

Kitoh, A., and H. Endo, 2019: Future changes in precipitation extremes associated with tropical cyclones projected by large-ensemble simulations. *J. Meteor. Soc. Japan*, **97**, 141-152. <https://doi.org/10.2151/jmsj.2019-007>

Plain Language Summary: Previous studies projected future changes of precipitation extremes such as an annual maximum one-day precipitation total (Rx1d) itself. Thanks to large-ensemble simulations, we can now investigate projected future changes of extremes in once-in-a-10-year and once-in-a-100-year rare events. It is found that such a rare event will increase in a region extending from Hawaii to the south of Japan, implying an increasing risk of rare heavier rainfall events there by global warming.

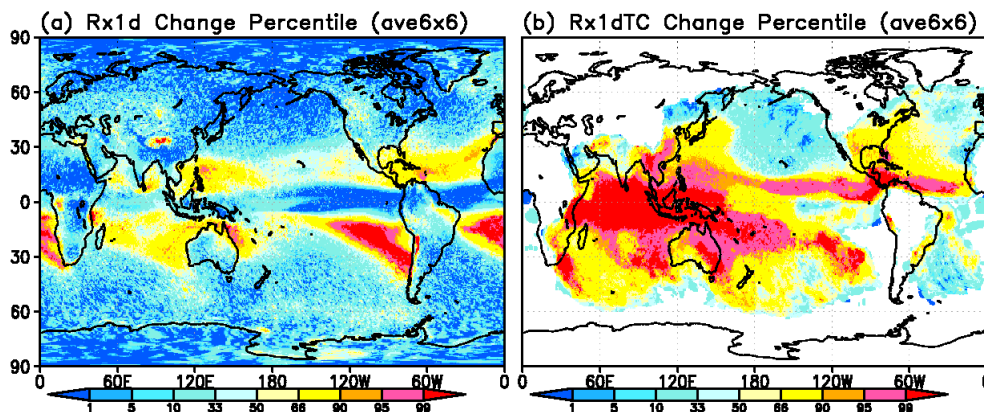


Figure 1: Largest percentile value in each grid point at which future changes in (a) Rx1d and (b) Rx1d associated with tropical cyclones change sign. Those values are calculated for each experiment (six different SST patterns) and then averaged.

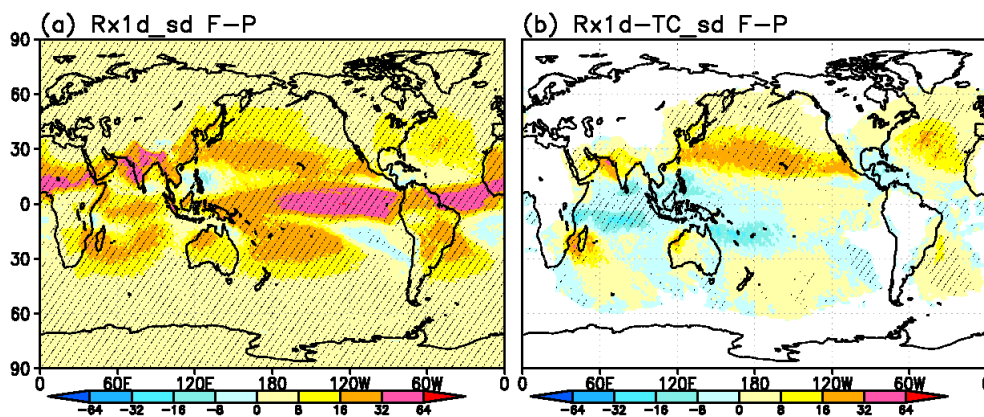


Figure 2: (a) Future changes (future minus present) of interannual standard deviations of Rx1d. (a) As in (b) but for Rx1d associated with tropical cyclones. Unit is mm. Hatches denote where all six members of different SST pattern experiments have the same sign.

Highlights:

- Future changes in precipitation extremes (Rx1d: annual maximum daily precipitation) and a role of tropical cyclones (TCs) are investigated by a large ensemble experiment, 6,000 years for the present and 5,400 years under +4 K warming, with a 60-km mesh MRI-AGCM3.2.
- The large ensemble size enables us to investigate changes in the tails of the Rx1d distribution. It is found that 90- and 99-percentile values of Rx1d associated with TCs will increase in a region extending from Hawaii to the south of Japan. In this region, interannual variability of Rx1d associated with TCs is also projected to increase, implying an increasing risk of rare heavier rainfall events by global warming.