**Earth System Dynamics**

Discussions

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# *Interactive comment on* "Consistent increase in Indian monsoon rainfall and its variability across CMIP-5 models" *by* A. Menon et al.

**A. Menon et al.**

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Dear Prof. Matthew Huber,

Thanks for pointing this out. Here is our modified response to Reviewer 2's first comment:-

In this study, we haven't done any direct comparison of CMIP-5 models with CMIP-3 models to analyse their skill in simulating South Asian monsoon dynamics. However, a study by Sperber et al., (2012) suggests that CMIP-5 multi-model mean (MMM) is more skillful than CMIP-3 MMM in simulating several aspects associated with Asian summer monsoon. Hence we refer to this study as a quantification of the improved skill of the CMIP-5 GCMs in simulating the South Asian summer monsoon dynamics

compared to CMIP-3 GCMs. We have now additionally added the following sentences into the introduction section :- "Compared to CMIP-3 models, CMIP-5 models have higher horizontal and vertical resolution in the atmosphere and ocean as well as they have a more detailed representation of aerosols. Some of the CMIP-5 models have a more complete representation of the carbon cycle compared to CMIP-3 models. Sperber et al (2012) suggest that, because of the higher spatial resolution, CMIP-5 models have a better representation of rainfall compared to CMIP-3 models, especially in the vicinity of steep topography (like Western Ghats). CMIP-5 models outperform CMIP-3 models in simulating the monsoon annual cycle, the onset of monsoon as well as the time of the monsoon peak. The spatial extend of monsoon in CMIP-5 multi-model mean (MMM) is more realistic than in the CMIP-3 MMM. The magnitude of intra-seasonal variance is also more realistic in CMIP-5 MMM compared to CMIP-3 MMM. Both CMIP-5 and CMIP-3 MMM capture low-level monsoon circulation quite well with pattern correlations of 0.98 and 0.97 respectively, compared to ERA40 observational dataset. Even though the time-mean rainfall error has a consistent pattern between CMIP-5 and CMIP-3 MMM, the amplitude of error is less for CMIP-5 MMM compared to CMIP-3 MMM (Sperber et al., 2012)."

Reference:- Sperber, K. R., Annamalai, H., Kang, I. S., Kitoh, A., Moise, A., Turner, A., Wang, B. & Zhou, T. (2012). The Asian summer monsoon: an intercomparison of CMIP5 vs. CMIP3 simulations of the late 20th century. Climate Dynamics, 1-34.

Thanks,

Arathy Menon

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