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Ocean Science Discussions

Interactive comment on "Characteristics of the seasonal cycle of surface layer salinity in the global ocean" *by* F. M. Bingham et al.

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We greatly appreciate the reviewer's careful reading of our manuscript and thoughtful comments. The paper is much improved as a result of his/her input.

(1) We will make sure the terminology is clear in the revised version.

(2) Good question. The bimodal distribution of (former) Fig. 7 is controlled mainly by E-P. Plotting that histogram using E-P instead of S0(E-P)/h gives similar results, though there are some interesting differences. The months of the peaks in the histograms are about a month later for just E-P. We have mentioned this in the text, but did not feel it a significant enough result to merit an additional figure.

(3) We will include discussion of these previous results in the revised version of our paper. As discussed in the response to reviewer 1, advection can play a role in the tropics and mixed-layer entrainment in higher latitudes.

(4) The 1-2 month lag the reviewer is talking about is slightly different from what is shown in Mignot and Frankignoul (2003). This paper is mainly concerned with inter annual variability of SSS. It shows that the anomaly from the mean seasonal cycle has a 1-2 month lag from the anomaly of the freshwater flux (their Fig. 3). Our paper is discussing the mean seasonal cycle. [If I am understanding the paper correctly] Delcroix et al (1996) do show a 3 month lag between maxima of the EOFs of SSS and precipitation in the tropical Pacific (their Fig. 6). However, it is notable that our lag is 1-2 months and not 3.

(5) The reviewer is correct. The statistical test used to create Fig. 16 does not take into account errors in h or (E-P). (In fact, the calculation treats the seasonal h as a climatological value with no error at all.) Our calculation looks at the scatter in SLS and S0(E-P)/h and determines if the two are significantly different from each other. To some extent, the errors in SLS and E-P are contained in the scatter that gives the standard deviation that we use. However, this is a severe limitation on the validity of the information presented in this figure and should be stated clearly. The Wijffels paper cited by the reviewer gives errors in the mean E and P not the seasonal, so it is not clear how relevant those results are.

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