Comment on 'Improved global maps and 54-year history of wind-work on ocean inertial motions' by M. H. Alford

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[1] In his paper 'Improved global maps and 54-year history of wind-work on ocean inertial motions' *Alford* [2003], Mr. Alford is using near surface (10 meter) winds from a number of different sources as input for subsequent analyses. One of the sources is the gridded multi-decadal reconstruction prepared by *Feser et al.* [2001] with the help of the regional atmospheric model REMO [*Jacob et al.*, 1995]. Another source used are the NCEP reanalyses [*Kalnay et al.*, 1996]. Analyzing both types of data *Alford* [2003] comes to the conclusion that "The NCEP and the REMO winds are highly coherent at all frequencies over the entire domain. However, the spectra of the REMO winds at f are lower than the NCEP winds by a constant factor. To account for this attenuation, the REMO winds are multiplied by 1.32." This conclusion is based on the fact that a comparison of NCEP spectra with buoy data in the Pacific yields good agreement and that a visual comparison of spectra obtained from REMO and NCEP wind fields showed a clear underestimation at high frequencies for the REMO winds [*Alford*, 2003, pers. comm.].

[2] We tried to reconstruct the spectra that led *Alford* [2003] to the conclusion that REMO winds have too little variance at high frequencies. In Figure 1 spectra of the zonal wind component at 10 m height are shown for hourly sampled REMO and 6-hourly sampled NCEP winds. In addition a spectrum of 6-hourly sampled REMO winds is shown. While all three spectra agree well at low frequencies there is indeed discrepancy between the 6-hourly sampled NCEP (black curve) and the hourly sampled REMO winds (blue curve) at the high-frequency end of the spectrum. If the hourly REMO time-series is sampled at 6-hour intervals (red line), the resemblance with NCEP in the high-frequency range is obvious. This suggests that the hourly sampled REMO winds do not underestimate spectral densities but that the 6-hourly sampled data suffer from an aliasing effect (e.g., *von Storch and Zwiers* [1999], Figure 12.22, p. 281). In such cases, variations at time scales shorter than the Nyquist folding frequency $(2\Delta)^{-1}$ (where Δ represents the sampling interval), are folded onto the resolved frequencies.

[3] A poor choice of sampling intervals can obviously lead to non-fitting spectra and misleading interpretation. In fact, multiplication of the hourly REMO winds by a factor of 1.32 artificially raises the spectral levels at high frequencies close to those obtained from 6-hourly sampled NCEP (and REMO) data but in the same time leads to an overestimation of the spectral levels at lower frequencies. In consequence, such a multiplication will not lead to a correct solution as shown in Figure 2.

[4] In summary we conclude, that the statement in *Alford* [2003] regarding the difference between the spectra of the REMO winds and the one obtained from NCEP winds is ***not*** an evidence for REMO winds significantly underestimating variability at high frequencies but is caused by an

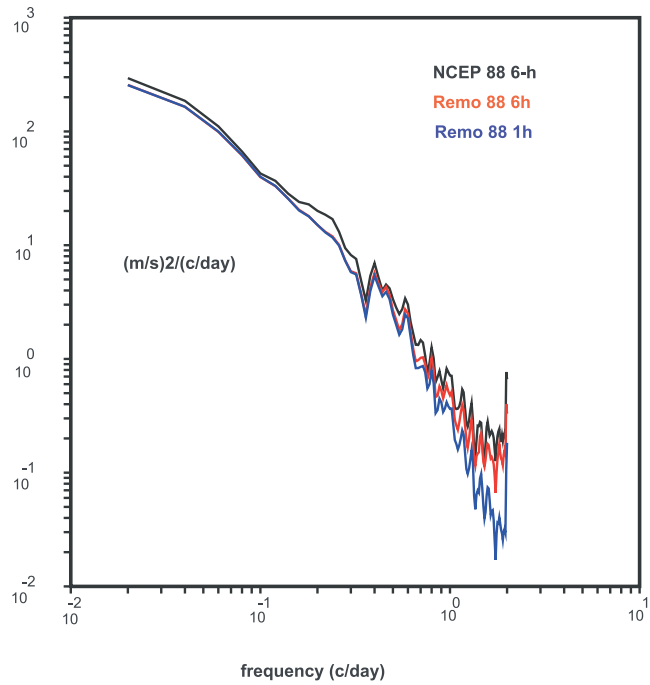

Figure 1. Power spectra of zonal wind at a height of 10 m at 43.0°N, 15.0°W in the Atlantic close to the Iberian Peninsula for 1988. REMO wind spectra are shown for hourly (blue line) and for 6-hourly (red line) values, NCEP winds were available every 6 hours (black line).

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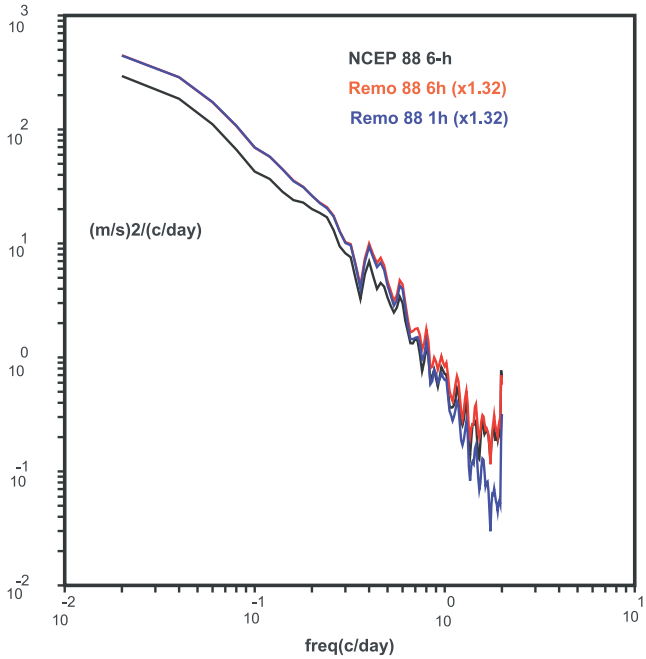

Figure 2. Same spectra as in Figure 1, but the REMO winds were multiplied by a factor of 1.32.

aliasing effect in the estimation of the spectrum due to different sampling intervals.

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