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Impact of Warming Trend in Western Equatorial Pacific on Modulating the Triple-Dip La Niña and Its Associated Teleconnection in 2020–2022

Abstract

The study explored the unique characteristics of the 2020–2022 triple-dip La Niña, contrasting it with similar events in 1973–1975 and 1998–2000. While the recent La Niña featured a moderate sea surface temperature (SST) anomaly in the eastern equatorial Pacific, it was marked by an unusually strong near-surface easterly wind anomaly in the central equatorial Pacific. This extended duration of La Niña was maintained by a strong zonal SST gradient influenced by a warming trend in the western equatorial Pacific (WEP) and a Pacific Decadal Oscillation (PDO) cold phase in the east. This warming, occurring faster than global averages, also shifted the Pacific–North American (PNA) teleconnection eastward.

The 2020–2022 La Niña, the first triple-dip event of the 21st century, caused significant global impacts, including extreme flooding in Pakistan. The study suggests that the western equatorial Pacific's faster-than-global warming trend played a crucial role in sustaining this La Niña. The shifted PNA pattern, associated with La Niña, intensified warming over the northwestern U.S. coast and cooling near northeastern North America. These findings highlight the interactions between warming in the western equatorial Pacific and broader climate patterns, which set the recent La Niña apart from earlier events.

Keyword

Triple-dip La Niña (三重反聖嬰)

Reference

Kao, P.-k., Huang, A.-Y., Hong, C.-C., Chiang, J., & Chang, C.-C. (2024). Impact of warming trend in Western Equatorial Pacific on modulating the triple-dip La Niña and its associated teleconnection in 2020–2022. *Geophysical Research Letters*, **51**, e2024GL109702. https://doi. org/10.1029/2024GL109702