

**Review of “Whole water distribution and carbon isotopic composition of ...” by Cavagna *et al.*, submitted to *Biogeosciences Discuss.***

Cavagna and co-authors presented an interesting dataset of concentration distributions and carbon isotopic compositions of two biomarkers (cholesterol and brassicasterol) from a transect from Cape basin to the Wedell Gyre. Different depths in the modern water column are investigated. The manuscript is based on a large dataset, but in the present form of the manuscript the main working hypothesis and conclusions of the study do not appear clearly. The introduction needs to be reorganized. The discussion parts contained a large number of titles and sub-titles that make the reading difficult. Similarly the manuscript contains a large number of figures (7!) and tables (5!). Most of them should be clarified and the authors could think of removing some of them while reworking and reformatting the discussion.

The dataset is of interest for the climatic/paleoclimatic community and the manuscript will be suitable for publication in *Biogeosciences Discuss.* The manuscript should however be deeply reorganized and clarified. Language also needs to be proof read by a native English speaker. Specific comments are following.

**Specific comments:**

- 1) **P1667- Title.** The title is too long and should announce the main focus of the paper.
- 2) **P1669- L22.** “The release of” ...? Production of ?
- 3) **L23 to the end of the abstract.** Long and unclear sentence.
- 4) **P1670- Introduction:** it should state the broader scope of the study (pCO<sub>2</sub> reconstruction? Understanding of the ecological turn-over?), then how this study compare to previous studies and literature (in the SO and elsewhere in the world). Finally, before to explain the work plan, the working hypotheses need to be stated.
- 5) **L2.** set
- 6) **L2-17.** This first paragraph is not precise enough and sentences are too long.
- 7) **L16-17.** The link between the first and the second paragraph of the introduction is not clear and the transition is abrupt.
- 8) **L27.** And elsewhere in the world? Are there other studies ? Has the GEOTRACE program gathered and investigated such a dataset?
- 9) **P1671 – L9.** A “general” biomarker : precise
- 10) **L9-15.** What is the range of d13C cholesterol in individual organisms and between species? Is the range of variation large? If it is the case, could d13C variations reflect structure of the community?
- 11) **P1673 – L1 to 17.** Are these pieces of information needed for the discussion? If not, they could be deleted.
- 12) **P1674 – L10.** English : home-laboratory ?
- 13) **L25-25.** The last sentence corresponds to results and no method presentation.
- 14) **P1675 – L6.** Case of the reference.
- 15) **L8.** Delete “max.”
- 16) **L22.** “since the added IS amount is known” : delete.
- 17) **P1677 – L19.** Does “contents” stands for “concentration”?

- 18) **L19 and below:** This part needs to be rewritten.
- 19) **L24.** “Similar magnitude”: values are missing.
- 20) **P1678 – L1.** What is the detection limit?
- 21) **L6.** The reason to provide density depth rather than regular depth is not clearly stated.
- 22) **L3.** “Variability due to analytical methods” : precise.
- 23) **P1681 – L6 to 21.** This part concerns the interpretations rather than the results.
- 24) **P1682 – L5 to 9.** How does this compare with core top sediments?
- 25) **P1685.** What is the estimation of the time lag?
- 26) **P1688 – L9.** In this entire part, it is difficult to see what is the main message of the manuscript and how its results compare with the existing literature. The authors should state at the beginning of this part, what their working hypotheses are based, on the existing literature. They should then discuss what new insight their results provide.
- 27) **P1689 – L17 to 21 and P1690 – L7 to 11.** This belongs to the Results part.

#### **Specific comments on Figures:**

##### **Each figure needs a proper title.**

**Figure 1:** On the left hand side, the titles of the axis are missing (SST, latitude). The black bars on the SST color scale should be removed. On the right hand side, the vertical scale is not easy to compare with a “usual” depth scale (place a double axis). Again titles for the axis are missing (T, S). Since the salinity distribution is not discussed, could not the panel be removed?

**Figure 3 and 4:** The labels and titles of all the axes are too small. On the vertical axis, having a double scale with conventional depth would help.

**Figure 5:** Could you provide the reader with the error bars on epsilon (either graphically or in the legend)?