Yi et al. investigate the response of surface ozone concentrations due to changes in sea surface temperature (SST) in three different ocean basins (North Pacific – NP, North Atlantic – NA, and North Indian Ocean, NIO). The authors use an Earth System Model (CESM) and perform a set of sensitivity studies in which they alter in turn the climatological SSTs of +/-1°C over the NP, NA and NIO. The imposed variation in SST leads to changes in surface ozone up to 5 ppbv. The authors focused on the summer season and they show that changes in transport associated to the SSTs anomalies are important in driving ozone anomaly at the surface. In general, increased SST reduces the intercontinental transport of O3.

Overall the manuscript is relatively well written and logically organized. However, in the introduction several references to previous work are missing, several parts of the manuscript need to be clarified and the authors should try to be consistent when displaying the results (see comments below). Overall, the study presents interesting new aspects and fits well with the scope of the journal. However, before publication large improvements are needed.

Major comments:

1) I suggest including a sensitivity test in which the SSTs in all 3 basins is increased. It will be interesting to see the effect of a generalized warming. I would also recommend to include a discussion of the results for winter season (see specific comments below)

2) I had major problems in understanding several figures: sometimes the figures are too "crowded" and it is not possible to distinguish the continents (e.g. figures. 4, 6, 9); the panels are often very small in particular in figures 1, 3, 4, 6, 9. The few figures that are clear are the one using the Mercator (or equirectangular) type of projection (e.g., Figures 5, 7, 8, S4, S5). I recommend the authors to be consistent and use the Mercator projection for all figures.
Furthermore, the authors should also be consistent with the use of colorbars: sometimes they use white for values that are not significant (e.g. figure 1), other times for small values (e.g. figure 3), other times they don't use it at all (e.g. figure 4). I recommend not using white color bins for small values, especially if they are significant as in figure 3. See specific comments. I struggle to understand the lack of consistency in making the plots (type of projections, type of colorbar, choice of significant levels, choice of how to display the significant values, etc) that makes it harder for the reader to follow.

3) In the introduction the authors do not cite several works done previously on the intercontinental transport of O3 and the meteorological factors affecting it, citing only 4 papers, which are not even the first to address these issues. Please make sure to include the references suggested in "specific comments" and possibly also extend the introduction/discussion.

General Minor comments:

- Why do the authors pick 11 years? Is 11 years enough to capture interannual O3 variability? The SSTs are fixed and in general 15-20 years should be enough to capture interannual atmospheric variability. I'm not sure about 11 though.

- The authors use different significance levels throughout the manuscript (0.01 or 0.05). Please, pick one and use that for all the analysis.

- I suggest not overusing sentences in which part of the text is in parenthesis in order to avoid writing another sentence (e.g.: LL24-25 Increasing 25 (**decreasing**) SST by 1 ºC in one of the regions of focus induces decreases (**increases**)). It makes it hard to follow. I think adding another sentence makes it much more easy to read (especially in the main text where there is no word limits).

- It is not necessary to include the figure captions in the text. Sentences like "Figure 2 shows …" belong to figure captions not the main text, and make it hard to follow. Please, discuss directly the results and point to the figure that shows them in the running text, e.g. *Larger anomalies (i.e., up to 5ppbv) are simulated in locations including the east coast of China, the Indian subcontinent, and remote oceans (Figure 1 and Figure S2).*

Specific comments:

LL59-61 Beside the missing reference pointed out in the short comment by Dr. Meiyun Lin there are several other key references missing that are related to the O3 long-range transport: Parrish et al., 1993; Fehsenfeld et al., 1996; Wild and Akimoto, 2001; Creilson et al., 2003; Simmonds et al., 2004.

LL66 Here as well, the authors do not cite several studies on the topic (e.g., Bronnimann et al. 2000; Hess and Mahowald, 2009; Pausata et al. 2012)

L104 remove spaces before and after comma.

L113 remove the hyphen after impacts.

L114 ENSO is an oscillation; hence "ENSO spring" does not mean anything. Please specify the ENSO phase the authors are referring to.

LL114-115 indulge a bit more and provide the explanation of how ENSO affects stratospheric intrusions in western US. Otherwise the reader is forced to look it up.

L194 mention also here at least some of the individual processes accounted for.

LL233-234 the sentence is unclear

LL253-254 It's not clear to me how the authors can conclude that the change in CHEM is "therefore" causing the increase in ozone at the surface over NA due to warmer Atlantic SSTs. See also comment on figure 2.

L264 "inconsistent surface O3 response": do the authors mean "opposite surface O3 response"?

L270 I understand the authors' point on investigating only summer since it's the seasons with higher O3 concentration at the surface. However, during winter and spring the ozone at the surface is mainly affect by changes in long-range transport and stratosphere-troposphere exchange. Hence, it is important to understand how the warming in the SST in different basins can affect long range and stratosphere-troposphere exchange. I would suggest expanding the analysis to also winter.

L291 "is believed": Beliefs do not belong to science. Please rephrase it and provide references to support the *belief*.

LL356-357 The authors stated that the O3 changes at the surface over North America (Fig. 7 "b", which is actually c) are negligible. However, they look quite large (regionally) to me: over the Great Lakes, California and Baja California peninsula; also along the east coast of Unites States the changes are not that small. Furthermore, the changes aloft (that the authors define "large") are of the same order of magnitude that the changes seen at the surface.

LL357-359 Given the above-mentioned comments, I am not sure how the authors could state that the changes seen in figure 7c are mostly due to enhanced photochemical production. This comment is also related to my previous comments on LL253-254.

LL366-368 please refer to figure 2 as well.

L369 The IPR analysis show suppressed deep-convection. However, the warming of the Indian Ocean strengthens the Indian Summer Monsoon, as also stated by the authors (e.g. LL290-292), hence I wonder why the deep-convection is weakened. Please comment on that.

LL396-400 Beside the fact that Figure 9 is difficult to read. The reduction in geopotential height over the Arabian Sea seems actually to increase the southwesterly flow towards the Indian subcontintent. Furthermore, the land sea contrast may play a very small role in enhancing or weakening the strength of the Indian Summer Monsoon (Molnar et al. 2010). Hence, an in depth analysis should be done before claiming that the change in land-sea contrast is what weakens the "thermal wind". Furthermore, the changes in temperature does not show a clear decrease in land-sea contrast, since there is a warming of SST, a cooling of the Tibert Plateau and northwestern Indian subcontinent, and a warming north of that cooling. Hence I really don't see the authors' point.
In any case, the sentence is not very clear and should be reformulated: "This nonuniform increase in air temperature (i.e., more significant at mid-latitudes)

weakens the meridional temperature gradient, resulting in a reduction of thermal winds." What is more significant at mid-latitudes? The nonuniform increase in temperature? Or the fact that the temperature increases more there than the ocean? Or what?

LL383-385 Referring to figure 8b, the authors state: "Similarly, for the North American tracer, a warming of North Atlantic SSTs by 1°C slightly increases (~2%) concentrations in North America but decreases (3-4 %) concentrations over downwind Europe". To me it looks like a slight decrease over Europe and quite an increase over large areas of North America. Please correct/clarify.

L443 I suggest to replace "reveal" with "show"

Figure 2: It is not clear to me how one can get the changes in O3 from the IPR analysis. It seems that the positive anomalies counterbalance the negative ones (if so this should be made clear, readers may not be familiar with the IPR analysis you are presenting). Therefore I wonder how can the total O3 anomalies be negative or positive (the circle)? It's not clear to me how to read the figure. Please clarify.
Why don't the authors plot in figure2 only the CONV and the TURB and instead place the figure with the full analysis in the supplementary?

Figure 3: the authors use 0.05 as significance level while in figure 1 was 0.01. Please pick one level. In figure 1 white colors were used for non-significant values, please be consistent. Furthermore, in figure 3 sometime white areas present significant changes.

Figure 4: The panels are small and it's hard to see the continents. Please use Mercator projection.

Figure 5: I think it would be better to show both the upwind and downwind area around the basin, i.e. in panel a) please show also the western coast of North and Central America; in panel b) please show the European coast. Finally, the authors plot the wind pattern but do not specify the level: is it at the surface or 850 hPa, …? Please clarify it. Furthermore, I would suggest not to use the surface level but rather a low-middle atmosphere level (850 or 700 hPa).

Figure 6: Impossible to understand it without major efforts.

Figure 7: as for figure 5 I don't understand the choice of the domain shown for each of the sensitivity experiment. Furthermore, panel b) should be switched with panel c). Furthermore, the authors should also here be consistent with the choice of the domain to show. I would advice to adopt the domain (or a similar one) used in figure 8.

Figure S3: which season?

References:

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