

Interactive comment on “Extreme waves and climatic patterns of variability in the Eastern North Atlantic and Mediterranean basins” by Verónica Morales-Márquez et al.

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The study investigates the relationship of extreme wave heights to atmospheric modes based on a high-quality wave hindcast. The study is described concisely and clearly. There are not any great revelations, but a useful study is reported fairly and competently in an appropriate form and to a suitable journal. I have some detailed comments, which are given below, but I am content for a revised version to be published after reasonable attention to all reviewer comments.

I do not have a problem with calculating the linear trends by a simple method and reporting these (Figure 4 and associated text), But I'd urge caution in interpretation.

C1

Firstly, there is likely to be some autocorrelation in the atmospheric forcing (and thus wave heights), which makes the independence of values assumed in simple regression doubtful. Secondly, the particular time period, 1979-2009 is pertinent; different periods would show different patterns. A similar weakness in estimation of statistical significance is apparent in the use of “t-values” for the relationship of PCs to climate indices (lines 130-136), but again that is a minor objection and should not discourage publication. It is possible to take the statistical analysis further, for example through a wavelet analysis of the wave height - climate index relationship (I have seen this for sea level, but I am not aware of such an analysis for wave heights), but that is for another paper.

My general impression is that, as for some previous studies, the relationship of extreme waves in the North Atlantic to NAO is very convincing, but (albeit with calculated significance) the other relationships are rather weak (possibly with the exception of SCAND). It seems to me to be open to debate if we understand the extreme wave heights better from modest correlations to atmospheric indices. The relationship to composite was more interesting and in some respects was more convincing. For example, the relationship to EA is physically sensible and quite satisfying in this form. The sections from lines 193-217 and from 219-246 are rather monotonous and not very effective in communication. I suggest finding a more engaging method of communicating this information, perhaps a Table?

I do not have any strong objections to the content of “Summary and conclusions” though I can be counted as a sceptic regarding simple projections of NAO behaviour and their utility in projections of extreme waves.

The abstract adequately describes the topic and principal results, but gives no explanation of the methodology beyond “31-year wave model hindcast”. I suggest adding another sentence. Line 64-65. “we assume that wave climate is constant for 3 hours”. I interpret that phrase as an assumption of an autocorrelation period of 3 hours, is that correct? Was the data analysed to reach this conclusion? Does it have any implica-

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tions beyond simply informing using 3-hour data? Line 76 and following: There are ~240 3-hour values in each calendar month. How exactly is the 99th percentile calculated? (An interpolation between the second and third highest values for each month?) Line 82. How good is a fit of annual and semiannual sinusoidal to the seasonality? Was there any analysis for higher harmonics? Line 93. spelling “cyclogenetic” Line 95. Perhaps change “adjusted though a first order polynomial . . .” to “fitted by a linear regression in time”? Line 101. Change “northern” to “north” Line 116. “periodicity . . . around 5 years” Not wrong, but perhaps risky? I would generally avoid talking about periodicity unless there is a very strong case. Line 145, “. . . being the rest of correlations marginal”. I could not make sense of this line! Line 196 “. . . leads a wind jet”. I suggest “this composite is characterise by a strong westerly wind stream . . .” N.B. A similar relationship was demonstrated dynamically by Wolf and Woolf (2006; GRL 33(6)). Add gratitude to NCEP and NOAA CPC for data in Acknowledgments?

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