The study analyzes the simulation of the mid-Pliocene West African monsoon in 17 coupled climate models in the framework of PlioMIP2. The model ensemble shows a robust summer rainfall increase over North Africa compared to pre-industrial. The study fits into the scope of Clim. Past and will certainly attract the interest of a wider readership. While I generally support the publication, I think the authors should consider several points and revise the manuscript accordingly.

(i) The authors conclude that the strengthened mid-Pliocene WAM is "most likely due to the greenhouse gas forcing". I am not entirely convinced by this main conclusion. Given the large spread in projected future WAM changes in the CMIP3 and CMIP5 ensembles, GHG forcing does not seem very likely as the (only) major cause for the very consistent and robust rainfall changes in the PlioMIP2 ensemble. Instead, I presume that other factors also play a crucial role. In particular, I suspect that the prescribed Pliocene vegetation cover over North Africa plays a key role, which would probably imply circular reasoning when the authors state that Pliocene greening of North Africa indicates wetter conditions, "which is qualitatively consistent with the results from the PlioMIP2 ensemble". I think the authors should provide some stronger arguments to conclude that GHG forcing is the major driver for the stronger mid-Pliocene WAM. I also wonder about the roles of other Pliocene boundary conditions that were applied in these simulations, like lake fraction, soils, a reduced Greenland ice sheet and the land-sea mask (Haywood et al., 2016). Unless sensitivity studies with individual forcings (i.e. boundary condition changes) can be presented, I suggest to perform some more detailed analyzes. For instance, how much do surface albedoes change (see Charney feedback through vegetation-induced albedo changes)? How large is the contribution of local water recycling (e.g. Brubaker et al., 1993)? What about changes in the large-scale meridional temperature gradient, which could be affected by reduced ice sheets and a stronger AMOC, which in turn could be induced by the closing of Bering Strait? A strong AMOC and a warm North Atlantic are well known key drivers of a stronger WAM (e.g. Mulitza et al., 2008). Maybe a combination of different forcing factors can explain the robust wettening of Pliocene North Africa, but I doubt that it is only the effect of GHG.

(ii) Please discuss whether the rainfall increases are sufficient to maintain the prescribed Pliocene vegetation cover. If the simulated rainfall increase was too small, the authors should tone down their statement that the PlioMIP2 "results are consistent with geological
(iii) Regarding WAM dynamics the authors only show SLP and 850h Pa wind anomalies. Other key dynamical features of the WAM, like the AEJ and TEJ are not considered at all, but are known to impact West African summer rainfall. At least a latitudinal transect of mean summer zonal wind over Africa, similar to figure 5 in Nicholson (2013), should be presented to provide a wider picture of the changes in the WAM system.

(iv) Line 280: What is the main reason for the stronger rainfall changes in PlioMIP2 compared to PlioMIP1? Is it a change in the boundary conditions or perhaps improvements in the climate models? Please discuss.

References:

