

Response to Reviewers' comments on the manuscript:

An updated synthesis of ocean total alkalinity and dissolved inorganic carbon measurements from 1993 to 2023: the SNAPO-CO₂-v2 dataset, MS No.: esd-2024-464

Reply to Reviewer 2, Toste Tanhua (in black from reviewer, in blue our reply)

The manuscript describes a data set of about 67000 observations of ocean dissolved inorganic carbon and/or total alkalinity around the world. The data set is mostly based on observations by the French vessels and scientists, analysed in a lab in France.

This is a valuable compilation of data in a single format and with a coherent quality control. The manuscript is well written and perceived. Quality controlled data in a consistent format of ocean carbon variables are valuable, so the manuscript deserves to be published.

The ms refers to both the GLODAP and SOCAT data products. There is some overlap, but also differences. In particular for GLODAP there is a potential overlap since that is also dealing with interior ocean DIC and TA data. It would be good if the ms could state how large a fraction of the SNAPO data are already in GLODAP, and an estimate on how large a fraction will be submitted to GLODAP for future versions.

Very often when using ocean carbon data, there is a need and a strong correlation to other variables. I can imagine that often (but probably far from always) other variables were being measured during these campaigns, for instance, oxygen and nutrients (variables often needed to calculate the anthropogenic component of the DIC). However, by looking at the individual data sets for those cruises where that is available, I was in most cases not able to locate the other variables, or even find a list of other variables that could be available. I realize that amassing other variables as well, just as is done in GLODAP or SPOTS, for instance, is probably outside the scope of this work. However, it would be useful to have that information about additional variable available in a concise format, for instance in tables S1. At least for the "most important auxiliary variables", possibly guided by variables available in GLODAP.

Response: We warmly thank Toste Tanhua for his support.

The reviewer is correct, some (but only a small proportion) data of the SNAPO-CO₂ synthesis are in GLODAP (e.g., OUTPACE, PANDORA, EGEE, BIOZAIRE) or SPOTS (e.g., DYFAMED). The SNAPO-CO₂ dataset is dedicated to AT and CT data, somehow like SOCAT for fCO₂. When we started SOCAT (at a workshop in Paris UNESCO, 2007) it was suggested to include not only fCO₂ data but also AT, CT or pH. However, due to available personnel and technical issues, only fCO₂ was selected for quality control in SOCAT (which is a very important step anyway). Here, we decided to start a synthesis of AT-CT dataset with the data we have on hand and measured with the same technic. This may motivate other groups to do the same and maybe a way to start SODAT... (Surface Ocean Dic AT data) ?

For other properties, if available (e.g. for anthropogenic estimates or associate nutrients), users interested can find information in the DOI listed in Table S3. In addition, on the Seanoë page where the SNAPO-CO₂ data is archived (<https://doi.org/10.17882/102337>), there is a list of the projects and their link. As an example, a user interested with the North Atlantic can obtain the data from SURATLANT at Seanoë (see Reverdin et al, 2018, 2023, <https://doi.org/10.17882/54517>). As noted in the manuscript, we encourage users to contact the PIs (listed in Table S1a and S1b) to get information on all properties measured for each project.

Note also that in a paper in preparation (Jiang et al, in prep) information on SNAPO-CO₂ along with GLODAP, SOCAT and many other data-products are synthesized. Users can thus merge some of these products for specific study. Finally, as was done for SNAPO-CO₂-v1, the SNAPO-CO₂-v2 dataset will be available in GOA-ON for SDG 14.3.1 (<https://oa.iode.org/>); this is specified line 82 in the submitted MS. The data will be also available in ODV (see line 1009: <https://explore.webodv.awi.de/ocean/carbon/snapo-co2/>).

Reference in this reply:

Jiang, L.Q., Fay, A., Müller, J. D. et al: Synthesis products for ocean carbon chemistry. In prep., 2024.

Reverdin, G., Metzl, N., Olafsdottir, S., Racapé, V., Takahashi, T., Benetti, M., Valdimarsson, H., Benoit-Cattin, A., Danielsen, M., Fin, J., Naamar, A., Pierrot, D., Sullivan, K., Bringas, F., and Goni, G.: SURATLANT: a 1993–2017 surface sampling in the central part of the North Atlantic subpolar gyre, *Earth Syst. Sci. Data*, 10, 1901-1924, <https://doi.org/10.5194/essd-10-1901-2018>, 2018.

Reverdin, G., Metzl, N., Olafsdottir, S., Racapé, V., Takahashi, T., Benetti, M., Valdimarsson, H., Quay, P. D., Benoit-Cattin, A., Danielsen, M., Fin, J., Naamar, A., Pierrot, D., Sullivan, K., Bringas, F., Goni, G., Becker M., Leseurre C., and Olsen A.: SURATLANT: a surface dataset in the central part of the North Atlantic subpolar gyre. SEANOE. <https://doi.org/10.17882/54517>, 2023.