Reply to Anonymous Referee #3:

We wish to thank the reviewer for his/her comments on this manuscript. Please note that we now denote the "KPH method" as the "Green function" or "GF" method. This is to maintain consistency with other recent publications where this terminology is used. Reviewer comments are in italic.

The authors frequently (at least on three places: Abstract, pages 10917, line 3 and 10910 line 21) refer to ""weak mixing and ventilation in the North Atlantic and Southern Ocean". I assume that the authors mean "weak mixing and ventilation in the North Atlantic and Southern Ocean in the CCSM model", rather than in the real ocean.

We did indeed mean in the CCSM. We have clarified this in the revised manuscript.

It would be useful to add the definitions C(ant_cnst), C(ant_var) and C(ant_all) to Table 1. That would make the reading of the ms a bit easier.

This is a good suggestion. We modified the Table1 to include these definitions.

The authors refer to the "KPH method", the maximum entropy method. It would be interesting to know what KPH actually stands for. I think I have seen this method referred to as the "Green function" method/approach before.

We thank the reviewer for pointing out this inconsistency in notation. "KPH" stands for the initials of the authors of the paper (Khatiwala, Primeau, and Hall) in which the Green function method using the maximum entropy inverse technique was first described. We have now removed this designation and simply call it the "Green function" or "GF" method to maintain consistency with other recent publications. Note, however, that the so-called "TTD method" employed for example by Waugh et al. [2006] also utilizes a type of Green function, albeit a much more simplified one known as the "inverse Gaussian" (IG). The IG functional form is parameterized by two variables, a mean and width. In the TTD approach, CFC observations are used to constrain the mean (assuming that mean=width). In the maximum entropy inversion approach, no functional form is assumed for the Green function and the mixing of waters of both different ages and different source regions is accounted for.

In section 3.1.1. the range of data-based estimates of the global anthropogenic carbon inventory is given. For the TTD method both the corrected and uncorrected data are given. In the context of comparing the different methods, it would be interesting to know what the uncorrected value is for the Delta-C method, i.e. without setting negative Cant concentrations to zero. Since the non-corrected TTD value is given, it would be fair to state the non-corrected Delta-C* value as well.*

We added the uncorrected ΔC* regional Cant inventory in Table 2.

Table 2 Regional and global distributions of C_{ant} inventories in 1994 (in PgC)

Region	ΔC* method	Uncorrected ΔC*[1]	TTD method	KPH method	CCSM C_{ant_cnst}	CCSM C_{ant_var}	CCSM C_{ant_all}
N.Pacific	16	14	17	18	18	18	17
S.Pacific	13	12	18	16	15	14	15
N.Indian	3	3	2	2	2	2	2
S.Indian	11	9	11	11	10	10	10
N.Atlantic	22	21	24	22	18	18	18
S.Atlantic	10	8	11	8	6	6	6
Southern Ocean[2]	30	27	49	36	22	23	23
Global	106	94	133[3]	114	92	91	93

In figure 1, the term C(ant_cnst) is used for all four panels with the particular method stated in parenthesis afterwards. In figure 2b, the title states "C(ant_cnst – KPH)". Although the legend explains the panel, the title is not consequent. Maybe it is the title of Figure 1 that makes it confusing at first. Terms like C(ant_KPH) are used in the text, which is useful.

We have revised this figure and modified title on each panel to clarify the plot.

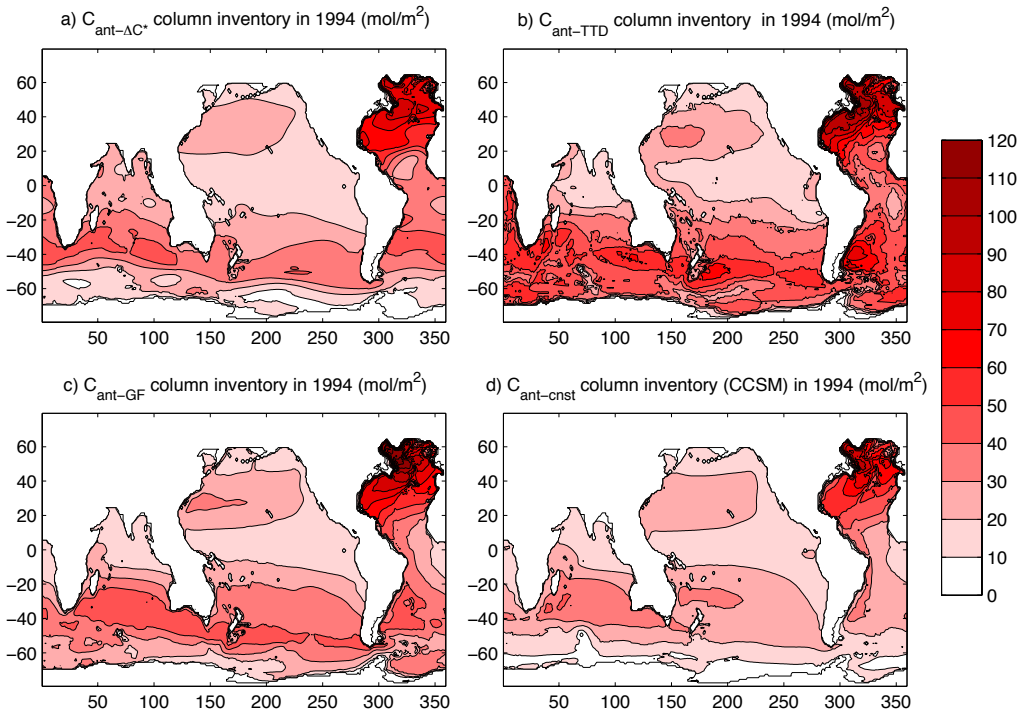

Figure 2: Why don't go all the way, and add a panel with the differences between TTD and anyone of the other approaches as well?

We have added another panel to show the differences between the TTD estimates and the estimates from the KPH/GF method.

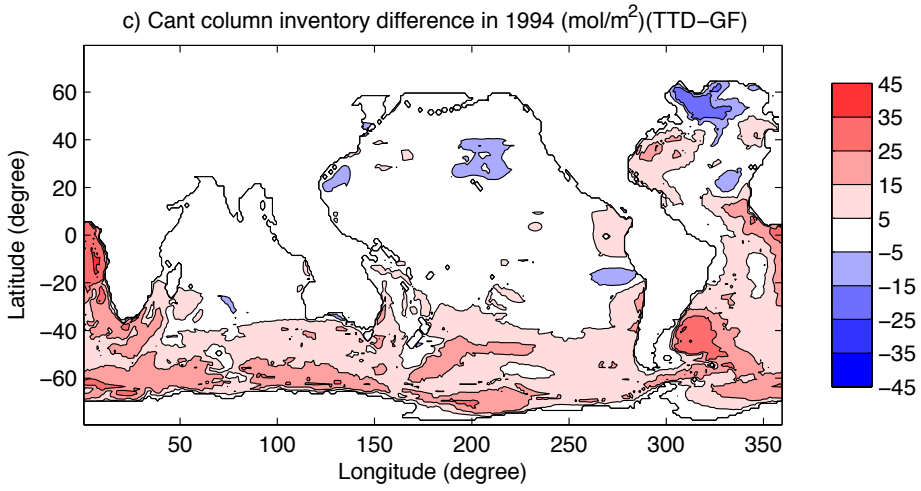

Figure 3: It is very difficult to evaluate the differences in the various estimates in the upper 1000 meter of the water column from these figures, maybe with the exception of the SO panel. Maybe a new set of panels can be made where the upper 1000 meters are expanded, or the difference in Cant vs. as reference method is shown for the whole water column would be useful.

We have modified the figure to expand the upper 1000m in each panel.