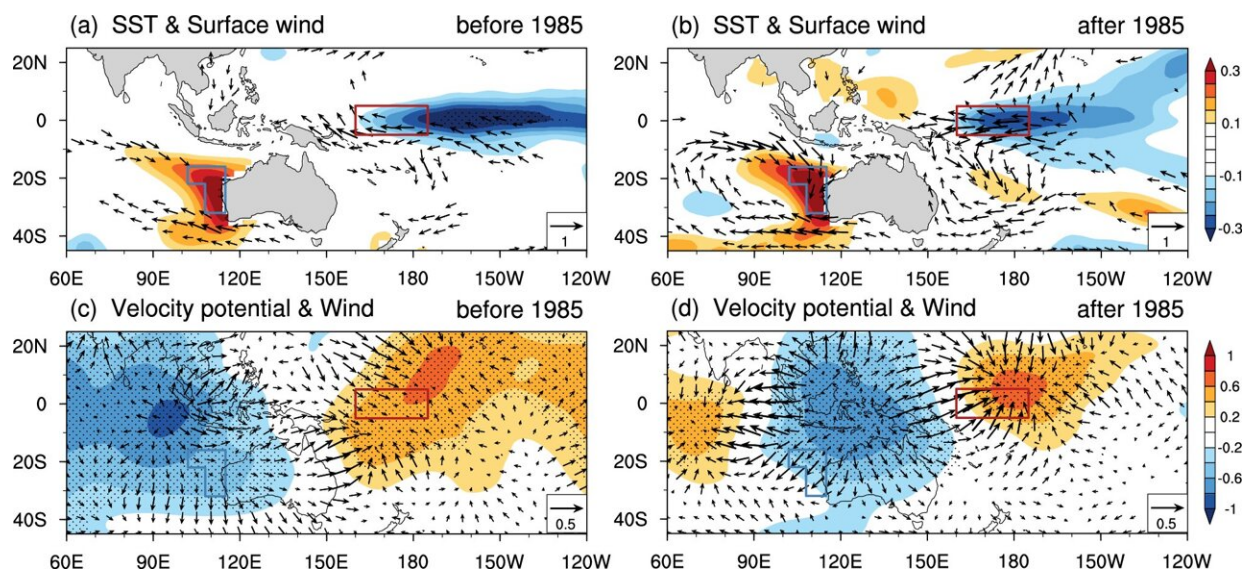


Researchers uncover decadal climate linkages between Western Australia and tropical Pacific

June 5 2024



Teleconnections for the decadal sea surface temperature (SST) variability off western Australian coast in December–January–February (DJF). Credit: *Nature Communications* (2024). DOI: 10.1038/s41467-024-48900-2

In a recent publication in [Nature Communications](https://www.nature.com/naturecommunications), researchers have uncovered significant interactions in sea surface temperature (SST) variations between the Western Australian coast and the western-central tropical Pacific.

"Our findings demonstrate a notable shift in [climate dynamics](#), driven by external forces such as [greenhouse gases](#) and volcanic activities, which have intensified SST variabilities in these regions since 1985," said corresponding author Prof. Lin Pengfei from the Institute of Atmospheric Physics at the Chinese Academy of Sciences (IAP/CAS). "Our discovery helps explain the increasing frequency of marine heat waves and coral bleaching events along the Western Australian coast."

The study utilized multiple observational datasets, pacemaker experiments based on FGOALS-f3-L and CESM1, and large ensemble simulations, building on previous work by the team. This comprehensive approach allowed the researchers to identify a crucial period starting in 1985, during which external forcings began to significantly influence the tropical Indian Ocean, leading to profound decadal climate linkages with the Western Australian coast and the western-central tropical Pacific.

These dynamics reveal that warm SST anomalies in the tropical Indian Ocean drive equatorial easterly wind anomalies, cooling the SST in the western-central tropical Pacific and enhancing the Indonesian Throughflow, which brings warmer water to the Western Australian coast. Additionally, these colder SSTs can induce cyclonic circulation in the Southeast Indian Ocean, amplifying warming effects off the Western Australian coast.

Prof. Lin emphasized the importance of these findings, noting, "Understanding these enhanced decadal linkages is critical for predicting future climate patterns and managing their impacts."

A co-author of the study, Doctoral candidate Ding Yuewen highlighted that the study also points to challenges in modeling these complex interactions, as current climate models often fail to capture accurately the incoherent warming patterns across different tropical ocean basins since the 1980s. This discrepancy underscores the need for improved

models to better predict the regional and global impacts of these climate changes.

This collaborative study was conducted by a team of scientists from IAP/CAS, the Department of Atmospheric and Oceanic Sciences (ATOC) at the University of Colorado, the National Center for Atmospheric Research in the U.S., and Nanjing University of Information Science and Technology.

The team advocates for advancements in climate modeling moving forward, to better represent the intricate warming patterns and their interactions with internal variabilities like the Interdecadal Pacific Oscillation (IPO) and the Atlantic Multidecadal Oscillation (AMO) using [FGOALS-g3 super-large ensembles](#). Improved predictions will be essential for managing the impacts of climate change in a warming world.

More information: Yuewen Ding et al, Emergence of decadal linkage between Western Australian coast and Western–central tropical Pacific, *Nature Communications* (2024). [DOI: 10.1038/s41467-024-48900-2](https://doi.org/10.1038/s41467-024-48900-2)

Provided by Chinese Academy of Sciences

Citation: Researchers uncover decadal climate linkages between Western Australia and tropical Pacific (2024, June 5) retrieved 26 June 2024 from <https://phys.org/news/2024-06-uncover-decadal-climate-linkages-western.html>

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