Assessment of Climate Biases in OpenIFS Version 43R3 across Model Horizontal Resolutions and Time Steps

Abhishek Savita[1], Joakim Kjellsson[1,2], Robin Pilch Kedzierski[3,1], Mojib Latif[1,2], Tabea Rahm[1,2], Sebastian Wahl[1] and Wonsun Park[4,5]

Thank you for your revised manuscript, which answers many of the two Referees' comments. However, regarding remarks of Referee #1, I consider that you satisfactorily answered his first major comment but not his two other major comments.
Even if you don't have definite answers or analyses on these two points, please add some text in your manuscript to discuss the issues raised, i.e.

1. the generalization of your results to resolutions and/or time-steps not tested in this manuscript, the convergence of the LR configuration and the possible effect of reducing time-step in a much higher resolution model
We have added some text to lines 452-456 as:
"Another limitation of this study is that the time step sensitivity was only tested for the low-resolution configuration, OIFS-LRA, and not the higher resolutions, e.g., OIFS-HRA. We found that much of the surface wind biases were alleviated by a shorter time step due to increased shallow and mid-level convection (Fig. 3). We therefore speculate that a similar sensitivity should be present at high horizontal resolution (~25 km), i.e., a simulation with OIFS-HRA using a 1h time step would most likely exhibit a much larger surface wind biases than the OIFS-HRA simulation with 15min time step".

2. the impact of time-step/resolution on the representation of extreme; on this point, you may simply state that this is an interesting area of study that will be addressed in another paper.
We have added this information in the manuscript to lines 448-450 as:
"In this study, we have not investigated sensitivity of extreme events to the model time step as our focus is mostly on mean state biases. The effect of model horizontal resolution and time step on precipitation extremes is the topic of another manuscript currently in preparation".

Regarding the comments of the 2nd reviewer:
• please add some justification on why you did not run OIFS-HRA at 1h timestep (in Section 2 when you introduce Table 1)
We have added some text to lines 113-117 as:
We note that exploring the effect of different time steps was only done for the lowest horizontal resolution (Tco95, ~100 km). We did not run similar sensitivity experiments for the high-resolution configuration (Tco399, ~25 km) for two reasons. First, the high-resolution configuration is very computationally expensive. Second, it was deemed more important to explore time step sensitivity at low resolution since this configuration (and other similar resolutions) is often used for coupled climate simulations. The potential time-step sensitivity at high-resolution is discussed in the Discussion section.

• please consider adding some text with an explanation on why wind tendency magnitudes are stronger over the Southern Ocean than the Northern Hemisphere.

We have added this information now (lines 239-241):

"The larger magnitudes of the tendencies over the Southern Ocean compared to similar latitudes on the Northern Hemisphere is likely due to the Southern Hemisphere having fewer continents in midlatitudes than the Northern Hemisphere and thus the surface is less rough and allows for stronger winds."