

## ***Interactive comment on “Interannual-to-decadal variability of North Atlantic air-sea CO<sub>2</sub> fluxes” by S. Raynaud et al.***

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While I am following the developments of climate research to the degree necessary to keep my undergraduate teaching up-to-date, I am not an expert on numerical modelling of carbon dioxide fluxes. The modelling community clearly has its own terminology, and it may be helpful for readers from other fields to take that into account. As a sea-going oceanographer I usually think in terms of natural phenomena, and it took me a while to understand that “atmospheric inversions” in this context does not mean atmospheric temperature inversions but inverse models of the atmosphere. This could be spelled out more clearly.

Another area where clarification may be required is the importance of the Redfield ratio for the model. I think the statement “phosphate and nitrate+ammonium are  $\ddot{E}$  linked by constant Redfield ratios” requires some adjustment. There is accumulating evidence

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that Redfield ratios are not constant but vary between ocean regions, and recent evidence suggests that they have some time variability as well. (Relevant references can be found in the paper “Detecting changes in Labrador Sea Water through a water mass analysis of BATS data” in this volume of Ocean Science Discussions.) The authors should clarify how important the constancy of their Redfield ratios is for their model.

Finally, the choice of weights for the active and passive variables requires some justification. Obviously the active variables should have larger weights than the passive variables, but an objective choice of weights is obviously preferable to a subjective choice of 1.0 and 0.1. Objective weights take into account the degree of accuracy of the measurements that produce the variables, the reliability of the instrumentation, and other factors. It is not always possible to quantify those factors in a rigorous manner, but some justification of the weights based on data quality or other relevant factors should be given.

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