Analyzing Precipitation Dynamics: Insights from GPM Satellite Data (2020–2024)

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Abstract

This study leverages daily precipitation data from the Global Precipitation Measurement (GPM) satellite spanning 2020 to 2024 to analyze spatial and temporal precipitation patterns. The research focuses on identifying trends, variability, and anomalies in precipitation at multiple scales, including daily, monthly, and annual resolutions. Preprocessing techniques, such as quality control and spatial-temporal aggregation, are employed to ensure data reliability and usability.

Key objectives include examining the spatial distribution of precipitation, understanding interannual variability, and assessing the occurrence of extreme events, such as heavy rainfall and droughts. Integration with auxiliary datasets, such as land use and hydrological data, further enables insights into the influence of environmental factors on precipitation patterns.

The results contribute to a deeper understanding of precipitation dynamics, offering implications for water resource management, agricultural planning, and climate change adaptation. By utilizing high-resolution GPM data, this research highlights the critical role of satellite observations in advancing meteorological and hydrological studies.