
Understanding the differences in the trend of precipitation in the ITCZ in the two reanalysis datasets

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Abstract

Precipitation in the Inter-Tropical Convergence Zone (ITCZ) accounts for a large portion of precipitation amount in the tropical Pacific, and it affects the global atmospheric circulation by supplying a latent heat energy to the atmosphere. Therefore, it is important to understand how the characteristics of precipitation change in the ITCZ in a changing climate. In this study, we analyze the trend of precipitation in the ITCZ in boreal summer (June, July, August) during the period of 1979-2020 using the two different reanalysis datasets including the ECMWF reanalysis data ver.5 (ERA5) and Japan 55 reanalysis data (JRA55). While the trend of total precipitation was similar across the globe in two datasets, that of convective precipitation was opposite in the ITCZ. To understand these differences, we analyzed the trends of atmospheric variables including the vertical temperature and specific humidity. It was found that the convective precipitation in JRA55 shows an increasing trend, which is in contrast to that in ERA5. We also found that there exist some discrepancies in key variables including the atmospheric stability, the vertical structure of equivalent potential temperature as well as Convective Available Potential Energy between two reanalysis datasets. It is necessary to further understand how such differences in the trend of convective precipitation are associated with the characteristics of atmospheric circulations in two reanalysis datasets.

Keywords: ITCZ, Precipitation, reanalysis dataset, JRA55, ERA5

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