I am grateful to the authors for carefully responding to all my remarks and comments, and for making some changes to the manuscript which, in my opinion, have resulted in some improvements and clarifications. I recommend the manuscript for publication in Ocean Science, although I have one final comment that should be addressed.

This comment concerns the implementation of the PCA and follows to the authors' response to my previous comment on this issue (l.300 in the first version of the manuscript). I know understand that the Sea Level Anomaly is pointwise normalised by the standard deviation (along the time coordinate) prior to computing the covariance matrix to obtain the PCA modes and eigenvalues. That is, if we call $\eta(x,t)$ (dropping y here for simplicity) the initial sea level time series, and $\eta' = \eta - \langle\eta\rangle_t$ (where the brackets denote averaging over the variable denoted by the index), the PCA is computed on a "reduced" variable $\tilde{\eta}(x,t) = \eta'(x,t)/\sigma(x)$ where $\sigma = \sqrt{\langle\eta'^2\rangle_t}$. Although this does not seem to be critical for the data analysed here, probably because the spatial variations of the time variance are moderate, to my knowledge, this is not a standard procedure and needs to be justified (if it is a documented procedure, please add a reference). As a result, the PCA modes do not account for the variance of the SLA (η') but of the reduced variable $\tilde{\eta}$ (which is 1), and the PCA modes (and eigenvalues) are different that what would be obtained by performing a PCA analysis on η' (and they are not simply related by a factor σ^2). As far as I understand, the authors then project the SLA η' onto the modes for the reduced SLA, which is not a standard procedure either. Indeed, while the modes form an orthonormal basis, implying that one could use either basis of modes – PCA(η') or PCA($\tilde{\eta}$) –, one loses the properties that the truncated series over the PCA modes is optimal in terms of variance captured. So it would be surprising if your procedure gave better results than using PCA on η'.

All together, I think a clarification and justification of the procedure should be given in the manuscript.