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Ocean Science Discussions



# *Interactive comment on* "Environmental controls on marine productivity near Cape St Francis, South Africa" *by* Mark R. Jury

**Mark Jury**

mark.jury@upr.edu

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AUTHOR REPLIES IN CAPITALS The author acknowledges that this work should be regarded as an explorative investigation of a number of variables available from high resolution re-analysis. Indeed, it seems at times that as many different parameters as possible are thrown into the mix to see where the best correlations could be found. There are results which support the generally held view of the relationship between winds, upwelling and the influence of the Agulhas Current in shelf-edge upwelling. However, the introduction of salinity as an indicator is a novel approach,



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and the values obtained allow a correspondence to rainfall and river run-off to be made. Nonetheless, the catch statistics in Table 2 show a low correlation and it may be that averaging marine data over a year does not provide the necessary detail. Moreover, averaging parameters over such a wide, dynamic and variable region may lead to suppression of localised and important processes which could markedly affect the resultant conditions. Overall, I recommend that the paper be published, on the understanding that some of the results are speculative. However, there are a number of details which require additional clarification; these are listed below. Figure 1(a): Bathymetry less than 1000m is important, and should be shown. THE -100 AND -200 ISOBATHS WERE ADDED. It is not clear why the three rivers, Fish, Sundays and Gamtoos were chosen, since there are a number of other large rivers in the area, e.g. Kariega, Bushmans, Swartkops, Kromme etc. Rivers should be shown in Figure 1 and not left to Figure 3. THOSE 3 RIVERS HAVE THE GREATEST DISCHARGE AND APPEAR TO AFFECT THE SHELF SALINITY MORE THAN OTHERS, HENCE THEIR DATA WAS ANALYZED. THE AUTHOR FEELS THAT THE RIVERS WILL BE 'LOST' IN THE COMPLEX TOPOGRAPHY OF FIG 1, AND SO PREFERS TO KEEP RIVERS IN FIG 3 WITH WATER FLUX Intense stratification occurs over the wider Agulhas Bank in summer due to insolation and milder winds, while in winter a loss of heat from the surface layers combined with stronger westerly winds causes vertically well-mixed conditions (Schumann and Beekman, Trans Roy Soc SA, 1984, 191-203). YES, THAT WILL BE ADDED. Presumably the sensible heat flux of Figure 1(c) is outgoing, supporting the SST of Figure 1(b). This is one of the cases where the seasonal differences are substantial, and are not evident in such averaged portrayals. AGREED - HENCE, THE AUTHOR COVERS THE SEASONAL CYCLE IN FIG 1D,E,F. The south and south-eastern sections of South Africa are not summer rainfall areas, but rather fall between the winter rainfall of the Western Cape and eastern South Africa. AGREED. Identify parameters $\zeta$ and $\tau$ in line 191 Table 1 – why is salt/chloro correlation shown (0.62) and not chloro/salt? OK, PARAMETERS IDENTIFIED, THE CORRELATION IS LISTED IN TABLE 1 AND DUPLICATE RESULTS ARE OMITTED.





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The importance of waves is not clear, in particular with the high correlations shown in Table 1. WAVES DERIVE FROM WINTER STORMS AND BUT RAINFALL AND RUN-OFF PEAK IN SUMMER. THAT IS NOW MENTIONED. It is not clear where the data used to determine the correlations in Table 2 was obtained for the period 1981 to 2015, in particular values such as sea temperature and currents at 10m. THAT IS MENTIONED IN DATA SECTION, USING SODA3 REANALYSIS, EXCEPT FOR UPPER WINDS, SST AND RAIN. THOSE ARE IDENTIFIED IN TABLE 2 CAPTION.

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2019-55/os-2019-55-AC1-supplement.zip

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