Reviewer 1

The present manuscript presents the sensitivity of some relevant parameters: sea level changes, AMOC and global mean temperature assessed in two different scenarios of CO2 emissions (stabilization and overshoot pathways) during the XXI century, both of them reaching the recommended target of 1.5 K of global surface temperature increasing by the year 2100.

The manuscript is very well written, discussed and documented, based on appropriate referenced bibliography. The manuscript shows clearly that, even though the same global temperature is reached, the followed pathway may produce significant differences (e.g. sea level rising and AMOC), leading to scenarios with worst societal impacts than others.
We thank the reviewer for a supportive, insightful and thorough review, which helped us to improve the manuscript. We respond to each point in blue text interwoven with the reviewer comments below. All major additions to the manuscript are also highlighted in blue text.

There are only a few points which would be worth to refer.

1 – Authors discuss only AMOC and sea level changes. However, the Earth System model runs have produced much more output namely that concerning the global budgets of water (hydrological cycle) and angular momentum and other surface properties (e.g. precipitation leading to changes in floods and droughts occurrences). The authors may add a few sentences regarding these aspects and quantify significant changes in case they are relevant.

We agree that there are many more variables that could be potentially interesting. We remain focused on the original set of variables, but have added a few additional time series figures. The first was pH, which was requested by all three reviewers. It now appears as a panel in Figure 1, with relevant discussion and quantification in Section 3. In addition, we have added a Supplementary Figure of global average precipitation, with the following brief discussion in Section 3:

Because the hydrological cycle tends to spin-up as the climate warms (Held and Soden, 2006) the global average precipitation increases approximately 1% over the 21st century in all three scenarios. The rate of change seems to roughly track the global temperature change, therefore leading to slightly stronger increases in Overshoot and RCP4.5 starting at mid-century (Supplementary Figure 2). However, internal variability causes substantial overlap between ensemble members.

Finally, we also explored the salinity in the subpolar North Atlantic, since a slowdown of the AMOC is central to the manuscript, and is often assumed to be triggered by salinity changes. We found that subpolar North Atlantic salinity declined in all three models, but declined fastest in the Overshoot ensemble, as now detailed towards the beginning of Section 4.

2 – The chosen overshoot pathway is not unique. There are maybe more pessimistic ones. In the discussion, the authors may discuss which variations could be considered in the overshoot pathway keeping it consistent with the final temperature rising of 1.5K (e.g. initial stage and its end before the CO2 uptaking phase) and what should be the expected impacts.

We now reference other studies that have compared various overshoot simulations of different intensity during ramp-up and ramp-down, as well timing of the inflection point in the Methods on page 3.

3 - Line 32, pg. 2 (2 x2.5°) lat -long?) Clarify.
Yes, the reviewer is correct in that the resolution is 2° latitude by 2.5° longitude, and the clarification has been added to the manuscript

4 - Lines 8-9, pg. 3, clarify the type of added SST perturbations in the ensemble members: standard deviation of the perturbations, Gaussian distributed?
For each ensemble member $i = 1,2 \ldots, 5$, we added: $dT = 0.0001°C * i$ to a single ocean grid cell in the Weddell Sea at 5-m depth. This information has been added to the Methods.

5 - Add dz in the integral giving the steric term (Eq. 3).
Thank you for catching this omission. It has been corrected.

6 - Line 7, Pg. 7. Acidification is not quantized. Give some numbers clarifying the differences between the stabilization and overshoot pathway scenarios
We have added a panel to Figure 1 to show the pH changes over time in the surface layer, and a deeper layer (1573 m). We also added the following text to the manuscript to describe the changes:

The higher atmospheric carbon concentrations in the overshoot pathway relative to the stabilization pathway temporarily cause more ocean acidification (i.e. lower pH values) at the surface (Fig. 1f). In 2100, when the atmospheric CO_2 in overshoot nearly matches stabilization, the surface pH is still lower in overshoot, but is rapidly approaching the stabilization surface value. At depth (e.g. 1573 m), both the emergence of greater acidification as well as the turn-around in pH in the overshoot scenario are delayed by about 20 years relative to the trends in atmospheric CO_2, as transport and mixing between the surface and interior ocean is relatively slow (Gebbie 2012). As a result, ocean pH is lower in the overshoot scenario than in the stabilization scenario at the end of the 21st century, as expected from the carbon budget (Figure 1b). Based on the rate of change at 2100 in our simulations, we expect this difference in pH to persist for a few decades after the crossover point in atmospheric CO_2, as the ocean slowly releases the excess CO_2 to the atmosphere.