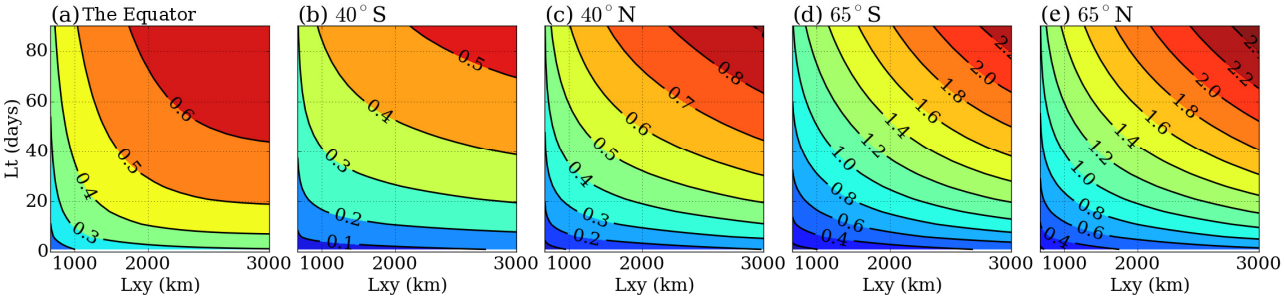
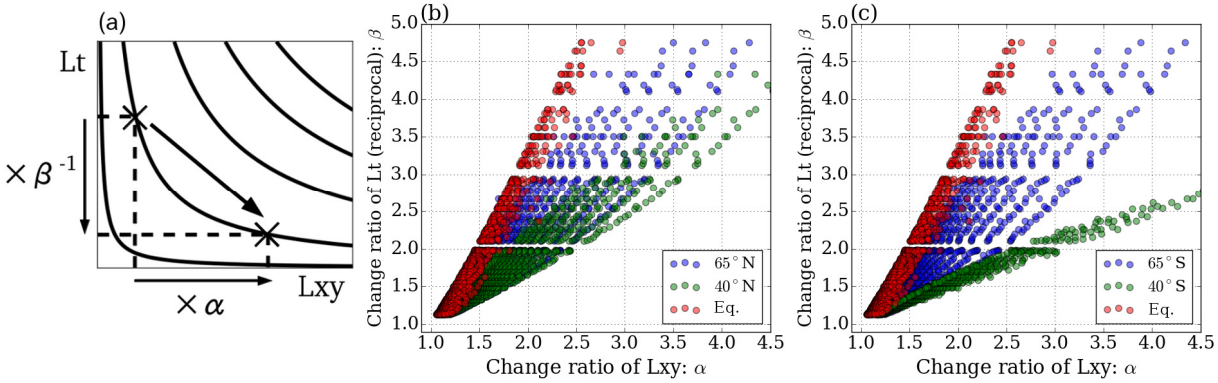
Hibino, K., and I. Takayabu, 2016: A trade-off relation between temporal and spatial averaging scales on future precipitation assessment. *J. Meteor. Soc. Japan*, **94A**, 121-134. https://doi.org/10.2151/jmsj.2015-056



↑ Figure 5. The dependence of the SNR values on the temporal averaging scales L_t and spatial averaging scales L_{xy} at (a) the Equator, (b) 40°S, (c) 40°N, (d) 65°S, and (e) 65°N. The spatial averaging scales L_{xy} are arranged in such a way that their squared values are linearly arranged on the x-axis. This enables the x-axis to be proportional to the number of grid-point data used to obtain the spatially averaged values

↓ Figure 6. (a) Schematic of the definition of change ratios of the spatial and temporal averaging scales α and β, respectively. Scatter diagrams showing the relation between the two change ratios corresponding to the trade-off relation shown in Fig. 5 for (b) the Southern Hemisphere and (c) the Northern Hemisphere. Blue, green, and red points represent the results for latitudes 65°N (65°S), 40°N (40°S), and the Equator, respectively. For comparison, the same result at the Equator is drawn in both (b) and (c).



- The present study showed the dependence of the detectability of the precipitation change signal toward the end of the 21st century on the temporal and spatial averaging scales and proposed a trade-off relation between them (Fig. 5).
- The characteristics of the trade-off relation are found to differ qualitatively depending on latitude: the tropics, the mid-latitudes, and the subpolar regions (Fig. 6).
- The result of the trade-off relation is closely related to the precipitation power spectrum representing spatio-temporal scales of precipitation-related meteorological phenomena, e.g., baroclinic waves.
- The trade-off relation is obtained quantitatively and provides useful information for climate change impact assessments using various temporal and spatial scales or resolutions.