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**Plain Language Summary:** The future projection by the CMIP5 models well reproducing the observed westerlies over East Asia, which is stronger than the CMIP5 ensemble mean, indicates that summertime monthly climatological precipitation in future East Asia is more likely systematically decreased in some regions (Fig.1b) rather than evenly increased in every wet region (Fig.1a). Because the strong downward motion change in East Asia is caused in the atmospheric response to large future reduction of the tropical vertical motion for the models simulating the present-day climatology of much tropical precipitation and the associated strong East Asian westerlies.

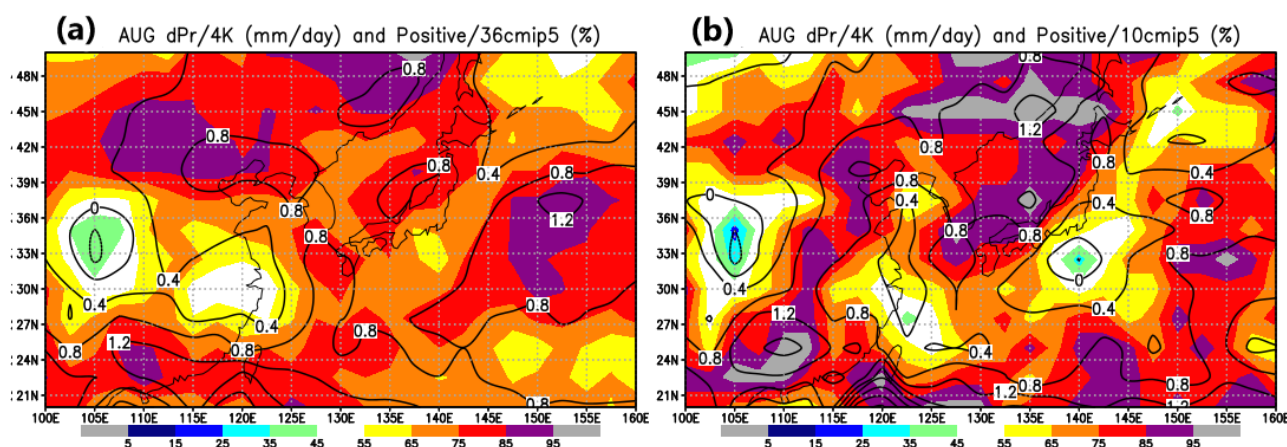


Figure 1. Geographical distributions of the future change in precipitation of the (a) 36 CMIP5 model and (b) 10 CMIP5 model ensembles for August in the 4 K global warming condition under the RCP 8.5 scenario. The ensemble means are represented with contours of every 0.4 mm day<sup>-1</sup>. The percentages of the ensemble members indicating the future increase in precipitation are shown with colors for every 10% interval.

- The CMIP5 ensemble mean monthly circulation change at 700 hPa in East Asia is characterized through the future summertime by a cyclonic circulation change to the south of Japan and the associated downward motion changes around Japan.
- The models showing the above features more clearly tend to project the enhanced possibility of a decrease in monthly precipitation against the ‘wet-getting-wetter’ effect in some regions.
- A finding is that these models tend to simulate stronger westerlies over East Asia and more tropical precipitation in the present-day northern summer climatology, which leads to large future reduction of the tropical vertical motion and large atmospheric response in East Asia.