

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

F. Feser, H. von Storch, R. Weisse, and E. Zorita

Institute for Coastal Research, GKSS Research Center, Geesthacht, Germany

Received 23 June 2003; accepted 21 July 2003; published 26 November 2003.

INDEX TERMS: 3337 Meteorology and Atmospheric Dynamics: Numerical modeling and data assimilation; 3339 Meteorology and Atmospheric Dynamics: Ocean/atmosphere interactions (0312, 4504); 3322 Meteorology and Atmospheric Dynamics: Land/atmosphere interactions; 3384 Meteorology and Atmospheric Dynamics: Waves and tides; 3399 Meteorology and Atmospheric Dynamics: General or miscellaneous. **Citation:** Feser, F., H. von Storch, R. Weisse, and E. Zorita, Comment on ‘Improved global maps and 54-year history of wind-work on ocean inertial motions’ by M. H. Alford, *Geophys. Res. Lett.*, 30(22), 2165, doi:10.1029/2003GL018026, 2003.

[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

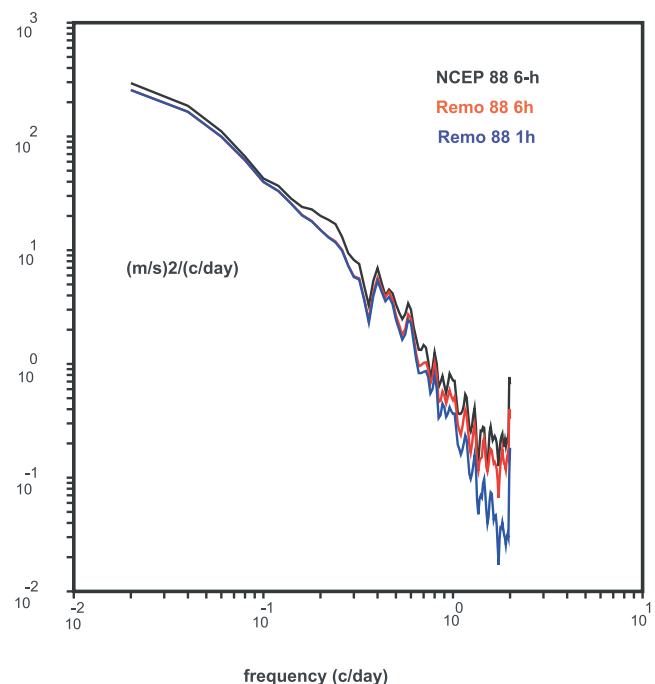


Figure 1. Power spectra of zonal wind at a height of 10 m at 43.0°N, 15.0°W in the Atlantic close to the Iberian Peninsula for 1988. REMO wind spectra are shown for hourly (blue line) and for 6-hourly (red line) values, NCEP winds were available every 6 hours (black line).

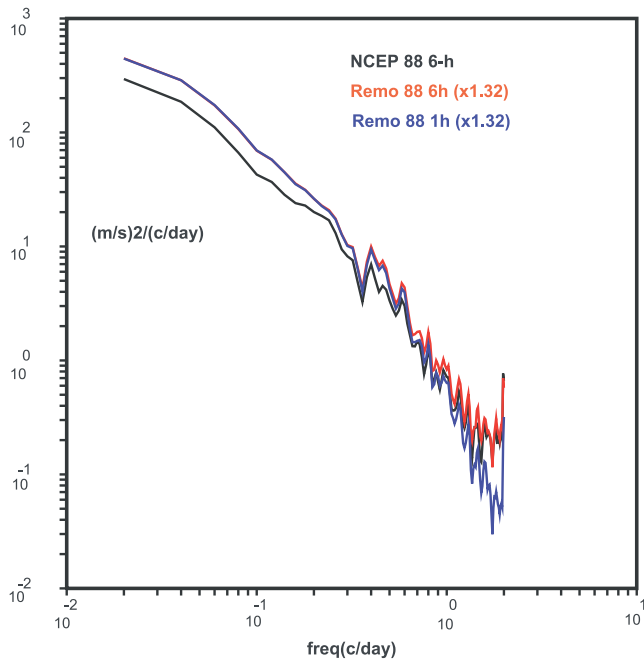


Figure 2. Same spectra as in Figure 1, but the REMO winds were multiplied by a factor of 1.32.

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

References

- Alford, M. H., 'Improved global maps and 54-year history of wind-work on ocean inertial motions', *Geophys. Res. Lett.*, 30(8), 1424, doi:10.1029/2002GL016614, 2003.
- Feser, F., R. Weisse, and H. von Storch, 'Multi-decadal Atmospheric Modeling for Europe Yields Multi-purpose Data', *Eos Trans.*, 82(28), 305–310, 2001.
- Jacob, D., R. Podzun, and M. Claussen, *REMO—A Model for Climate Research and Weather Prediction*, Intl Workshop on Limited-Area and Variable Resolution Models, Beijing, China, 273–278, 1995.
- Kalnay, E., M. Kanamitsu, R. Kistler, W. Collins, D. Deaven, L. Gandin, M. Iredell, S. Saha, G. White, J. Woollen, Y. Zhu, M. Chelliah, W. Ebisuzaki, W. Higgins, J. Janowiak, K. C. Mo, C. Ropelewski, J. Wang, A. Leetmaa, R. Reynolds, R. Jenne, and D. Joseph, 'The NCEP/NCAR reanalysis project', *Bull. Amer. Meteor. Soc.*, 77(3), 437–471, 1996.
- von Storch, H., and F. W. Zwiers, 'Statistical analysis in Climate Research', Cambridge University Press, 510 S, 1999.

F. Feser, H. von Storch, R. Weisse, and E. Zorita, Institute for Coastal Research, GKSS Research Center, Geesthacht, Germany. (feser@gkss.de)