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Interactive comment on "Why productive upwelling areas are often sources rather than sinks of CO_2? – a comparative study on eddy upwellings in the South China Sea" *by* N. Jiao et al.

Anonymous Referee #2

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The paper describes the CO2 dynamics in two cyclonic eddies resulting in upwelling sites. While most of the relevant parameters have been measured, one particular, albeit important parameter is only poorly constraint, i.e, microbial respiration. This is deduced from leucine incorporation measurements, assuming a prokaryotic growth efficiency of 8%. Clearly, this microbial respiration should have been measured directly via CO2 production or O2 consumption assays. As shown in a number of studies, the prokaryotic growth efficiency can vary substantially. Hence, taking a reported value and applying it for the specific eddy conditions might result in major deviations from

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the actual rate. While the paper presents two conceptual models on the CO2 dynamics in upwelling regimes, it does not discuss the CO2 dynamics in the light of the 'remineralization depth' concept. I think the authors needs to thoroughly discuss the remineralization depth concept and the model exercise given in Kwon et al, 2009, Nature Geosci. The Kwon et al paper appears to be the most useful paper to compare their findings and conclusions with and even use the modeling approach for their data. Also, the paper needs some editing of the English.

Table 1: for bacterial abundance, the n=2, nevertheless, the standard deviation is given. This is wrong since for calculating SD, an n of at least 3 is needed. For some of the estimates there, the SD is large compared to the mean and it remains unclear whether there are statistical differences between the sampling sites. Some statistics should be included here in the table. Fig. 3: in the legend of the 2 left hand panels, liter is given as 'l' while everywhere else it is given as 'L'. Also, it is unclear what the number of samples is. Fig. 5: instead of 'unicellular' Leu-uptake use the term 'cell-specific'

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