Ocean Science
Discussions

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Interactive comment on "Statistical Analysis of Wave Energy Resources Available for Conversion at Natural Caves of Cape-Verde Islands" *by* W. M. L. Monteiro et al.

Anonymous Referee #1

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This paper presents a statistical analysis of a time-series of significant wave height and peak period recorded in one location near Cape-Verde from 1979 up to 2009. The wave energy power for the 31 years is calculated, and it shows to be decreasing over the years. A characterization of the monthly average wave energy power is also performed. Finally, a forecast of the future availability of the wave energy power is presented.

General comments:

A part for being an interesting/particular area to study, the paper reads more as a technical report than a scientific paper and it is difficult to fully understand with many references to statistical software.

The paper is missing a state-of-the-art section pointing out which are the techniques usually used for quantifying the wave energy power availability and what are the novelties presented in this work. For example are there statistical methods used that go beyond the state-of-the-art of commercially available software? The methodology (and the data used) should be better presented, which would allow to show the scientific novel aspects presented in this paper.

In the presentation of the results there are some points that remain unclear and not fully discussed: 1) the monthly averages do not show any trend in time, but then looking to the annual time series a decreasing trend is present. Should this decreasing trend be present also in the time-series of monthly average power? 2) If a decreasing trend is present analysing the historical data, how can you justify that the future forecast does not show any trend? Is the future forecast not calculated on the basis of the historical data analysed?

The paper can be accepted only after a major revision addressing the above main issues.

Specific comments:

Abstract

Page 1 – Line 11. A reference to the SOWFIA project should be added to allow the reader to have more information on the data used in the paper.

1. Introduction

Adding a state-of-the-art section in the Introduction would help to situate the work and to understand the novel aspects presented. Furthermore, a literature overview of the wave climate in the Cape Verde area, if available, could help to strengthen the paper findings.

Page 5 – Line 14. An additional section "Data" should be added to the manuscript. This will allow the reader to understand better the methodology used. A short description of

the data used is at the beginning of the Results section (page 9 – line 10-14), that can be moved here and further described.

2.1 Average Power

Page 5 – Line 20-21-22. The wave power energy presented in Eq. (1) is valid for any wave spectrum, not only for the Pierson-Moskowits wave spectrum.

Page 6 – Line 1-7. This paragraph is a bit confusing. The significant wave height comes from the integration of wave spectrum too. If you add a "Data" section the description of significant wave height and peak period can go there.

Page 6 – Line 8-15. Have you calculated the wave spectrum using the Pierson-Moskowits parametrization? If not, it is not worth mentioning. After reading this paragraph, it is not clear which is the approach you finally used to calculate the energy period. If you started your analysis from a dataset of significant wave height and peak period, this paragraph can go also in the "Data" section, presenting the starting point of your analysis.

Page 6 – Line 22-24. You could add further discussion and references to other studies about the wave climate in the Cape Verde region. You found that there is a seasonality in the wave power distribution. What happens to the annual trend if one year instead of spanning from January to December (solar year) goes from September to August next year?

Page 7 – Line 1-2. Please explain how data is collected and made available at SOW-FIA, in the "Data" Section.

2.4 Statistical Analysis

Page 8 Line 8. Add a reference to the XLSTAT and Minitab Software.

2.5 Representativeness...

Page 8 Line 28. Add a reference to the Minitab Software.

3. Results

Page 9 – Line 10-14. This paragraph can be moved to the "Data" Section. It might be helpful to have a map showing the location of the data collection point and the position of the NC of Cape Verde. Are the waves recorded at 3700 m representative of the wave climate at the NC of Cape Verde? How is the bathymetry in the area?

Page 10 – Figure 4 is not cited and commented in the text. If it adds additional information, please comment it, otherwise remove it.

Page 10 – Line 12-13. Can be more information be added to reinforce your "suspect" ?

Page 11 – Figure 5 is not commented in the text. If it adds additional information, please comment it, otherwise remove it.

Page 12-13 – Figure 6 and Figure 8. If the annual averages come from the average of the monthly averages, it sounds strange that the monthly averages do not show any trend for any of the months, while the annual average time-series show a decreasing trend.

Page 12 – Figure 6 and Figure 7. Is it possible to make them bigger? It might be better to have the same y axis limits for Figure 6 and Figure 8 so we can better compare the annual and monthly trends.

Page 13 – Line 12. The "increase" should be the "decrease".

Page 13 – Line 8-11. It is difficult to get why if you are not able to explain the trend of the historical data "in this context, it is then worth making a forecast".

Page 13 – Figure 8. Add proper label on y axis, missing quantity plotted and units.

Page 14 – Line 10-11. See General Comments.

Page 15 – Table 5. What is "Row"? It might be more readable to see this table as a plot, for example as a continuation of Figure 8.

Page 16 – Figure 10. What is on the axis of Figure 10?

Page 17 – Is it possible to present Table 6 in a Figure? It will help the readability of the manuscript.

Page 19 – Line 7-10. Not clear what you are doing here. Is this an estimate of days of measurements during hypothetical operation of NC in Cape Verde?

Conclusion

Page 20 – Line 12-16. See General Comments.

Page 20 – Line 17-19. Can you elaborate a bit more on this point in the Result section and in the Conclusions.

Page 21- Line 3. "Table 6" should be "Table 7". Looking to Table 7, if I have less numbers of days of measurements during Spring and Summer, what are the implications? Is that important?

Typos:

Page 13 Line 8. Drop the space after "curves"

Page 13 Line 15. Change "its" to "it is"

Page 13 Line 15 "to see" . . . in Table 4?

Page 14 – Line 10. Drop the space after "1981)."

Page 17 Line 8. Change "reseults" to "results".