Review of: "Spatio-Temporal Analysis of Precipitation Patterns in Xinjiang Using TRMM Data and Spatial Interpolation Methods: A Comparative Study"

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Potential competing interests: No potential competing interests to declare.

The article is devoted to the current and important topic of precipitation distribution in the dynamically developing region of northwestern China. The authors have collected and analyzed quite extensive material over more than 20 years. The methods used by the authors are reasonable, modern, and fully justified by their goals and objectives. The authors set a specific goal and objectives. The study examines the efficacy of four spatial interpolation methods - inverse distance-weighted, kriging, radial basis function, and thin-plate spline. The goal is to evaluate their accuracy in mapping Xinjiang's annual precipitation distribution.

During the research process, the authors obtained interesting and important results. The inverse distance weighting method, when combined with TRMM data, showed the highest interpolation accuracy, making it suitable for analyzing Xinjiang's precipitation distribution. This offers an effective methodological reference for future studies.

Notably, precipitation in Xinjiang has generally increased over the study period, with the northern region experiencing markedly higher precipitation, particularly in summer, compared to the south. Over 63.6% of Xinjiang exhibited this increasing precipitation trend, predominantly in the north. The annual rainfall in Xinjiang from 1998 to 2019 has an increasing trend. In general, these increases were not significant; only 2.2% of the area had a very significant increase, and 20.9% of the area had a significant increase. These are mainly territories in the Aral, Aksu, Tachen, and Kashgar. Areas with decreasing rainfall accounted for 36.4% of the total area of Xinjiang, and most areas with decreasing rainfall had a slight decreasing trend.

In general, the volume of processed scientific data, the volume, accuracy, and methodology of the research work were carried out at a high scientific level. The reliability of the results obtained is beyond doubt and has important theoretical and practical significance. Therefore, it is impossible to disagree with the authors regarding the following conclusions.

The study's results lay the groundwork for more in-depth climate change impact analyses. Future research could leverage higher-resolution satellite data to refine the understanding of precipitation patterns and climate change in Xinjiang.

In summary, this study not only highlights the trends and regional characteristics of precipitation in Xinjiang but also compares the effectiveness of different interpolation methods. These findings have practical significance and theoretical value for water resource management, agricultural development, and climate change research in the region.

In general, the article is recommended for publication.