Temporal variations in the wind and wave climate at a location in the eastern Arabian Sea based on ERA-Interim reanalysis data

P. R. Shanas and V. Sanil Kumar

Ocean Engineering, CSIR-National Institute of Oceanography (Council of Scientific and Industrial Research), Dona Paula, Goa 403 004, India

This paper presents statistical analysis, based on ERA-Interim re-analysis, at an Eastern Arabian Sea location aimed at quantifying monthly, inter-annual and decadal variability of the wind and wave climate.

The proposed results are worth publishing as potentially useful in different scientific (physical oceanography and coastal science) and technical (engineering design and shipping industry) contexts, but some unconvincing aspects of the proposed analysis must be clarified and the text must be improved.

TO BE CLARIFIED

Section 2.3 Comparison of reanalysis data with measured data

Page 7244 Line 2 "The comparison between the reanalysis and measured SWH data shows very high correlation (correlation coefficient = 0.96) with small RMS error (0.27 m) during both years."

0.96 is very high! I have found similar correlations only when dealing with astronomical tides (i.e. a quasi periodic process). What about coherence and phase? I think the authors should show the original series and explain such a result.

Page 7244 Line 4 "Scattering Index (SI) value is 0.23 with a positive bias of 0.2m during 2011 whereas slightly reduced SI and bias is observed during 2012 (Fig. 2)."

The scatter of data (in particular for what concerns 2012) seems to suggest significant discrepancies between the two series.

Section 3.1 Variation in wind speed during 1979–2012

The analysis of maxima should be performed in terms of Extreme Value statistics. In particular, it should be considered that the reliability of statistical inference crucially depends upon the shape of the tail of the distribution (the ξ value of GEV distribution) and this has strong influence on the detection of trends.

As a consequence, I am not confident the proposed (in Section 3.5 Statistical trend analysis for the time series data) estimates of trends are reliable for what concerns extremes. More explicitly: if the extreme distribution is "long tailed" (strongly negative ξ) *very* long time series are needed in order to assess with acceptable reliability the presence of trends.

Section 3.4 Influence of ENSO and Indian Ocean dipole on wind and waves

To be quite frank I think that the analysis of just three events is not sufficient to support all the proposed discussion concerning various modes of climatic variability. I think the authors should limit themselves to explaining different influences of local and distant wind stresses in determining local wave height in view of the proposed scientific and technical potential applications, leaving aside climate problems that are outside the scope of the present work.

SOME DETAILS (suggestions)

Page 7240

Line 5 comparison *with* the reanalysis Lines 13 -15*relationships* between annual are tested and *it is found that* negative IOD *years....* Line 21 are *performed* for the tropical

Line 25and shows that ERA-Interim

Page 7243

Line 10 Eitherwind speed shows a decreasing or wind speeds show a decreasing

Lines 9-10 page 7244Statistical analysis of wind speed frequency is *performed* by classifying wind speed into different *ranges* through

Lines 12-13 The weakening of strong winds *is also consistent with* the decreasing trend of monthly mean wind speed over34 yr.

Line 19study also supports the *hypothesis* that the cyclonic activity in the AS is decreasing.

Line 25 These are statistically significant decadal variabilities ...

Page 7248

Line 3 observed speeds are

Lines 3-5 The most logical cause of the peak identified in the wave height *is* the increase in wind speeds over time.

Page 7250

Line 24confident of non-stationarity.

Page 7251

Line 7 Theil Sen's slope estimate is also *a* method

Lines 13-15 The study shows that during 1979–2012 the annual mean wind speed *is characterised by* a decreasing trend (1.5 cms-1 yr-1), whereas the annual maximum wind speed *displays* an upward trend of 3.6 cms-1 yr-1.

Line 24activity and wind speed *finding* that the peak2 event

January 28, 2014

Antonio Speranza