bg-2014-400 Submitted on 01 Aug 2014
Space-time variability of alkalinity in the Mediterranean Sea
G. Cossarini, P. Lazzari, and C. Solidoro

25 September 2014

REVIEW of Cossarini et al. (2014)

This work deals with the spatial and temporal modelization of alkalinity in a particular marginal sea, the Mediterranean. This landlocked area with a particular CO_2 system is suffering a particularly high human pressure and with regard to the oceanic system, physical, chemical and biological drastic changes have been reported.

There is now a major concern about the impacts of ocean acidification in the structure and functioning of ecological systems, with several international projects going on. Therefore, in order to predict future changes, apart of the observational and experimental efforts, the modelling community is integrating the CO_2 system in 3D transport-biogoechemical models adjusted to the particular MedSea circulation as a first step for a higher objective.

This work models TA in the MedSea, compares the results from the model with the gathered data in the area. The results are fairly good but the general objective is meagre. In my opinion, despite presenting interesting results, this work is too short or weak, lacking of entity to be published in a high rank journal as BGD. I propose major revision.

General Comments

1) Regarding TA:

- I miss a better quantification of the processes affecting its variability, they are commented, roughly quantified in Fig. 5 but it seems that the authors could go a little bit further. In the Conclusions is particularly stated that the model would help to understand how different factors contribute to defining spatial gradients and seasonal variability…. It would be nice to get a better quantification of all these processes as they are differentiated in the 3D transport model.

- why not using the MEDAR/MEDATLAS data?

- the variability of TA in the MedSea was commented in Schneider et al. (2007) and more thoroughly in the recent Álvarez et al. (Oc. Sc. 2014).

- given the low DIC/TA ratio, the CO_2 chemistry is particularly resistant to the CO_2 input from the atmosphere, this is quantified in Álvarez et al. (2014) but is a direct consequence of the CO_2 chemistry, i.e., general knowledge for CO_2 chemists.

- The work by Louanchi et al. (Decadal changes in surface carbon dioxide and related variables in the Mediterranean Sea as inferred from a coupled data diagnostic model approach, ICES journal, 2009) should be cited in the introduction.

- The recent work by Takahashi et al. (Mar Chem, 2014) should also be cited as they present a TA climatology with several TA vs salinity regressions and all the marginal seas are missing.

- Figure 5: very difficult to see, the numbers and the profiles. The equivalence of the letters is not commented in the caption.

2) Suggestions

This paper would greatly be improved if in addition to the quantification of the processes affecting TA, some results about DIC are also included. This is hinted in the methods section, DIC is mentioned as a new state variable in the OPATM-BFM (section 2.1). Why not presenting the results?.