Long-term Variations of the Winter Monsoon Season in Japan

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In the present study, by utilizing daily precipitation data in Japan observed by the Japan Meteorological Agency for the past 109 years since 1901, we defined the winter monsoon weather pattern in Japan based on the contrast in spatial distribution of daily precipitation between the Japan Sea side and the Pacific Ocean side regions. Then, on the basis of seasonal transition in occurrence frequency of the winter monsoon weather pattern, we delimited the beginning and ending of the winter monsoon season in a pentad time-scale for each year. We aimed to clarify characteristics of the long-term variations in the length of the winter monsoon season and seasonal march of winter weather conditions since the early 20th century in Japan.
As a result, we found a significant decreasing trend in the length of the winter monsoon season since the early 20th century. It was also found out that the occurrence frequency of the winter monsoon weather pattern has been significantly decreasing since the early 20th century. In addition to the long-term decreasing trend, we detected an abrupt decrease in the occurrence frequency of the winter monsoon weather pattern in the mid-1980s, which suggests abrupt weakening of the winter monsoon after the mid-1980s.

Keywords: Asian winter monsoon; length of winter season; winter monsoon weather pattern; abrupt weakening of the winter monsoon