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Earth System Science Data Discussions

Interactive comment on "Global distribution of pteropods representing carbonate functional type biomass" *by* N. Bednaršek et al.

Anonymous Referee #2

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This database compiles abundance data, and makes estimates of biomass, for pteropods in the global ocean. This is a timely contribution and potentially valuable database "for modellers for the study of ecosystem processes and global biogeochemical cycles". However, as it stands, I cannot recommend this database for publication. Firstly, the authors need to take into account and be explicit about the sampling gears that were used to collect the data in the different studies. Substantial differences exist in the catchability of animals between gears, and this is potentially a major source of error in both abundance and biomass estimates. Secondly, the application of one species length-weight relationship (Limacina helicina) across all pteropod taxa, may cause a substantial overestimate of pteropod biomass in mid to low latitude regions. Given the lack of species specific length weight relationships (or measured biomass data) at this stage I would recommend this data base to focus on abundance data only.

Title:

The title is a misnomer as not all of the pteropod species considered in this study have a calcareous shell.

Data

Origin of data

It is necessary to include information on the mesh size of nets used, as well as the type of net. Were the data used in this study constrained by criteria of mesh size and net types, so that the data from the different surveys were comparable? It is not possible to assess how meaningful the combined data are without this information. Even a mesh size difference of 300 vs 500 μm could make a substantial difference to estimated densities. The authors note in the discussion that mesh size and net type are both important in determining the organisms sampled. The biomass estimates presented in this study cannot really be applied meaningfully in any quantitative study without taking these factors into account.

Methods

Biomass Conversion

The method of biomass conversion is surprising. All organisms were converted to biomass based on the length weight relationships of Limacina helicina. The form of the genus Limacina alone is quite variable, but within pteropods there is substantial variation in shape, along a spectrum of round (e.g. Limacina) to needle shaped (e.g., Clio, Creseis). There is also substantial variation in the density of pteropod species, some being gelatinous (e.g., Corolla). The biomass of non-spherical and gelatinous species would be substantially overestimated using the length weight relationships of Limacina helicina. Further contributing to this are that the Limacina dry weights used for the estimates likely included the inorganic carbon weight of the Limacina shell, which, for example, the shell less (Gymnosome) pteropods do not have.

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It is impossible to assess the impacts of these issues on the estimated biomass distribution without knowing the species composition of the pteropods analysed in the different regions. Since the polar regions are dominated by Limacina, and the temperate to tropical regions (where the vast majority of samples in this analysis come from) have the highest diversity of species and morphologies, the biomass estimates of pteropods in the latter regions may be substantially overestimated using the Limacina length weight relationship.

The authors indicate that at this stage there are no species specific length weight relationships to apply to their data set, and these are indeed data that are urgently required. Given the obvious flaws in using the Limacina length weight relationship for all pteropod species, I cannot recommend publication of these biomass data. Perhaps it would be best at this stage, in lieu of species specific, or at least form specific length weight relationships, to publish only the abundance data.

Interactive comment on Earth Syst. Sci. Data Discuss., 5, 317, 2012.