

## ***Interactive comment on “Biogeochemical protocols and diagnostics for the CMIP6 Ocean Model Intercomparison Project (OMIP)” by James C. Orr et al.***

**T. Lovato**

tomas.lovato@cmcc.it

Received and published: 12 September 2016

This manuscript documents the experimental protocol for the biogeochemical and inert chemical tracers under the CMIP6 Ocean Model Intercomparison Project (OMIP), here referred as OMIP-BGC. The description of simulations protocols, preferred parameterizations, and diagnostics is very thorough and it provides a good guidance for all the groups involved in this intercomparison exercise. I have few comments on aspects related to the protocol definition.

1- At the beginning of section 2, authors strongly advice to use the constants recommended in best practices described by Dickson (2010). However, Orr and Epitalon (2015) clearly pointed out that some exceptions to the best practices might become

C1

relevant when dealing with numerical models. I think that the protocol could be revised by pointing out the use of more suitable parameterizations, like e.g. K1-K2 from Millero (2010) and KF formulation in Dickson and Riley (1979).

2- The protocol for simulations indicates that initial conditions for DIC and TA are based on the recent GLODAPv2 (see section 2.2). In particular, these data are provided over two distinguished time periods, namely from 1986-1999 for the WOCE era and from 2000-2013 for the CLIVAR one (see Kay et al., 2015). It would be very useful to report in the manuscript how these data will be handled to create the initial conditions (use only one period, data blending, etc.), especially if one consider that DIC is remarkably time-dependent over long time windows.

3- In section 2.5.3, it is indicated that in-situ temperature and salinity in permil units have to be used in the computations related to the carbonate system. I think that the preferred type of these two variables could be addressed more precisely, e.g. in-situ temperature as ITS-90 and Practical Salinity as PSS-78, also to comply with the routines used in mocsy.

4- In the companion paper on OMIP physical experiments (Griffies et al., 2016) it is considered also the use of most recent Equation of State for ocean physics (TEOS-10), which relies on Conservative Temperature and Absolute Salinity. This might represent a critical issue since equilibrium constants were all derived using practical salinity (Millero, 2007; Dickson, 2010). I guess that some guidelines on the use of the most appropriate conversions tools between different formulations of temperature and salinity should be addressed in the protocol description.

5- I think it would be very useful to have a table that summarizes the requested variables for each Tier and link them to the specific experiments of both OMIP-BGC and DECK.

Key, R.M., A. Olsen, S. van Heuven, S. K. Lauvset, A. Velo, X. Lin, C. Schirnack, A. Kozyr, T. Tanhua, M. Hoppema, S. Jutterström, R. Steinfeldt, E. Jeansson, M. Ishi, F.

C2

F. Perez, and T. Suzuki. 2015. Global Ocean Data Analysis Project, Version 2 (GLO-DAPv2), ORNL/CDIAC-162, ND-P093. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, US Department of Energy, Oak Ridge, Tennessee. doi: 10.3334/CDIAC/OTG.NDP093\_GLODAPv2.

---

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-155, 2016.