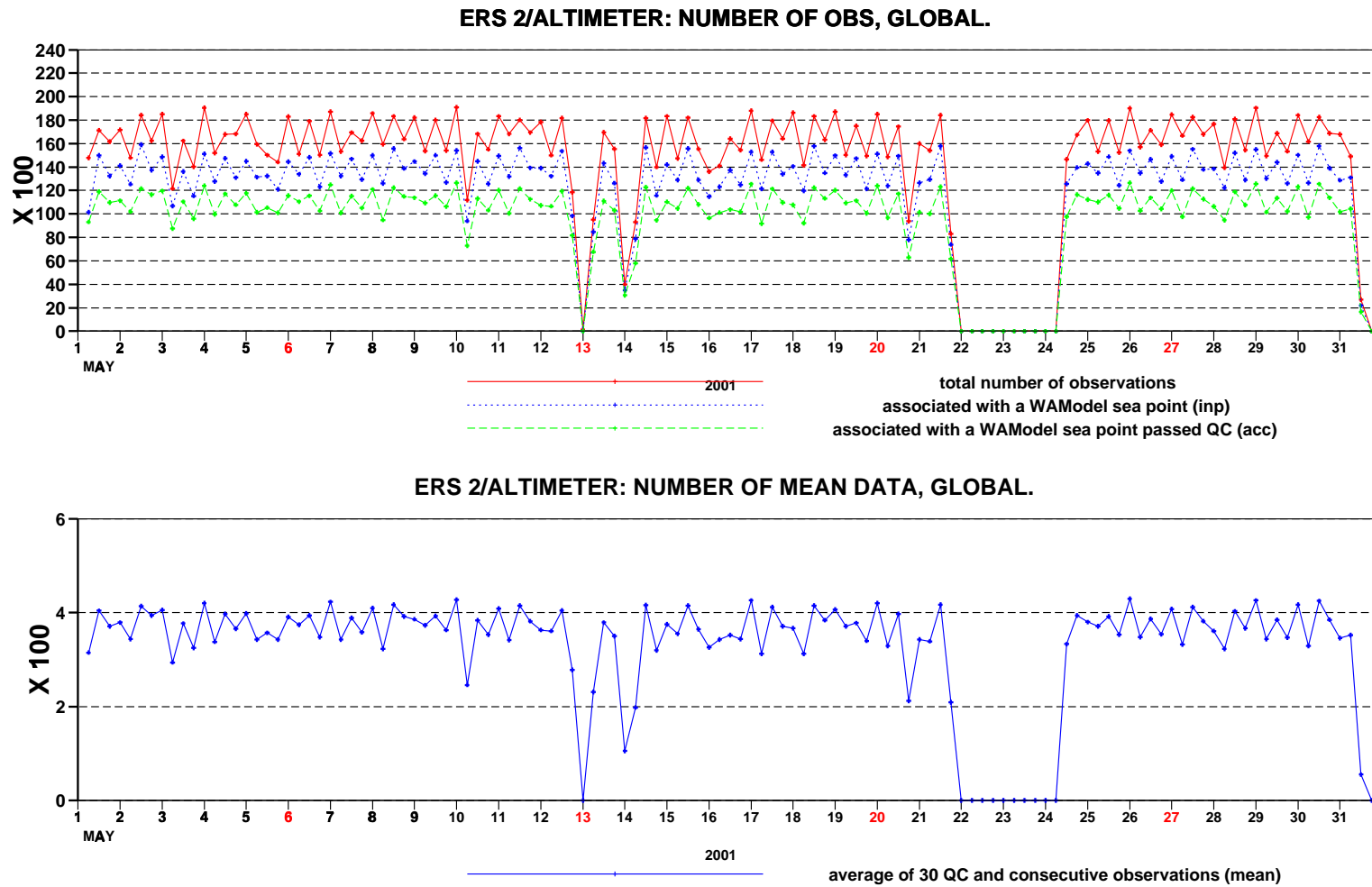


Figure 1: Time series of data reception for ERS-2 Altimeter data for May 2001

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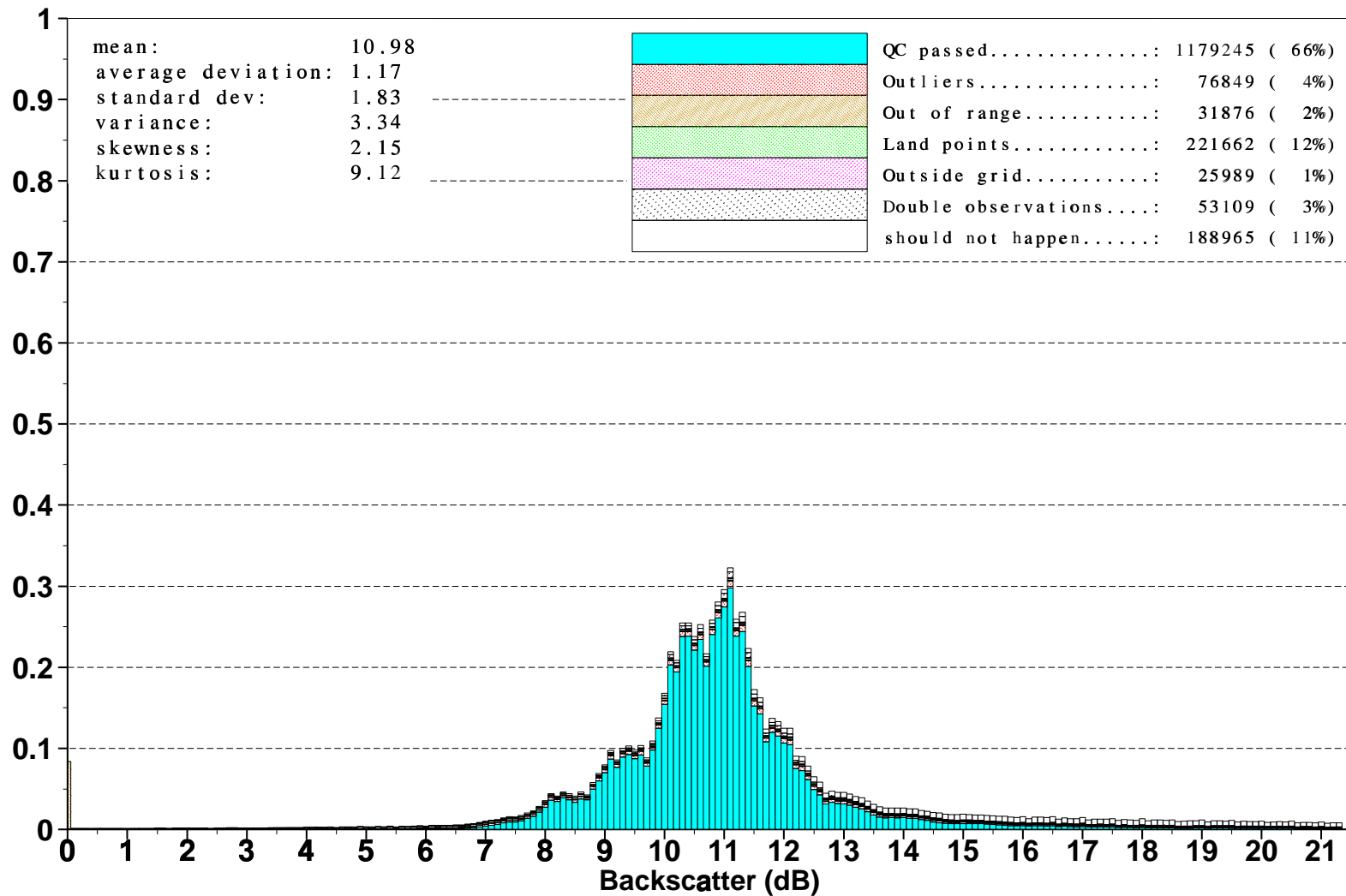


Figure 2: Distribution of the ERS-2 Altimeter backscatter after QC for May 2001



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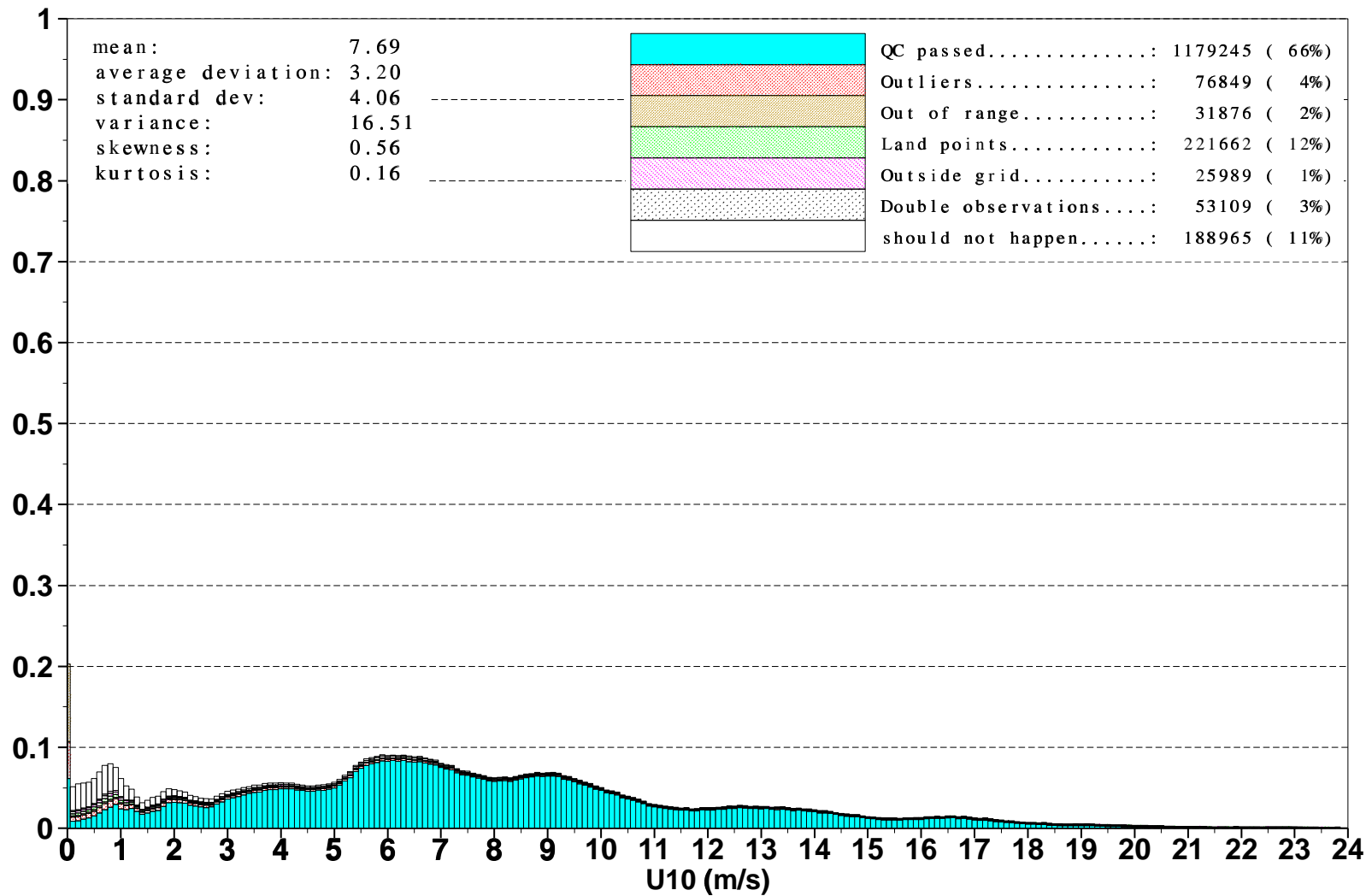


Figure 3: Distribution of the ERS-2 Altimeter wind speeds after QC for May 2001

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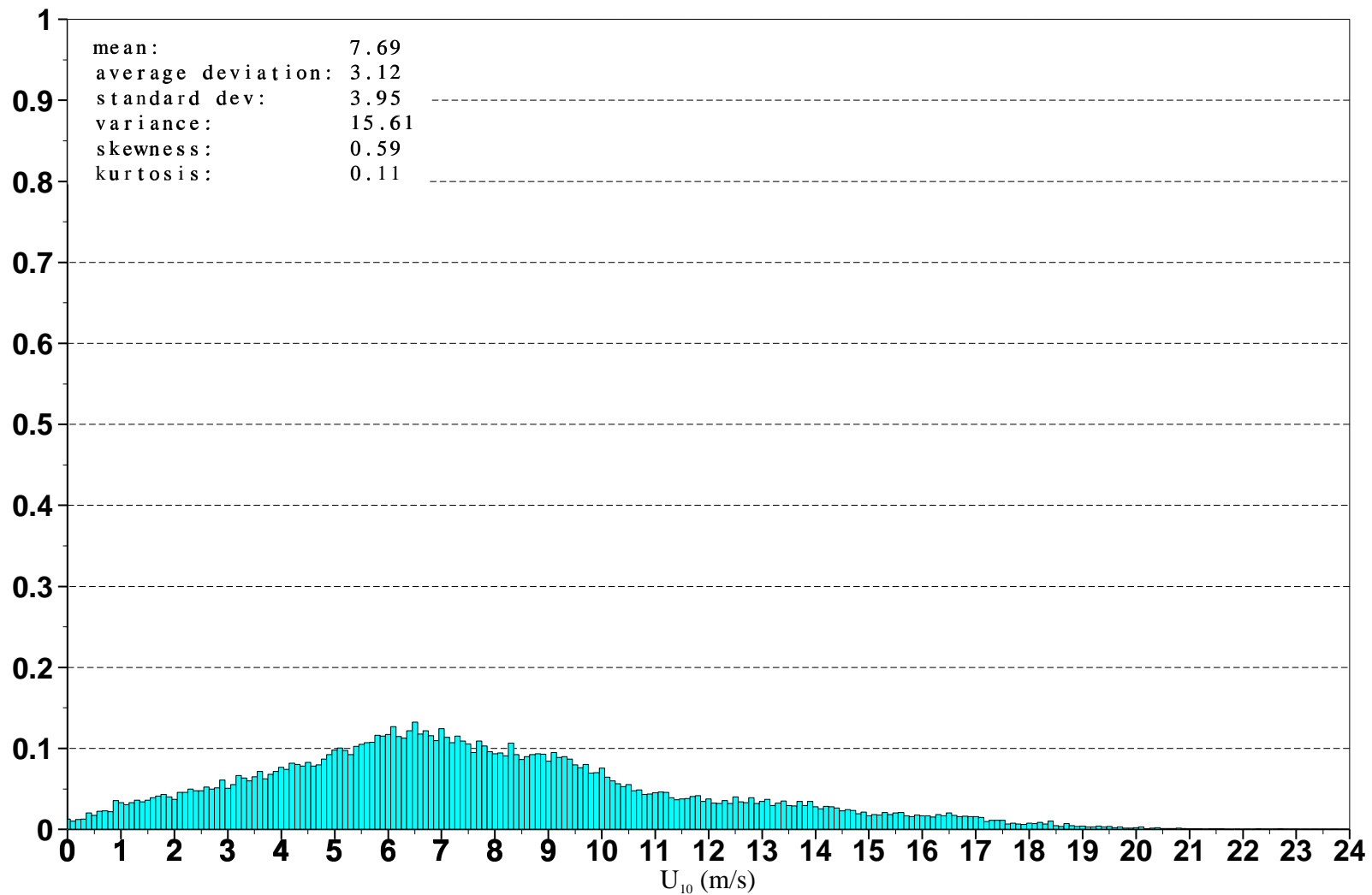


Figure 4: Distribution of ERS-2 Altimeter wind speeds after along track averaging for May 2001



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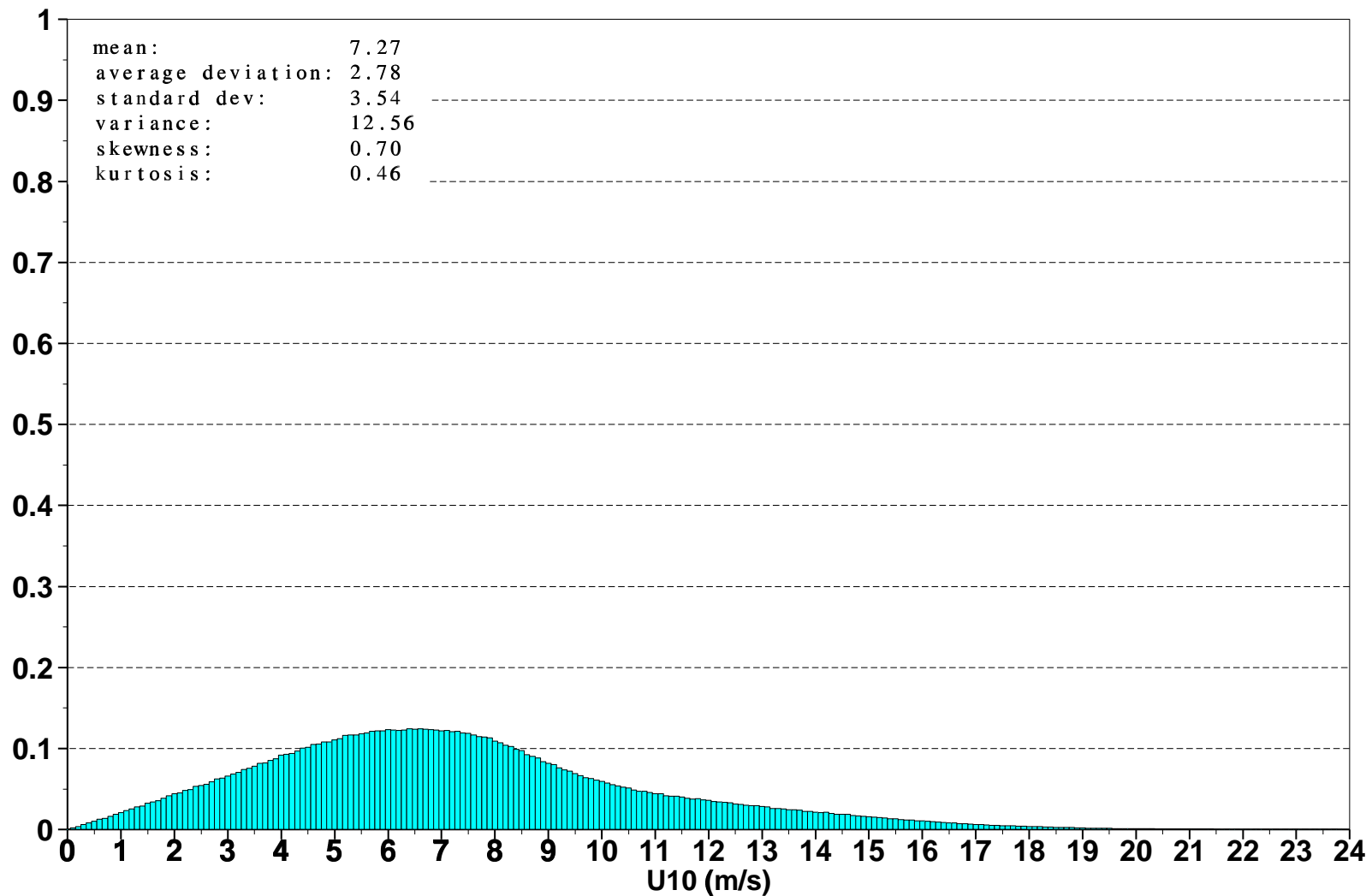


Figure 5: Global distribution of ECMWF ocean surface wind speeds for May 2001



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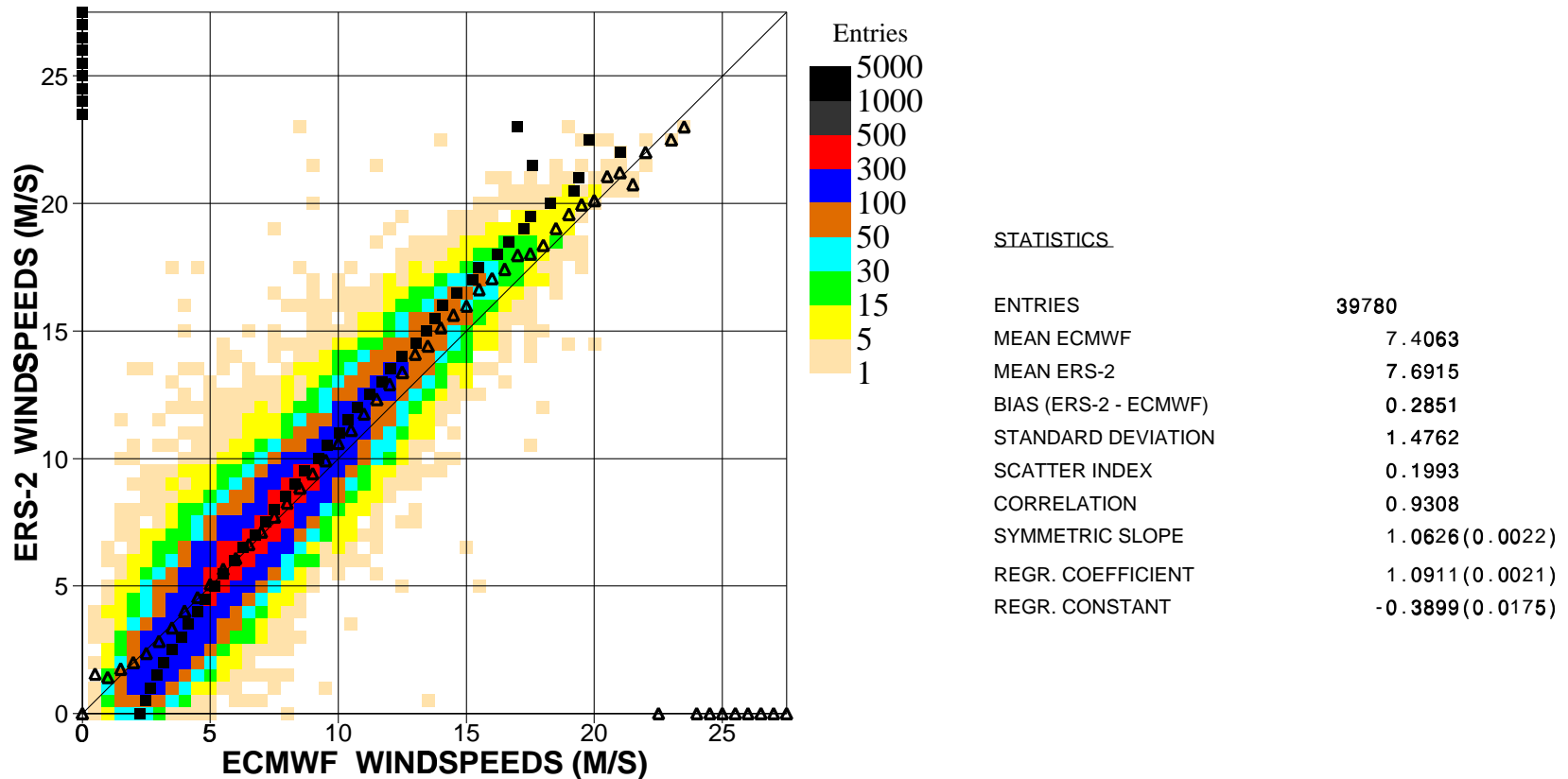


Figure 6. Comparison of ECMWF wind speed results with ERS2 Altimeter wind speed data for May 2001 (global)

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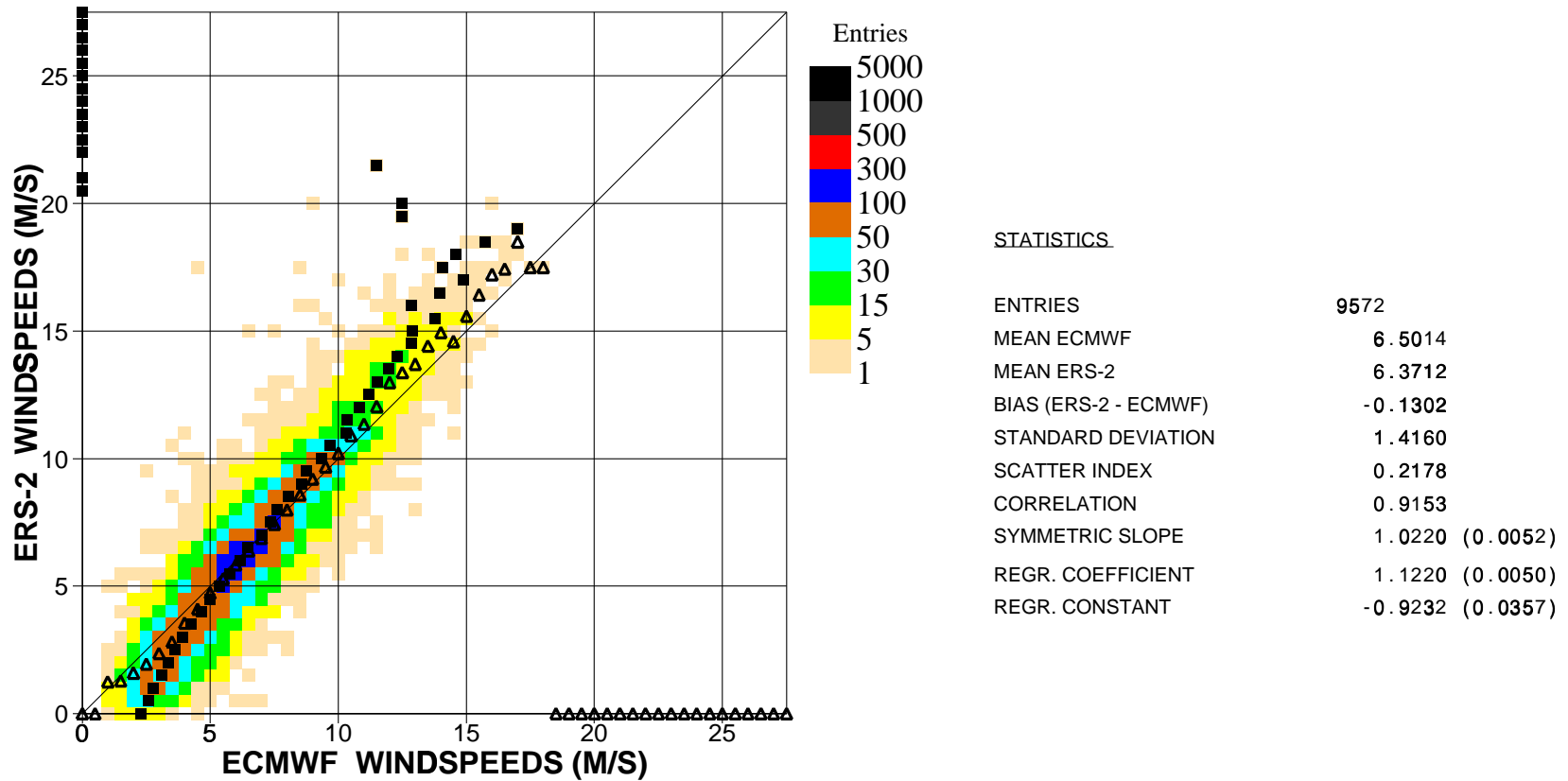


Figure 7. Comparison of ECMWF wind speed results with ERS2 Altimeter wind speed data for May 2001 (n.hem.)

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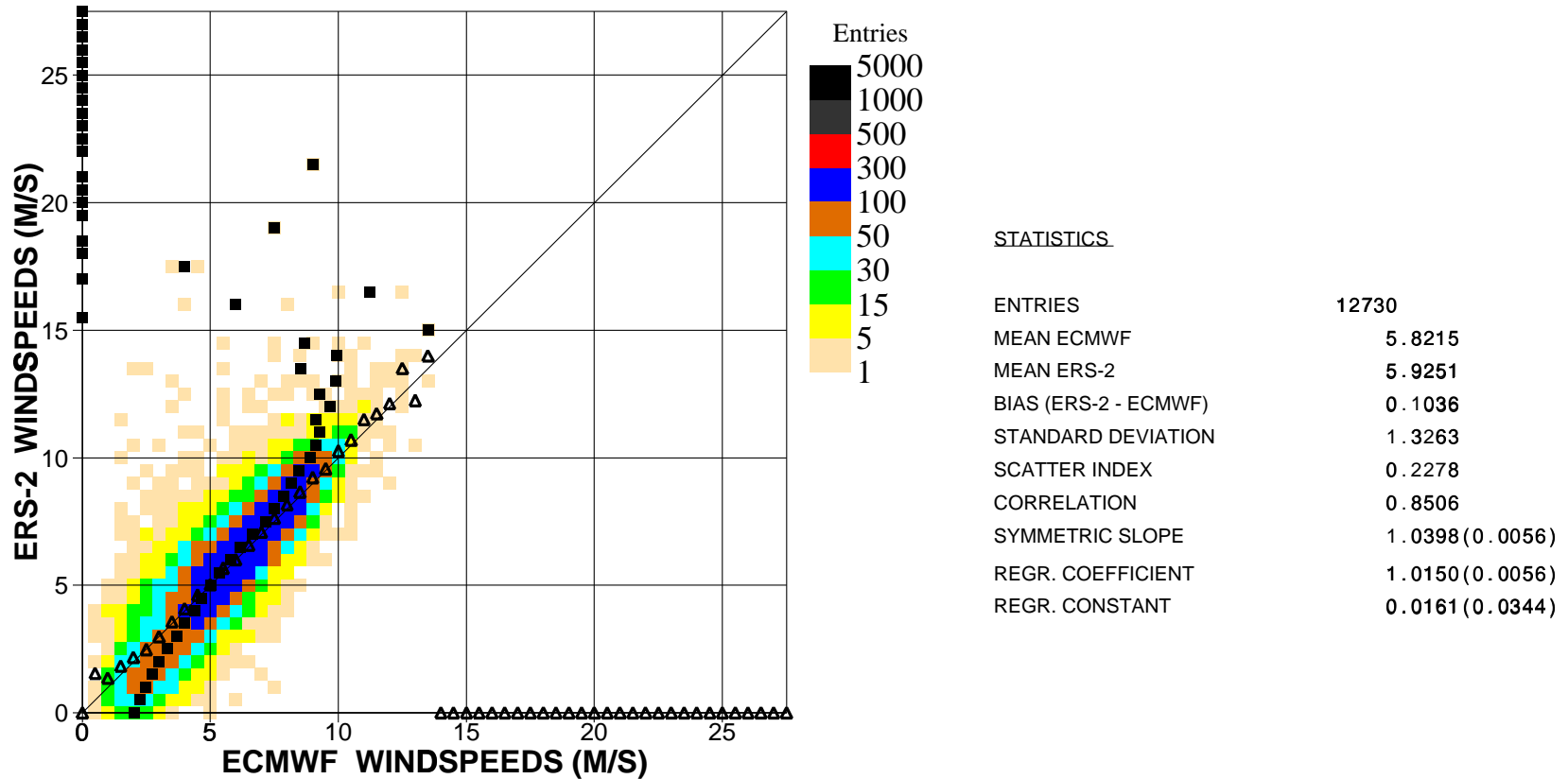


Figure 8. Comparison of ECMWF wind speed results with ERS2 Altimeter wind speed data for May 2001 (tropics)

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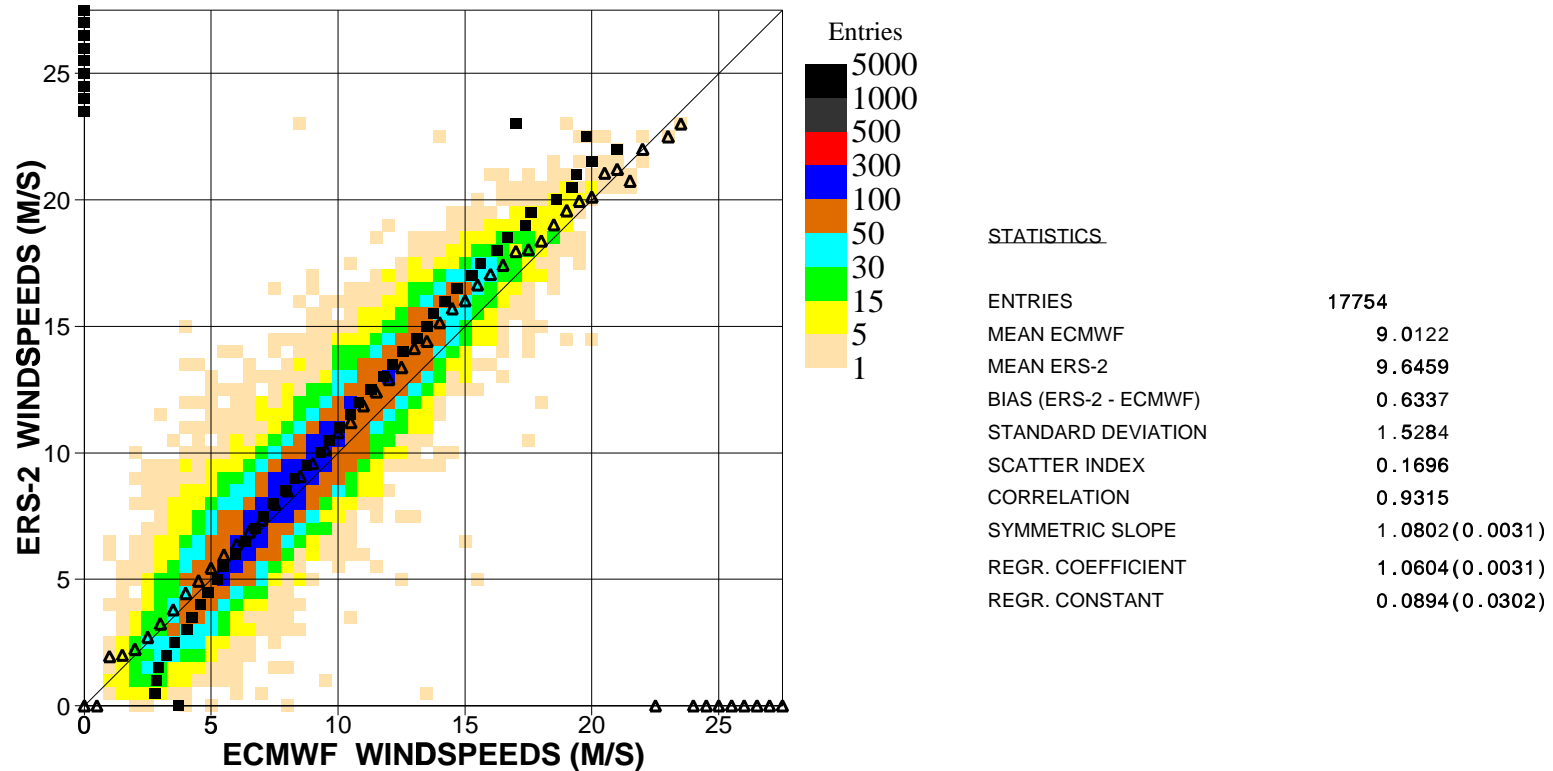


Figure 9. Comparison of ECMWF wind speed results with ERS2 Altimeter wind speed data for May 2001 (s.hem.)

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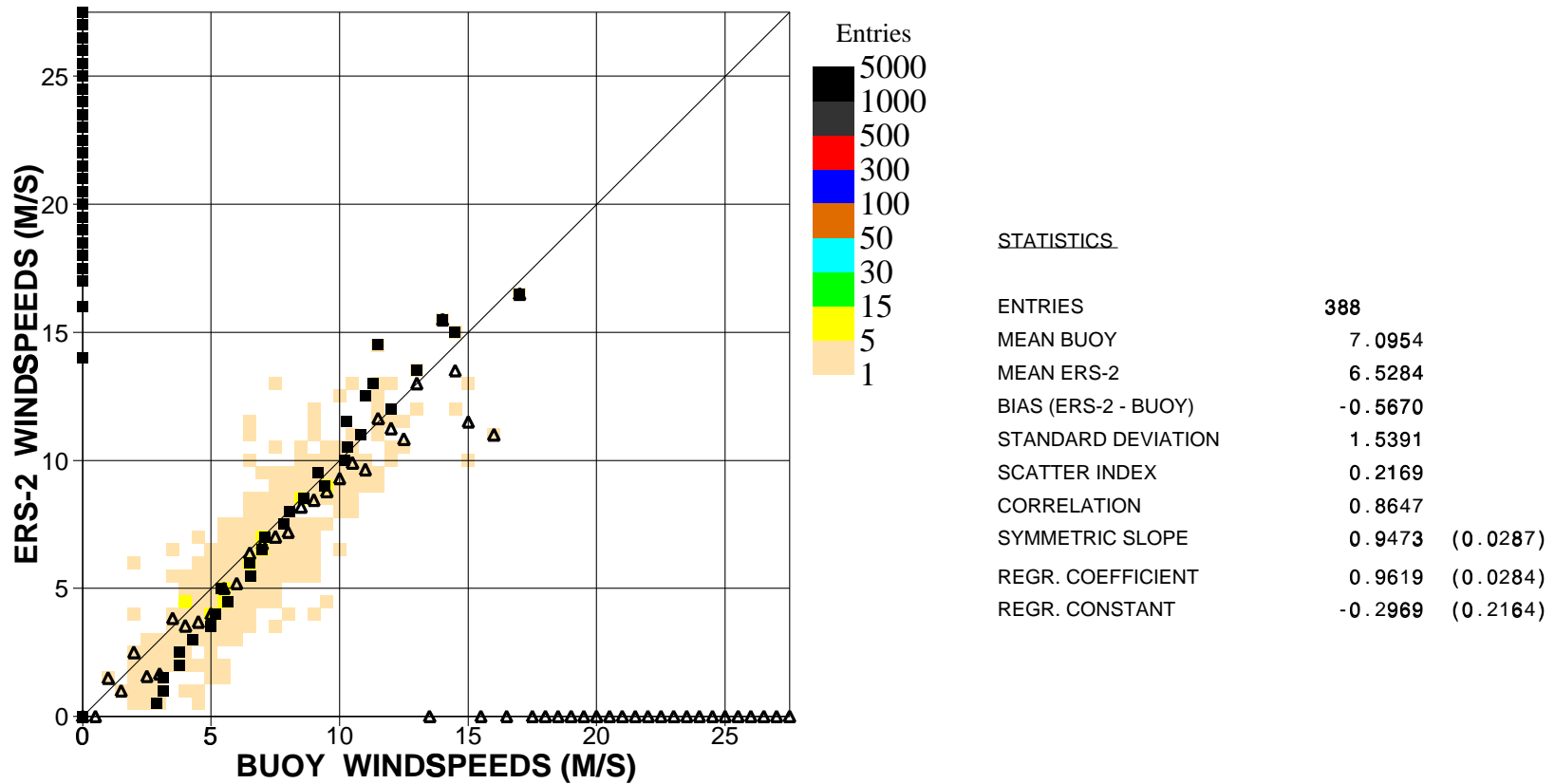


Figure 10. Comparison of buoy wind speed observations with ERS2 Altimeter wind speed data for May 2001 (global)

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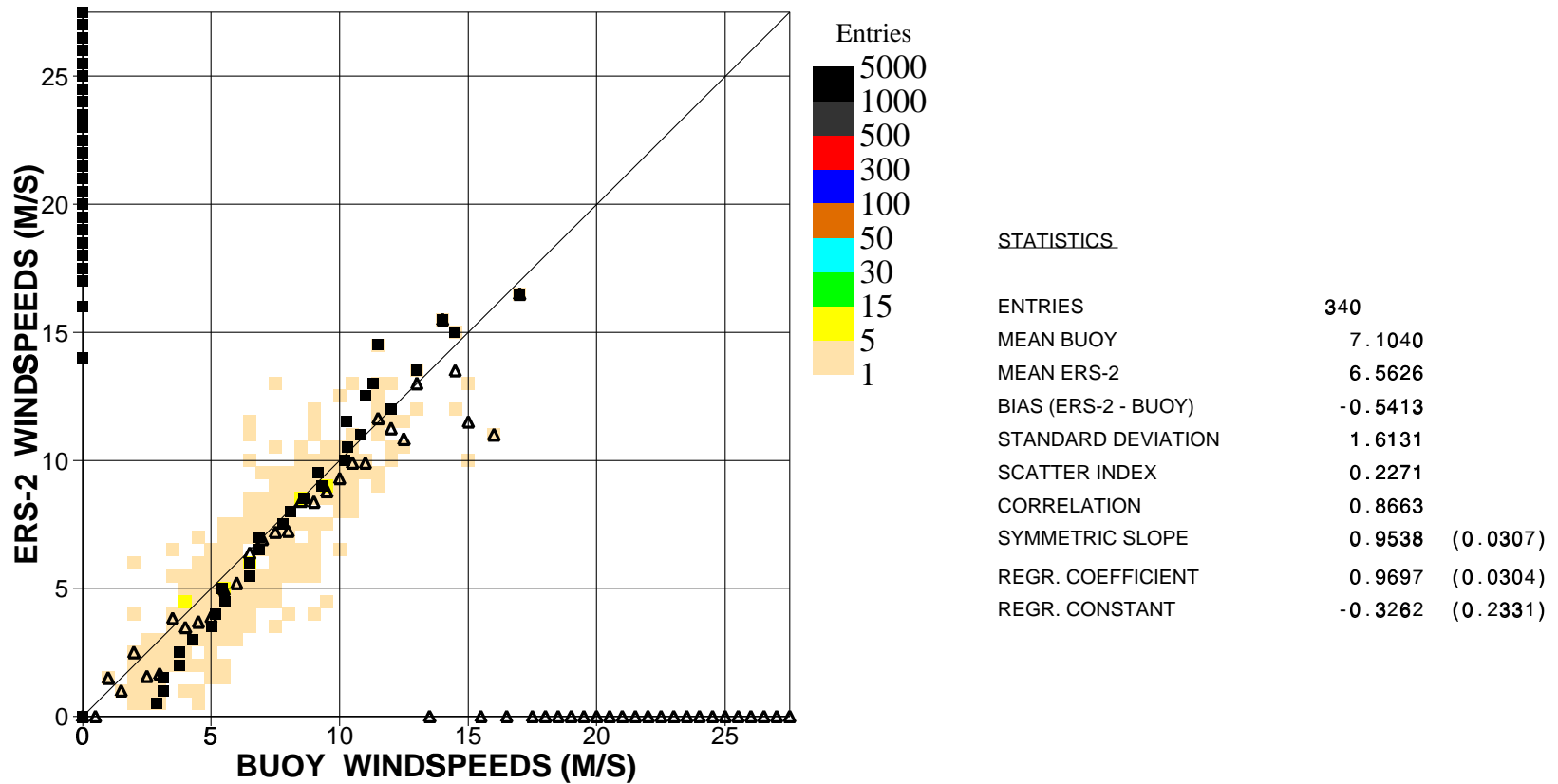


Figure 11. Comparison of buoy wind speed observations with ERS2 Altimeter wind speed data for May 2001 (n.hem.)

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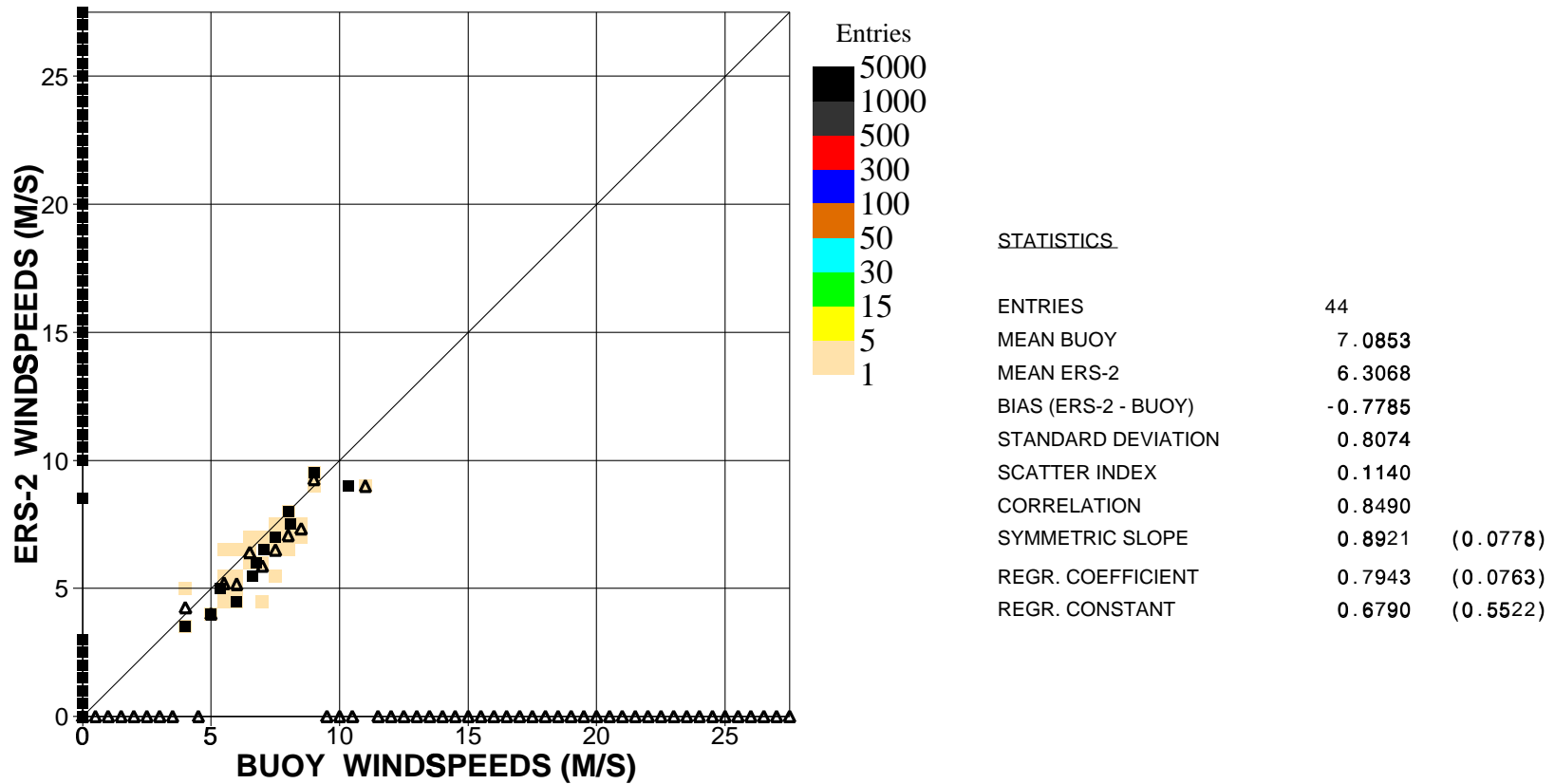


Figure 12. Comparison of buoy wind speed observations with ERS2 Altimeter wind speed data for May 2001 (hawaii)

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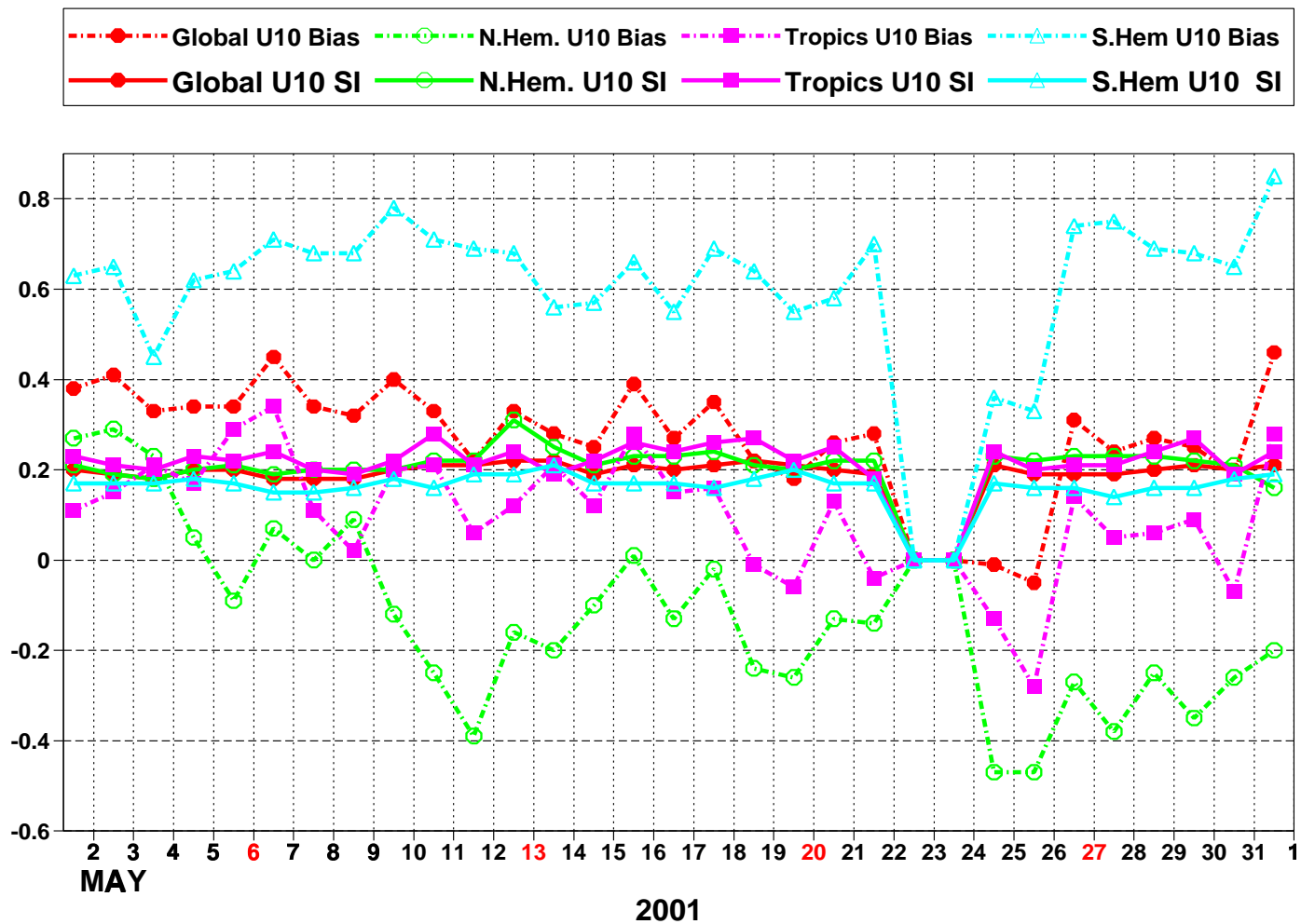


Figure 13: ERS-2 Altimeter wind speeds: Timeseries of bias (ERS-2 - model) and scatter index (SI)

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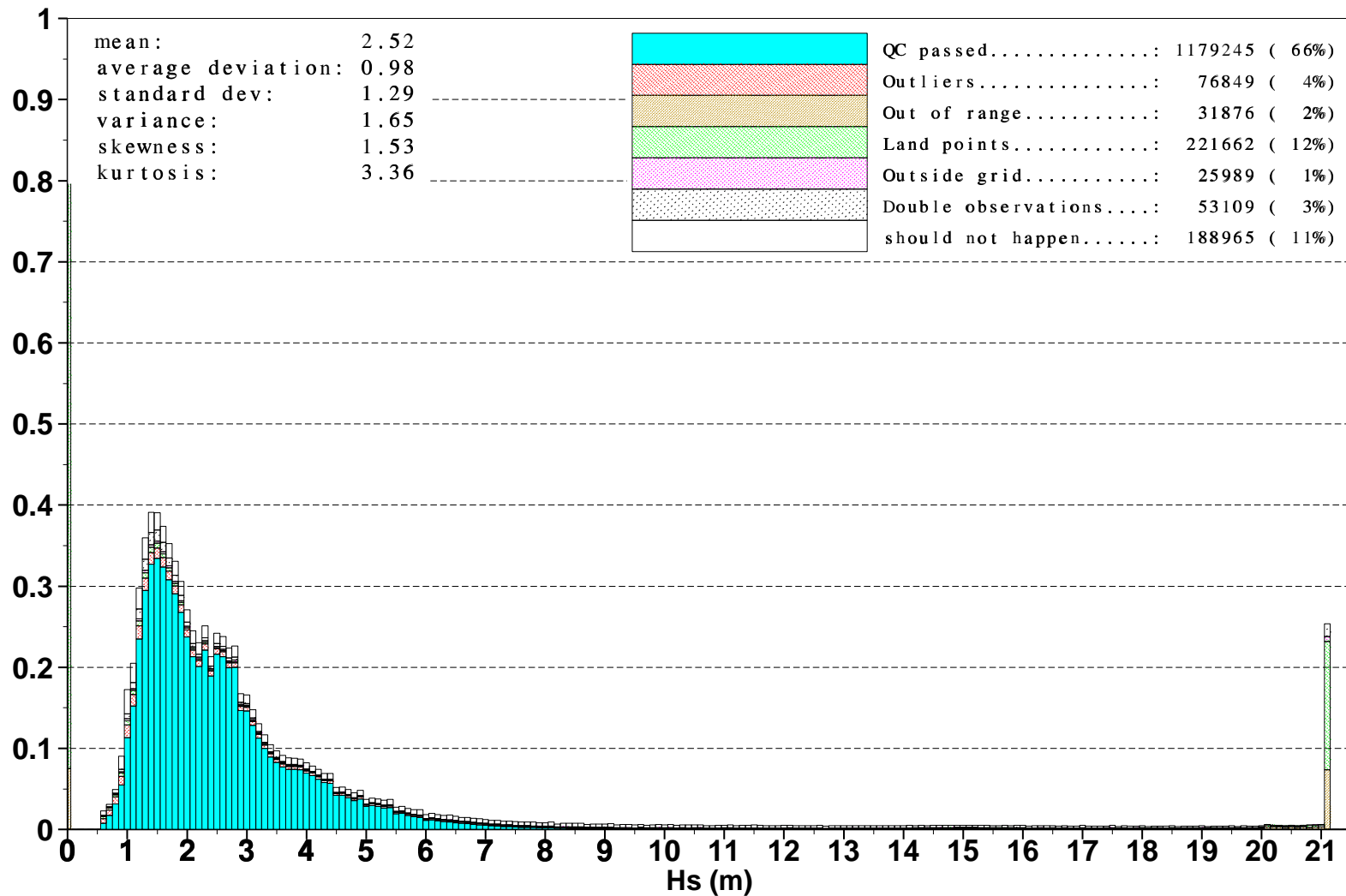


Figure 14: Distribution of the ERS-2 Altimeter wave heights after QC for May 2001



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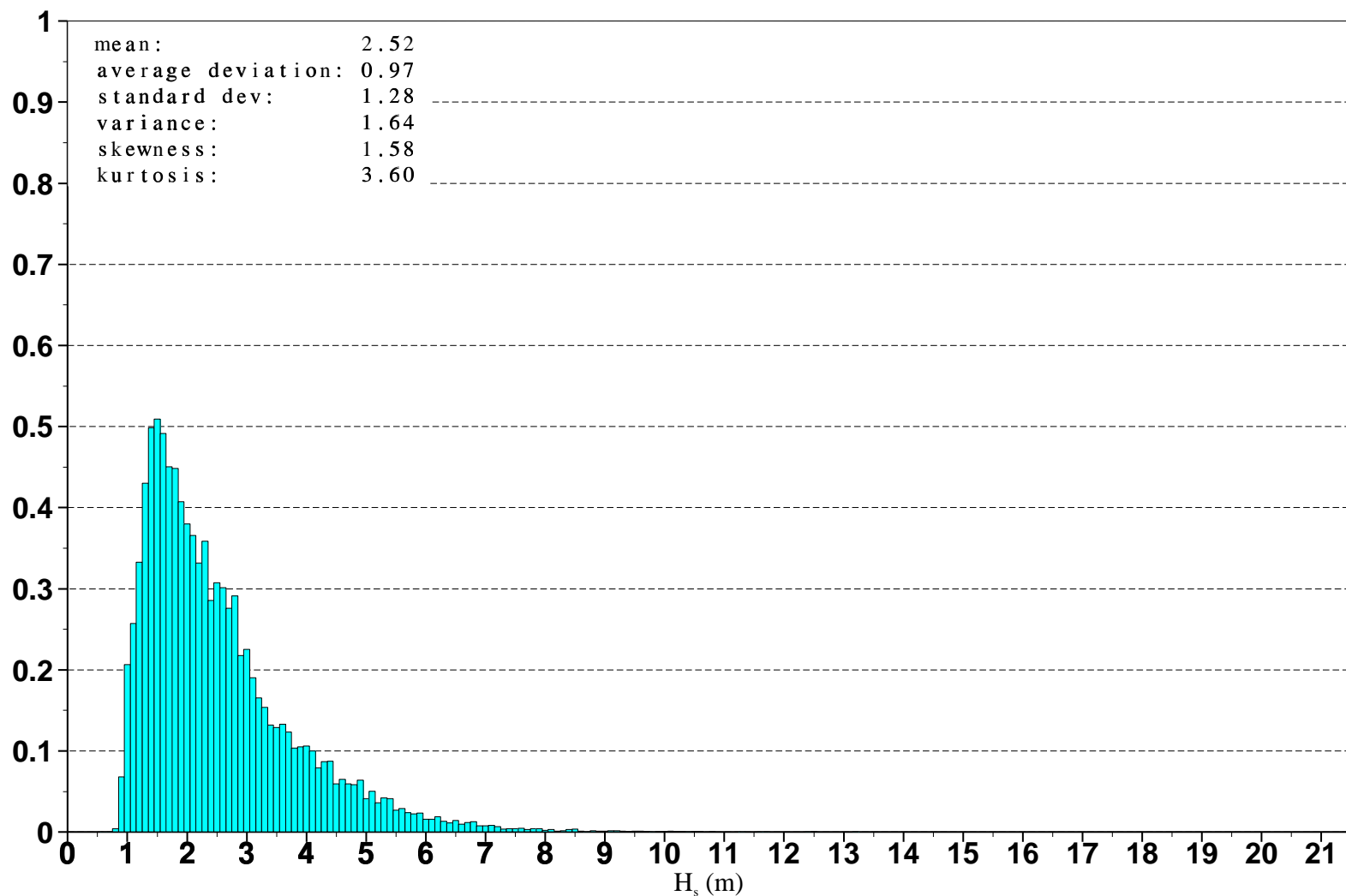


Figure 15: Distribution of ERS-2 Altimeter wave heights after along track averaging for May 2001



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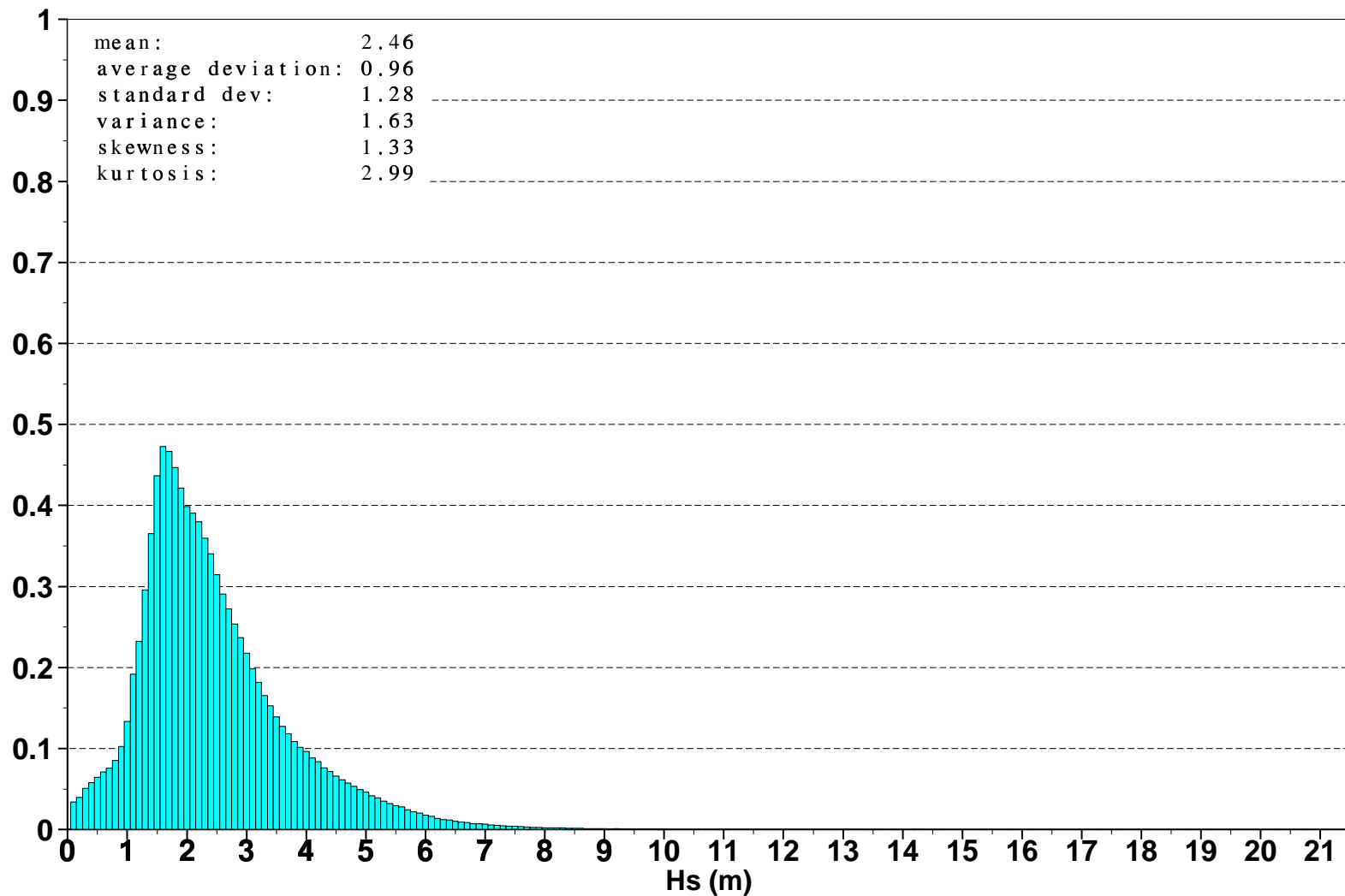


Figure 16: Global distribution of ECMWF wave heights for May 2001



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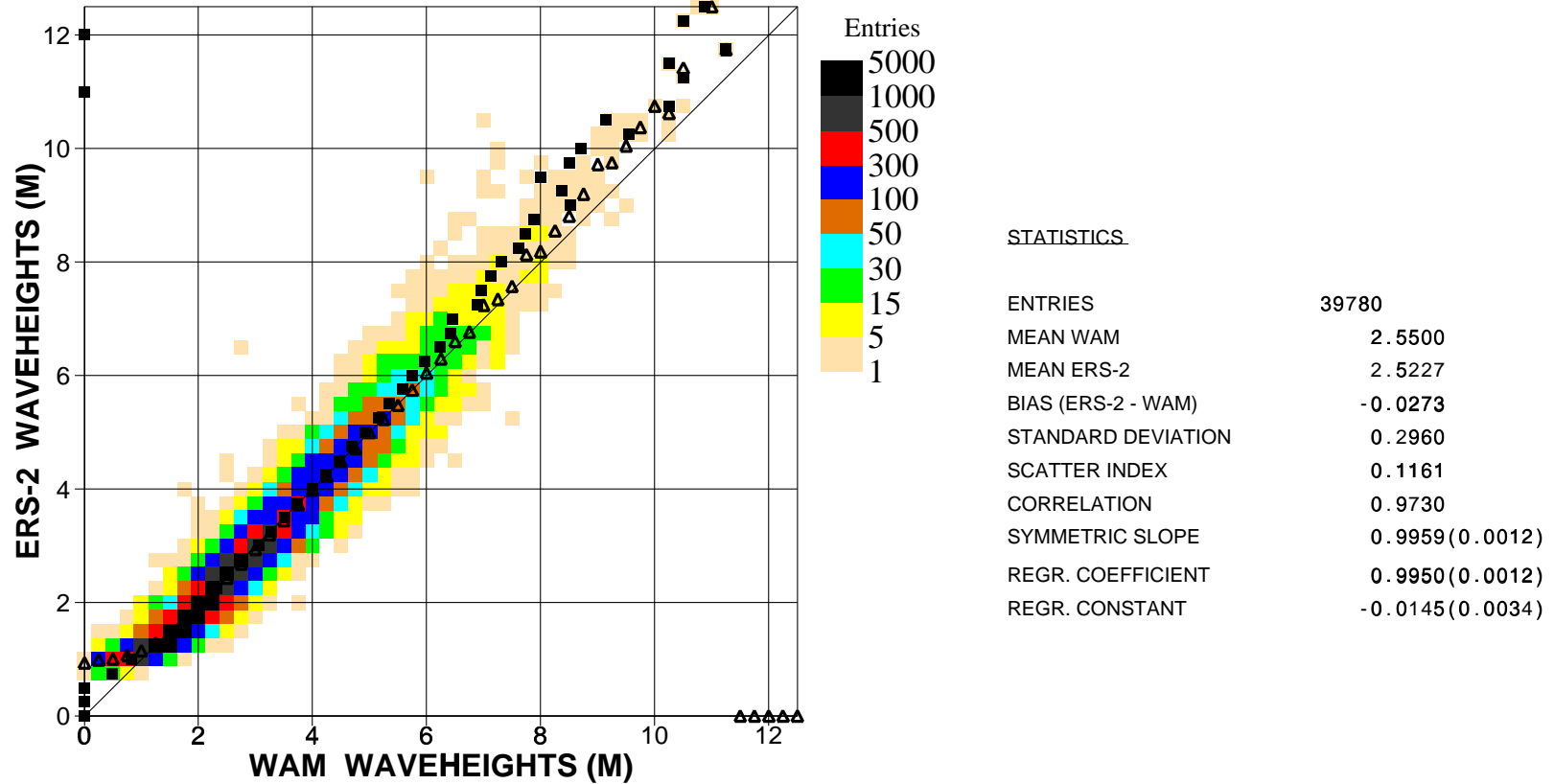


Figure 17. Comparison of ECMWF wave height results with ERS2 Altimeter wave height data for May 2001 (global)

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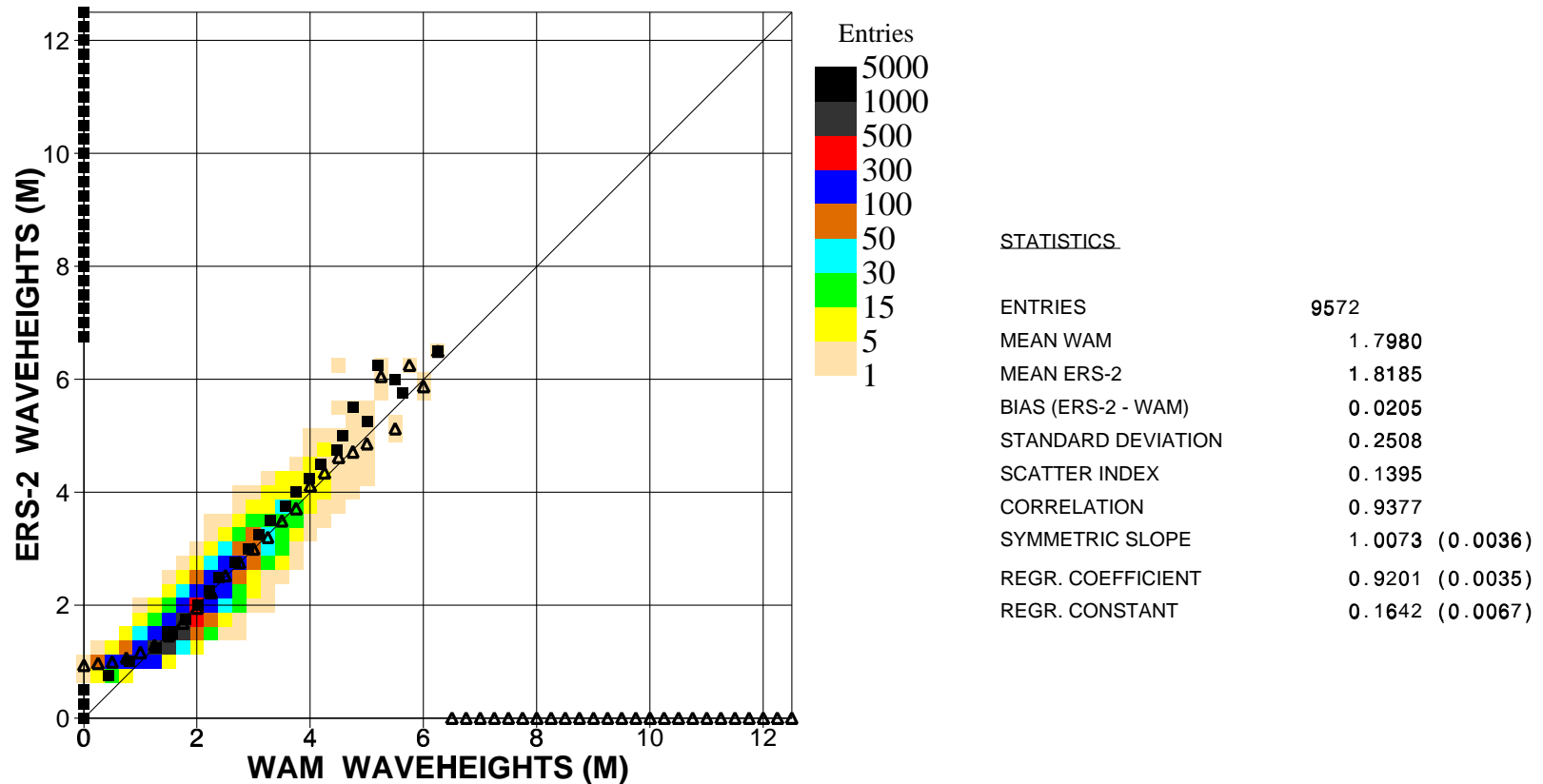


Figure 18. Comparison of ECMWF wave height results with ERS2 Altimeter wave height data for May 2001 (n.hem.)

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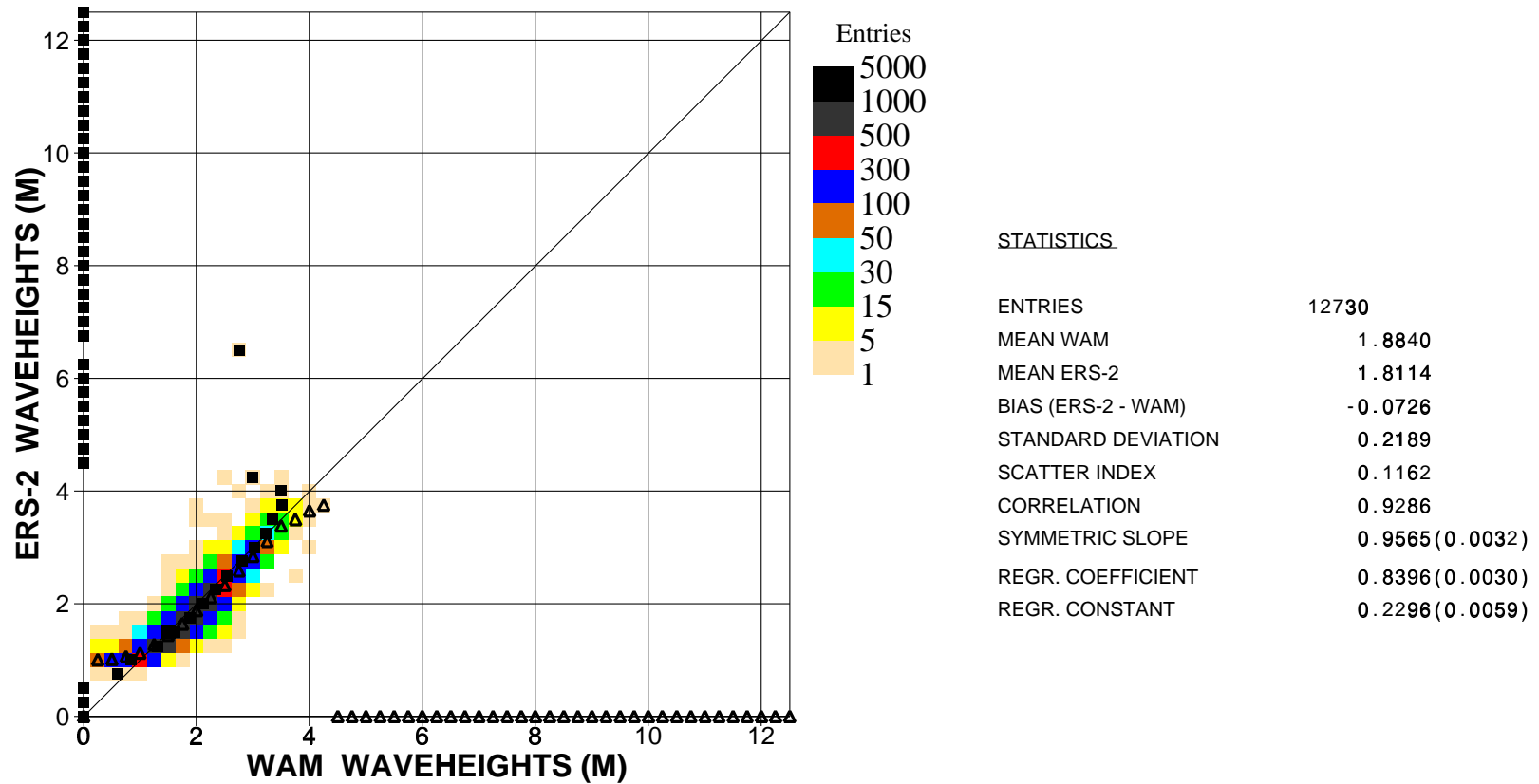


Figure 19. Comparison of ECMWF wave height results with ERS2 Altimeter wave height data for May 2001 (tropics)

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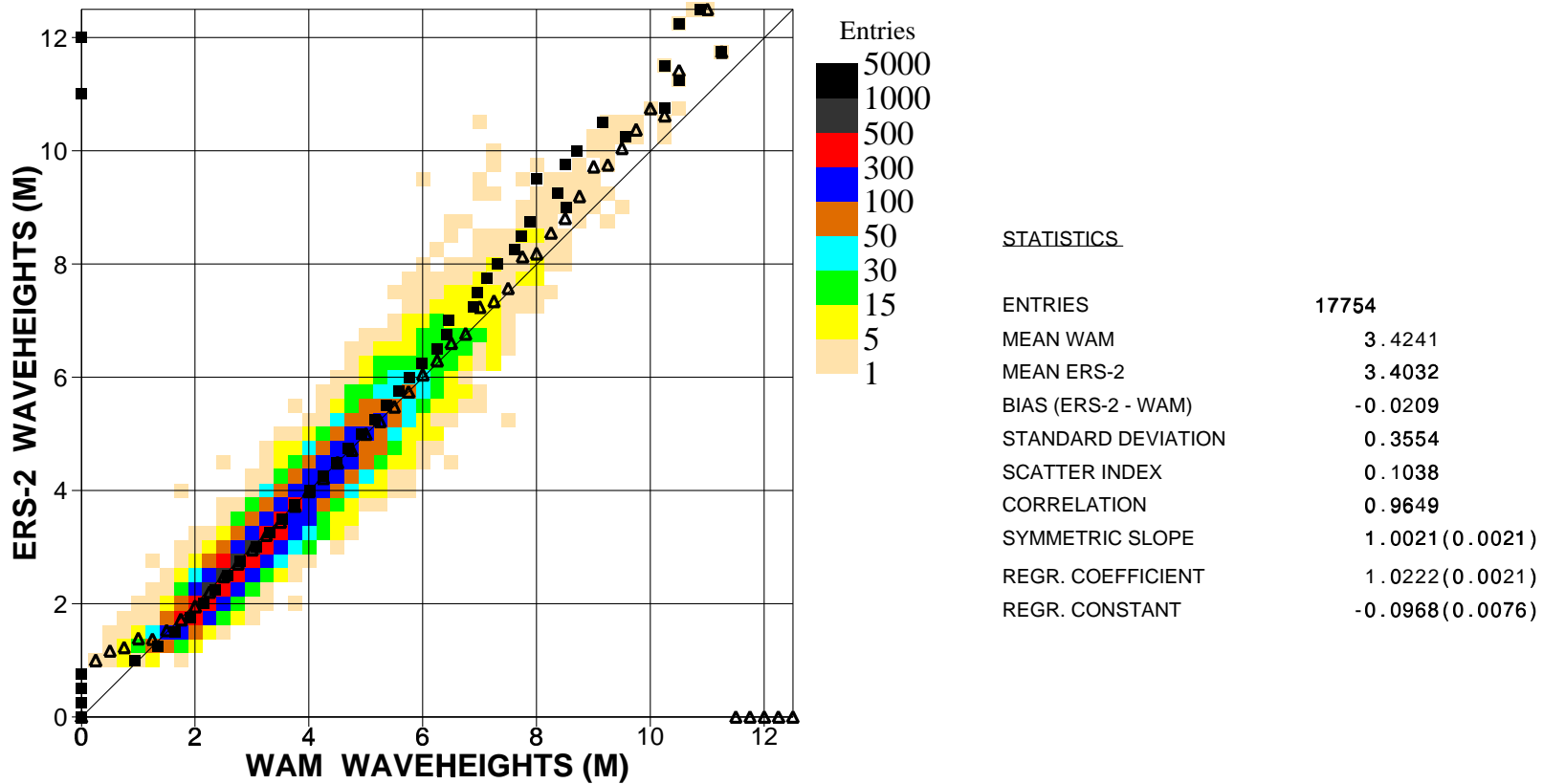


Figure 20. Comparison of ECMWF wave height results with ERS2 Altimeter wave height data for May 2001 (s.hem.)

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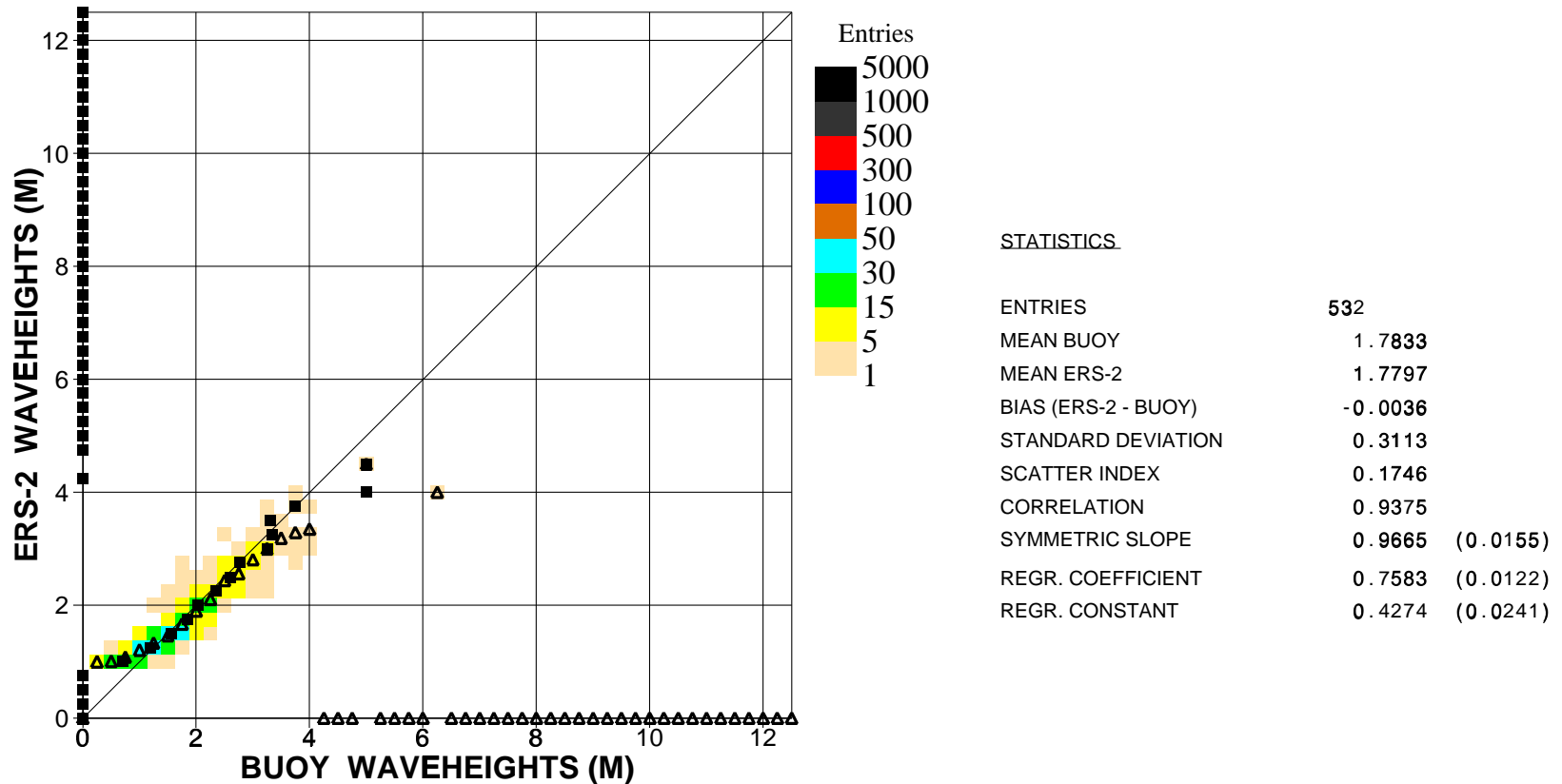


Figure 21. Comparison of buoy wave height observations with ERS2 Altimeter wave height data for May 2001 (global)

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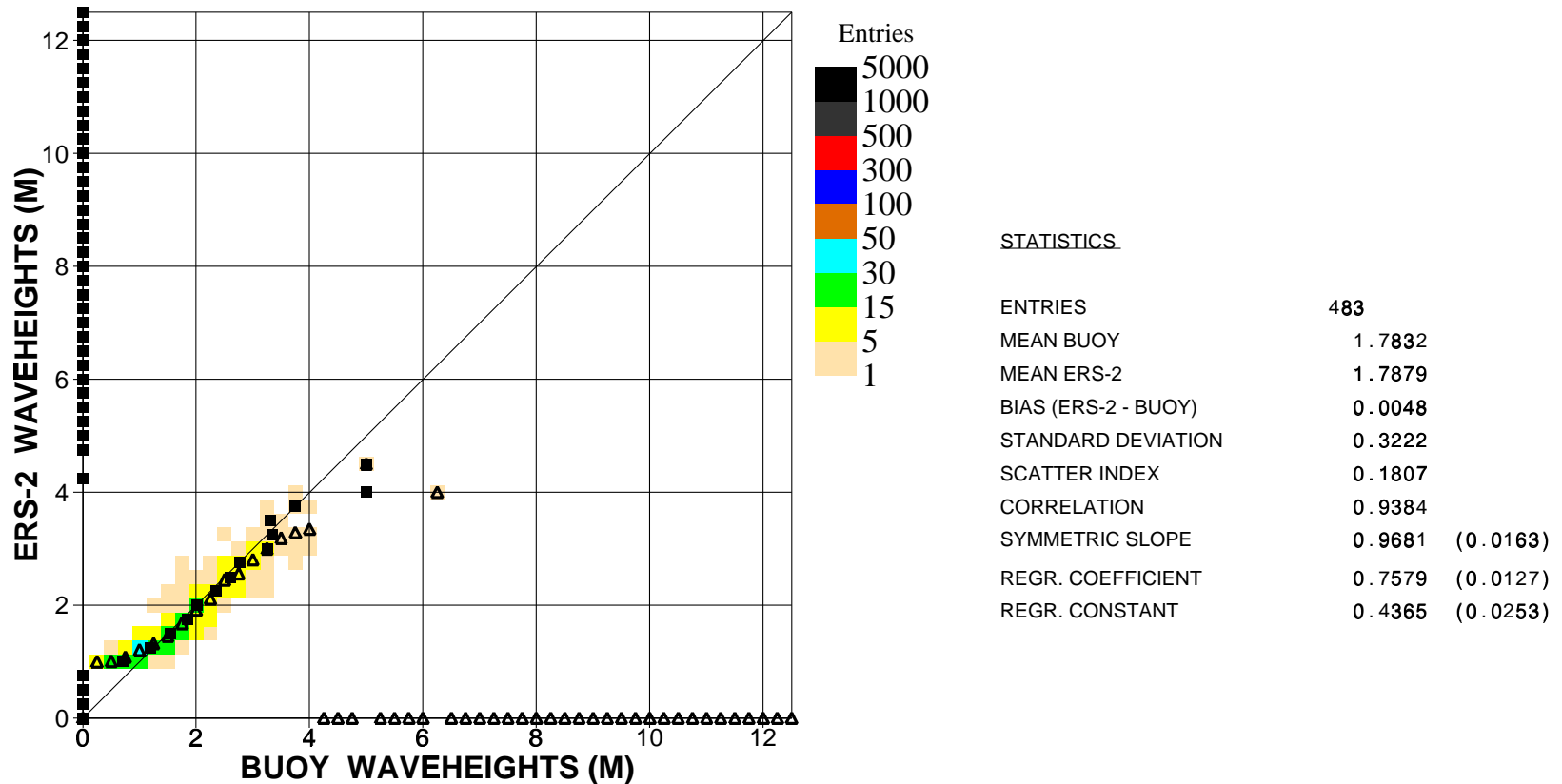


Figure 22. Comparison of buoy wave height observations with ERS2 Altimeter wave height data for May 2001 (n.hem.)

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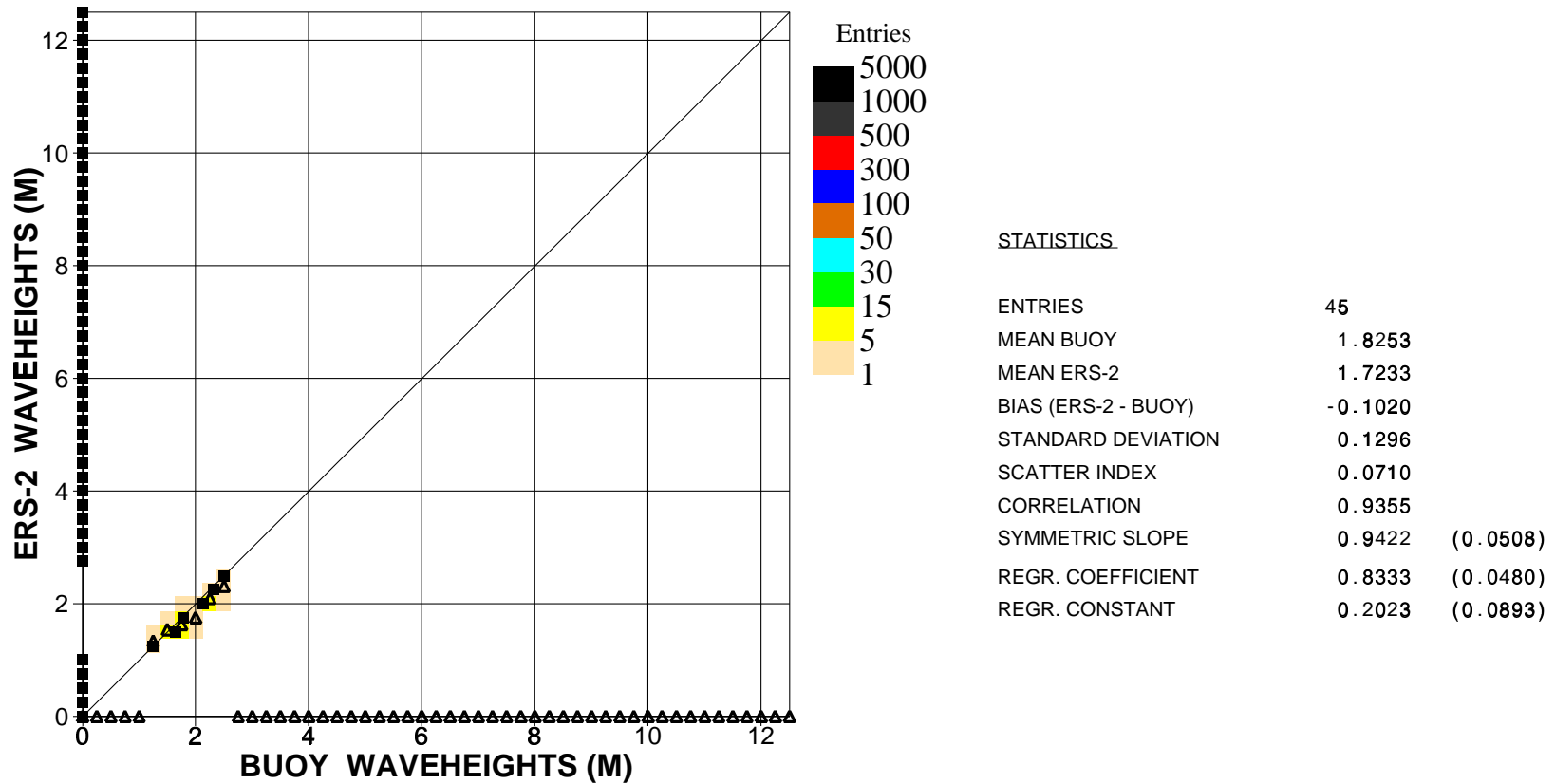


Figure 23. Comparison of buoy wave height observations with ERS2 Altimeter wave height data for May 2001 (hawaii)

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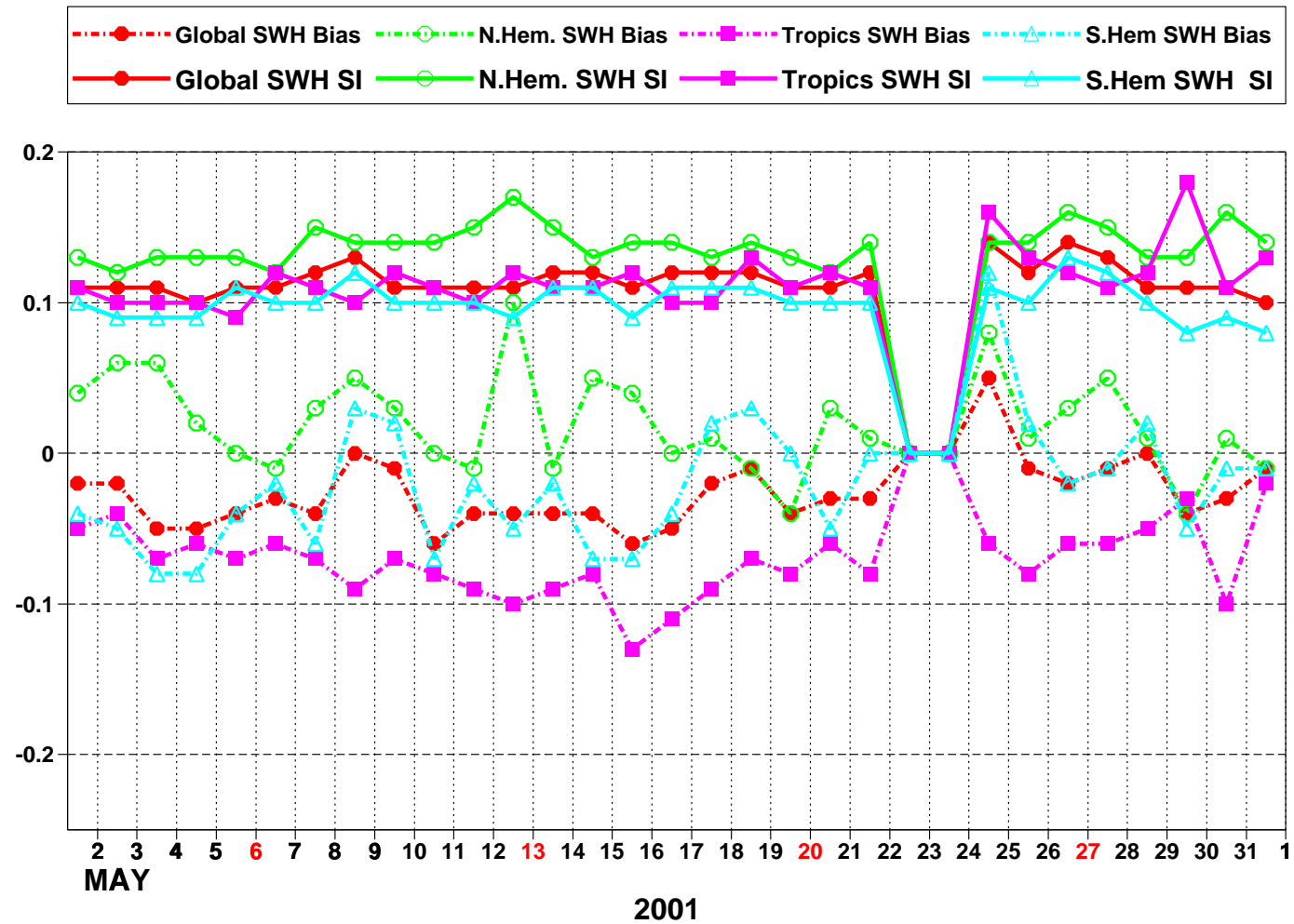


Figure 24: ERS-2 Altimeter wave heights: Timeseries of bias (ERS-2 - model) and scatter index (SI)



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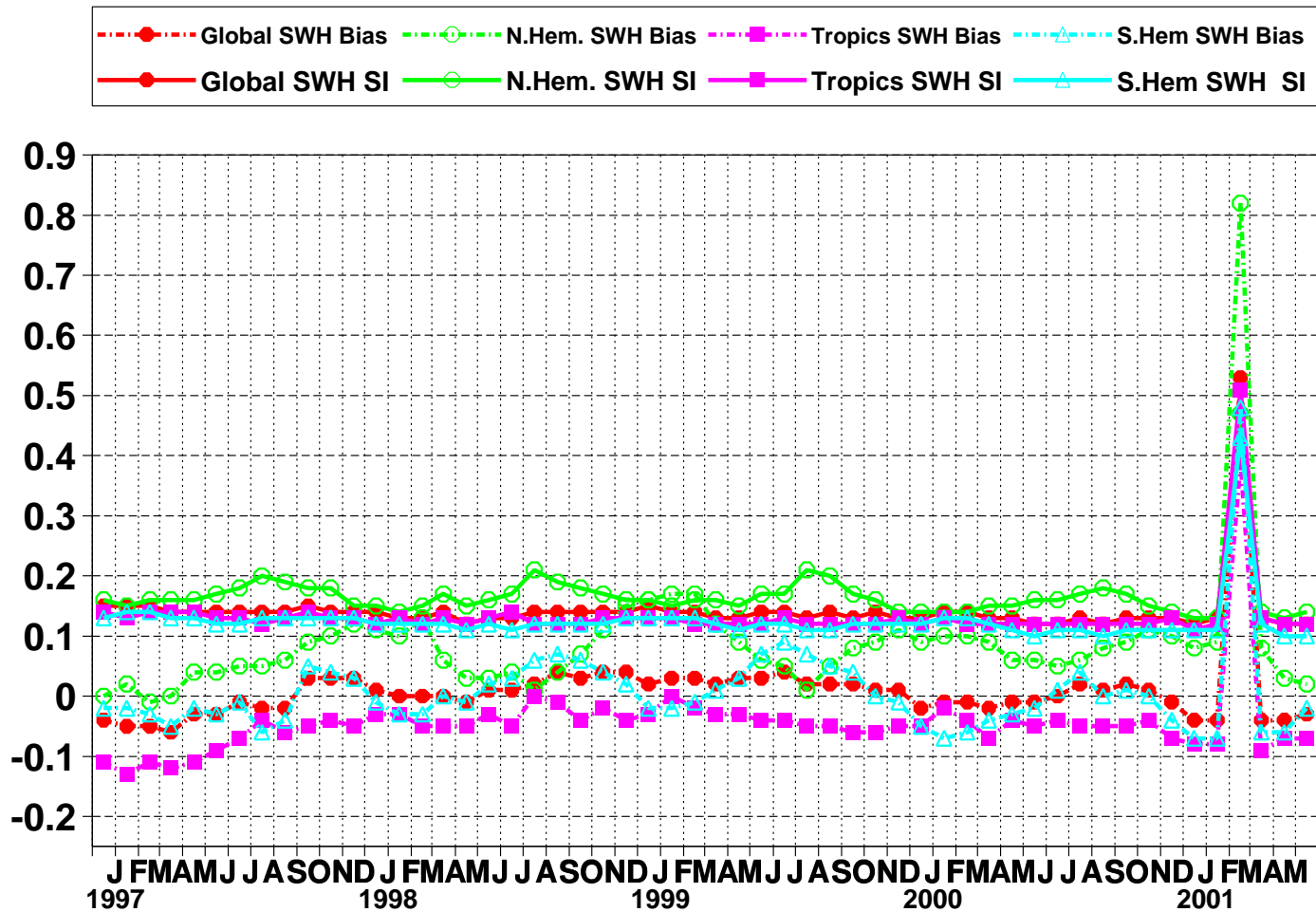


Figure 25: ERS-2 Altimeter wave heights: Timeseries of bias (ERS-2 - model) and scatter index (SI)



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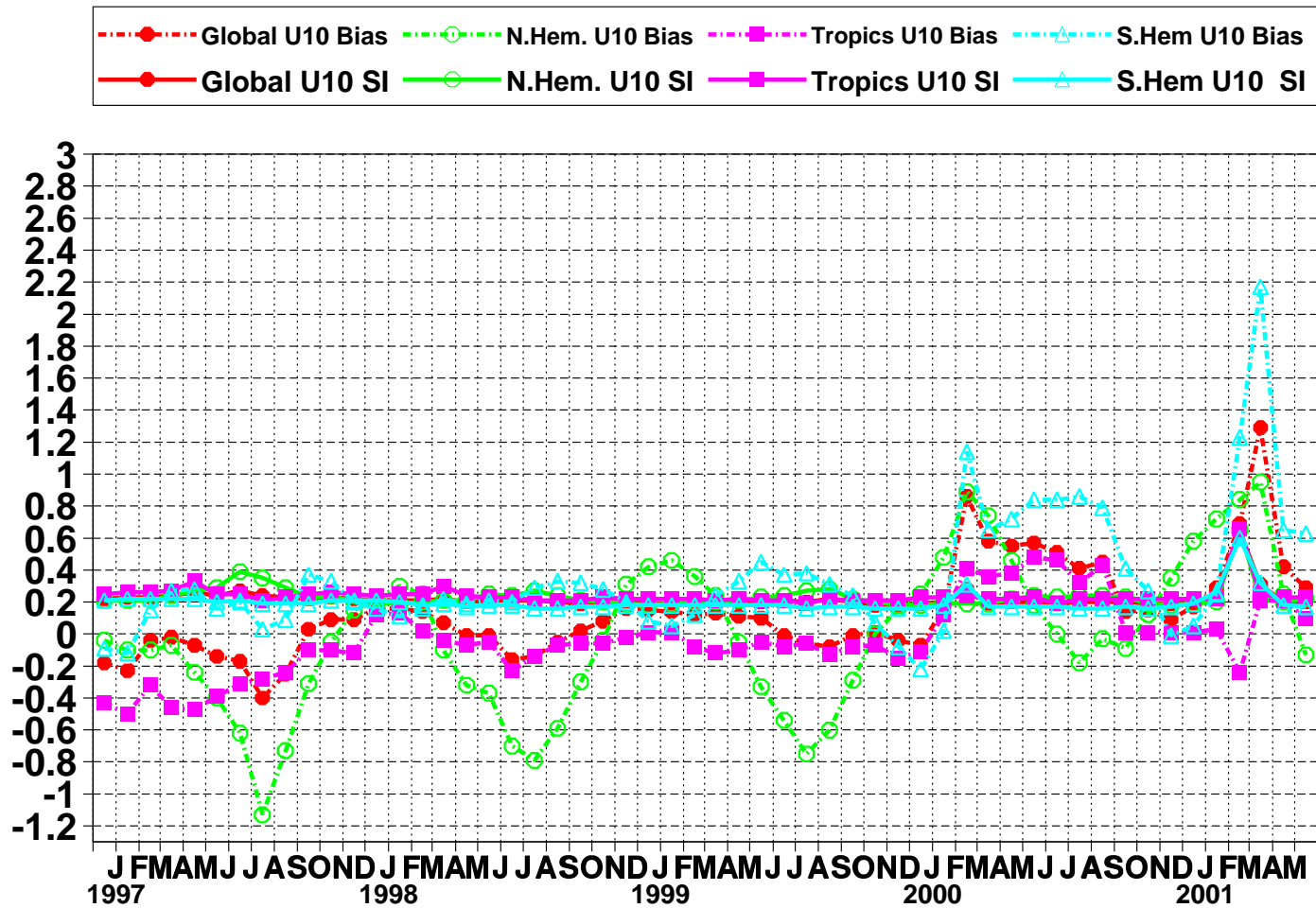


Figure 26: ERS-2 Altimeter wind speeds: Timeseries of bias (ERS-2 - model) and scatter index (SI)

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