

# Multidecadal variability in the transmission of ENSO signals to the Indian Ocean

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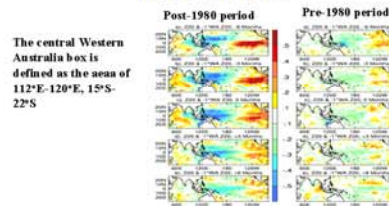
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## Introduction

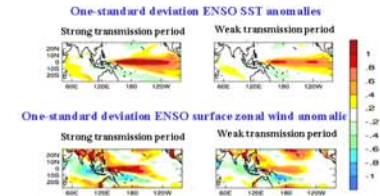
- Pacific Ocean variability is known to transmit to the Indian Ocean.
- Variations in zonal winds over the equatorial Pacific force a response, primarily arriving at the Western Australian coast.
- The transmission may also involve a subtropical North Pacific Pathway.
- We examine the robustness of the amount of energy transmitted via each of the pathway in the pre-1980 period and post-1980 period using SODA-POP.

Significant decadal difference exist.

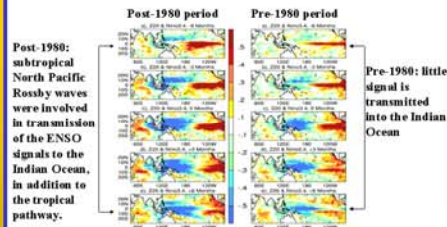
## Correlation between D20 & averaged over Western Australia



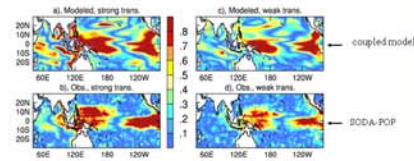
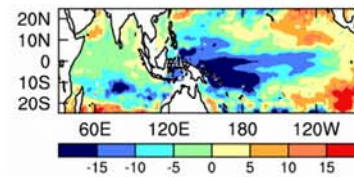
## Coupled model results



## Lag Correlation between Niño3.4 and D20



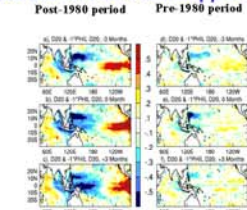
## Difference in D20 (post-1980 minus pre-1980)



Maps of "signal to noise" ratio defined as the standard deviation of a signal over the standard deviation of noise in terms of D20.

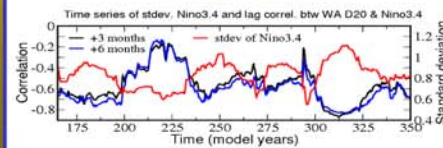
Left: Strong transmission period (model year 315, and post-1980).  
 Right: Weak transmission period (model year 215 and pre-1980).

## Correlation between D20 at Philippine Sea & D20



Philippine Sea box : 120°E-125°E, 12.5°N-17.5°N

## Coupled model results



Model results suggest that transmission goes through multidecadal fluctuations with ENSO properties: stronger ENSO with a broader meridional extent is associated with stronger transmission.

## Conclusions:

1. There is little ENSO signal transmitted to the Indian Ocean in the pre-1980 period.
2. In the pre-1980 period, the weaker ENSO events lead to smaller transmission via the equatorial pathway, and the smaller ENSO meridional extent determines that the North Pacific pathway is not involved in the transmission process.
3. A multi-century coupled climate model experiment reproduces these features, confirming that these are not artefacts of the reanalysis system.

## Reference:

Shi, G., J. Ribbe, W. Cai, and T. Cowan (2007), Multidecadal variability in the transmission of ENSO signals to the Indian Ocean, *Geophys. Res. Lett.*, 34, L09706, doi:10.1029/2007.GL029528.