
Exploring the changes in Atmospheric Circulation in East Asia during summer using K-mean clustering method

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Abstract

Recent studies have shown that the nature of atmospheric circulation is changing due to global warming. Changes in the characteristics of atmospheric circulation can also affect climate factors such as temperature and precipitation, resulting in changes in the features of extreme climates such as heat waves, heavy rains, and cold events. Therefore, it is important to understand the atmospheric circulation linked to the climate change and the associated climate factors. In this study, k-means clustering method is applied to 500-hPa geopotential fields to classify ten significant atmospheric circulation clusters during summer in East Asia for the period 1958-2020. It is found that there are some clusters which either significantly increases or decreases in their occurrence frequency. The regressed analysis indicates that Cluster5 and Cluster10, which increased obviously as time progresses, are related to a warming trend. They were also associated with sea-ice variations. These increasing clusters of atmospheric circulation are linked to Indo-Pacific Warm Pool, specifically Cluster5 is related to Indo warming and Cluster10 is related to Western Pacific warming. Two clusters show different impacts on East Asia in terms of the temperature and the precipitation.

Keywords: k, means clustering, East Asia, Indo, Pacific Warm Pool, global warming

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