Thank you for the comments, we have now made the following changes, listed below in blue.

Line 70. Change “To cover the A05 section, we use a regular grid with“ to “ We then map the A05 sections onto a regular grid with ..

This has now been changed.

Caption Figure 1. Add c) to “The spatially-average b) potential .... c) DIC

This has now been corrected.

Inverse Method.

I suggest you incorporate section 2.3 into section 2.7, removing any repetition. By incorporating section 2.3 into section 2.7, it becomes clear that W1 and W2 are not randomly chosen, but they are the estimated parameter variance and variability of total parameter changes of the section, respectively.
Section 2.3 has now been moved into 2.7, with the final system of equations now described in Section 2.6.

Also, throughout the manuscript including Table 1. I suggest you replace “initial guess” with “a priori estimate” or “initial estimate”. “Guess“ suggests that that you have no knowledge, which is not true. You have used knowledge currently available to provide an informed initial estimate (and weights). This suggestion is driven by many conversations I have been involved in regarding inverse techniques and their validity/value.

Thank you for the suggestion, all instances of initial guess have now been changed to initial estimate.

Line 184-187 Change “Once the coefficients are calculated for each individual grid point along the A05 section, they form matrix A and the system in Equation 4 can be solved via a weighted least squares fit approach. The magnitude of the oxygen change terms at each point can then be added back into the equations relating oxygen change to temperature and DIC changes to compute the magnitude of each driver of temperature and DIC change at each point along the A05 section”
To “Once the coefficients are calculated for each individual grid point along the A05 section, they can be input into equations ##-## (add number of equation) and represent as system of simultaneous equations in the from W1Ax=W2b and solved via a weighted least squares fit approach. The magnitude of the oxygen change terms at each point can then be added back into the equations relating oxygen change to temperature and DIC changes to compute the magnitude of each driver of temperature and DIC change at each point along the A05 section.”

This has now been changed, and is now at the start of subsection 2.6 due to merging subsection 2.3 and 2.7

Line 197-198. Change “In instances where no previous information is available, we instead assign an initial guess of zero, but must still give a non-zero value for the weighting in order to obtain a non-zero solution. In this case, when temporal variability data is not available, we assume an estimate of the spatial variability from previous literature to be comparable.”
To
“In instances where no previous information is available, we assign an initial guess of zero and estimate the spatial variability from previous literature.”
This has now been changed.

Figure 1. Are the contours that define the water masses potential density, neutral density or some other parameter? You need to include information on what the contours represent. The caption should be modified, for example assuming these contours are potential density; “.. with potential density (xx, xx, xx kg m-3) showing ..”

The definitions of the water masses have now been added to the Fig. 1 caption:

“contours showing the upper (uNACW, σ_0<26.7 kg m^{-3}) and lower North Atlantic Central Water (lNACW, 26.7 kg m^{-3}<σ_0<27.2 kg m^{-3}), Antarctic Intermediate Water (AAIW, 27.2 kg m^{-3}<σ_0<27.6 kg m^{-3}), and upper North Atlantic Deep Water (uNADW, σ_0>27.6 kg m^{-3} and σ_2<37 kg m^{-3}) based on definitions in Guallart et al. (2015) and labelled in g).”

Figure 6 Change “… from a) to rule out any effects due to seasonal variability.” To “… from a) exclude effects due to seasonal variability.”

This has now been changed.