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A road map for improving dry-bias in simulating the South Asian monsoon precipitation by climate models

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An outstanding problem of climate models is the persistent dry bias in simulating precipitation over the south Asian summer monsoon region. Guided by observations, it is hypothesized that the dry-bias in simulating precipitation by the models is related to underestimation of high pass variance by most models. An analysis of the simulated mean and variance in precipitation by 36 coupled models show that the dry bias in simulating the mean precipitation by the models is indeed proportional to the underestimation of the variance. Models also indicate that the underestimation of the high-pass variance arise due to the underestimation of the intense rainfall events by models. Further, it is found that the higher resolution models simulate increasingly reduced dry bias by simulating high-frequency variance better through better simulation probability of intense rainfall events. The robustness of our findings over different regions and during both boreal summer and winter seasons indicates the universality of the hypothesis.