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Interactive comment on “Reconciling surface ocean productivity, export fluxes and sediment composition in a global biogeochemical ocean model” by M. Gehlen et al.

M. Gehlen et al.

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We thank G. Jackson for his constructive review.

1- The description of coagulation: One of the objectives of this study was to compare different descriptions of particle fluxes of varying complexity in a 3D global biogeochemical model with respect to their capability to reproduce observations of particle fluxes. We put emphasis on the resolution of size classes and a prescribed versus a prognostic sinking speed. Following this approach, variants of the same coagulation model were used for all experiments. We recognize the importance of the coagulation model per se and the sensitivity of particle fluxes to its formulation needs to be tested in the future.

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2 - The parameterization of water column processes: The model PISCES includes two zooplankton size classes (micro- and mesozooplankton) that vary in space and time. Zooplankton biomass evolves as a function of resources (grazing) and losses (respiration and mortality). In the case of flux feeding of mesozooplankton on fast sinking particles, the intensity of feeding is modulated by the concentration of flux feeders. This point will be clarified during the revisions of the manuscript. The model version used for this study does not include an explicit description of the bacterial loop. Organic matter is however respired in the water column with a remineralization rate that is dependent on temperature and thus variable in space and time.

After efforts spent at improving the representation of surface ocean properties by biogeochemical models, it is timely to reconcile the surface ocean and the deep. Our study was intended as a first step down the road.

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