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Interactive comment on "Diatoms and their influence on the biologically mediated uptake of atmospheric CO_2 in the Arabian Sea upwelling system" *by* T. Rixen et al.

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The substantive new work in this paper is strongly dependent on a two end-member analysis of mixing in the Arabian Sea. The authors were criticized by both referees for this assumption in the initial version. They have mounted a defence of it in their replies, but the utility of the results still depends very much on whether one believes this analysis or not.

I have to say I have very severe doubts about it. Referring to fig 4 in the paper, the authors show T versus S in the mixed layers of the stations. The T-S relationship is not straight, indicating direct mixing between the two end members. THe authors explain this by saying that there are strong latent heat fluxes in the region. However,

the curvature of the T-S relation is of the wrong sign to be explained by mixing their two favoured endmembers and additionally removing some heat to the atmosphere – this would give a curvature towards lower temperatures, not higher ones! It seems to me that the probable explanation is that there are more than two endmembers to this problem, which would in any case seem quite likely – there are comparatively few places in the surface ocean where a two-end-member analysis such as this would work. If this is the case, much of the analysis of the paper would be incorrect. I would like to see the authors provide more convincing evidence in favour of this assumption.

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