Detailed responses to reviewer 2 (reviewer comments are included in black, responses in blue font)

General comments

The authors did answer the concerns initially raised. The objectives of the paper were better defined and reflect the work presented. It is a valuable piece of work and it will be useful for scientists seeking to use projections from ESMs as part of their work. I thus recommend that this paper be accepted for publication after some very minor corrections/improvements. See comments below.

Response: Thank you for the recommendation and your suggestions (see below).

Specific comments

Comment:

1. Line 15. I would repeat surface nitrate. Same for observed surface temperature.

Response: Done.

Comment:

2. Line 52: Maybe you wanted to refer to Gilbert et al. 2005?

Response: The reference was added. Both references are relevant, so we also left Gilbert et al. 2010.

Comment:

3. Lines 102 and 155: and salinity.

Response: Done.

Comment:

4. Line 314. Improvement in terms of scores? Could you specify what the improvement is? I see Chl a going from 0.9 to 1.4 to 0.8 to 1.4. That is not a big change. Nitrate improves a lot though.

Response: Here the improvement refers so the ranks of specific models. Since this is discussed below in section 4.6, we clarified the sentence as follows:

P12L4-5: "*The improvement in chlorophyll from CMIP5 to CMIP6 in some models without an associated improvement in temperature (see below) suggest that…"*

Comment:

5. Line 400. In fact the nutrients that are upwelled at the GS detachment point do not affect directly the Scotian Shelf. These waters are transported towards the sub-arctic gyre. However, mixing with Labrador Sea water occurs south of the Grand Banks and then flows south towards the Scotian Shelf. This is reflected in your better correlation of SS conditions with conditions at the eastern boundary. So you need to have a good correspondence between circulation, water mass representation and biogeochemical conditions. What Lavoie et al. mention is that these models do not represent the observed subsurface maximum. Their figure 13 actually shows that the surface nitrate is high along the whole transect with CNRM-CM5. We can also see in your figure S1 that the nitrate stays high everywhere all year round with this model. Something is clearly not working properly. Your figures S2 and S3 also show that nutrients are low in the CMIP5 IPSL models, except in S2 in the GoM.

Response: As indicated by the reviewer, CNRM-CM5 and CMIP5 IPSL models have high and low surface nutrients, respectively. These large scale patterns do not seem to be associated with upwelled GS waters and therefore our results do not fully support the underestimation of subsurface remineralization proposed by Lavoie et al (2019). We clarified the paragraph as follows:

P14L47-59: "*Lavoie et al. (2019) suggested that the PISCES biogeochemical model may underestimate subsurface remineralization in the CNRM and IPSL models, resulting in low surface nutrients where the Gulf Stream detaches from the coast. Our rankings (shelf and offshore) and the spatial patterns in Figures S1- 9 do not fully support this hypothesis; high surface nitrate concentrations were present in the CNRM models throughout the region, whereas concentrations in the IPSL- CM5A models were low (except around the GoM in Spring) (Figures S1–4, S7, S9). It is unlikely that these large-scale patterns are driven by upwelled Gulf Stream waters, although differences in remineralization could influence these general patterns*."