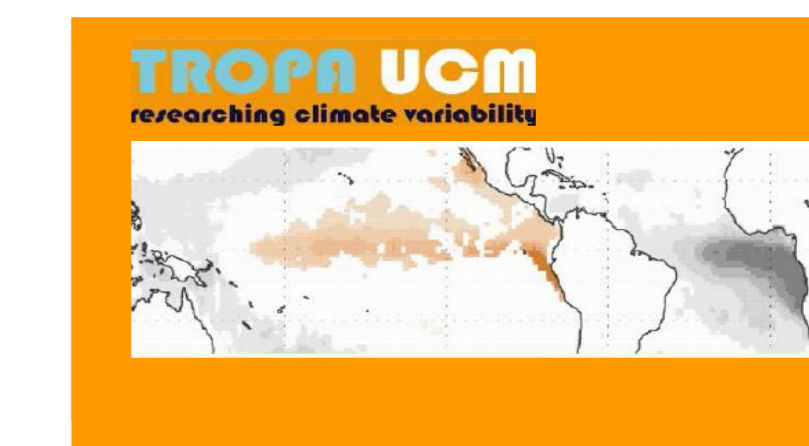


# Tropical Atlantic influence on the Pacific under different ocean background states

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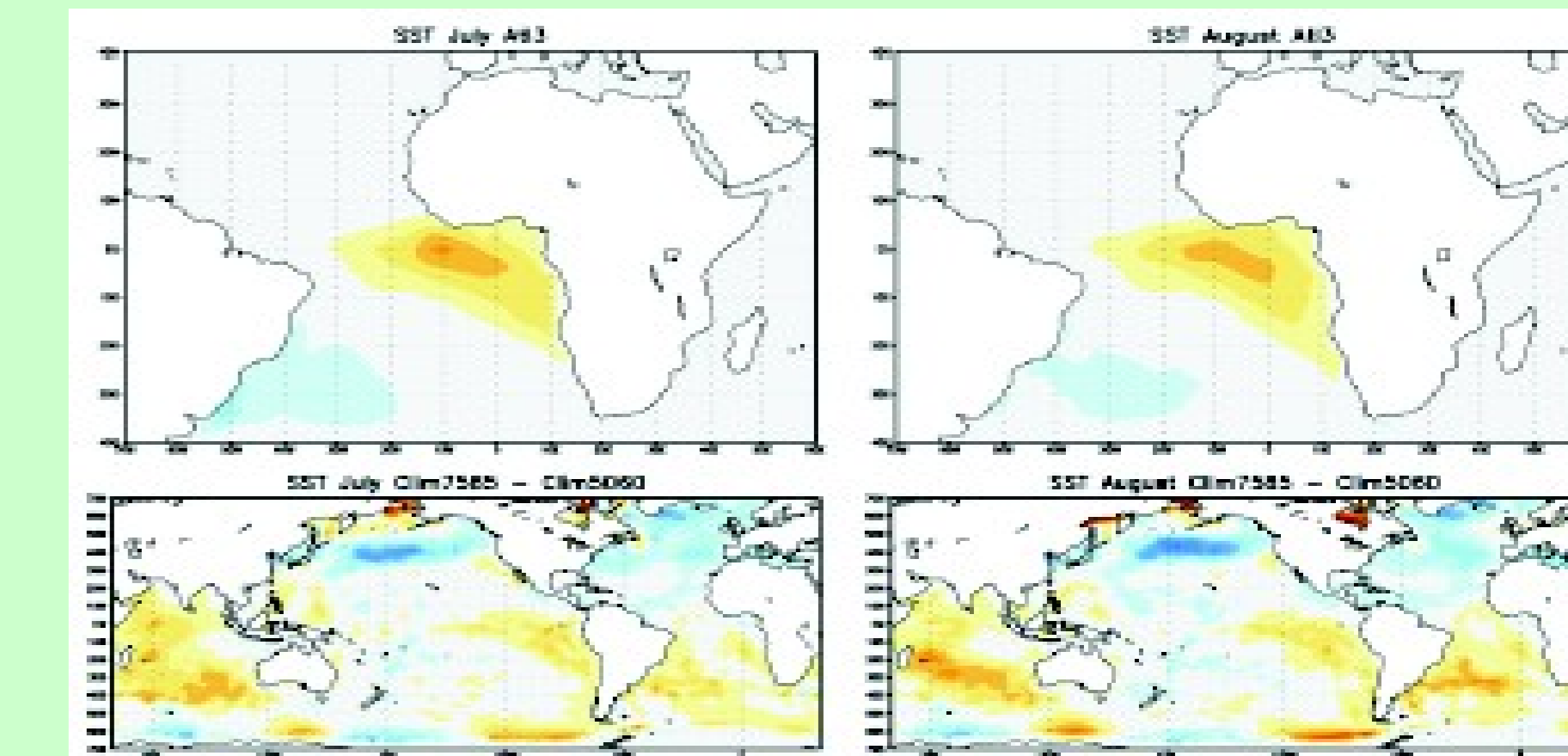
**Scientific Question:** what is the role of the background state in the Atlantic-Pacific connection?

**Models:** UCLA, ECHAM & SPEEDY  
**Same forcing and two different climatologies**  
**Variable to Analyze:** 925 hPa velocity potential

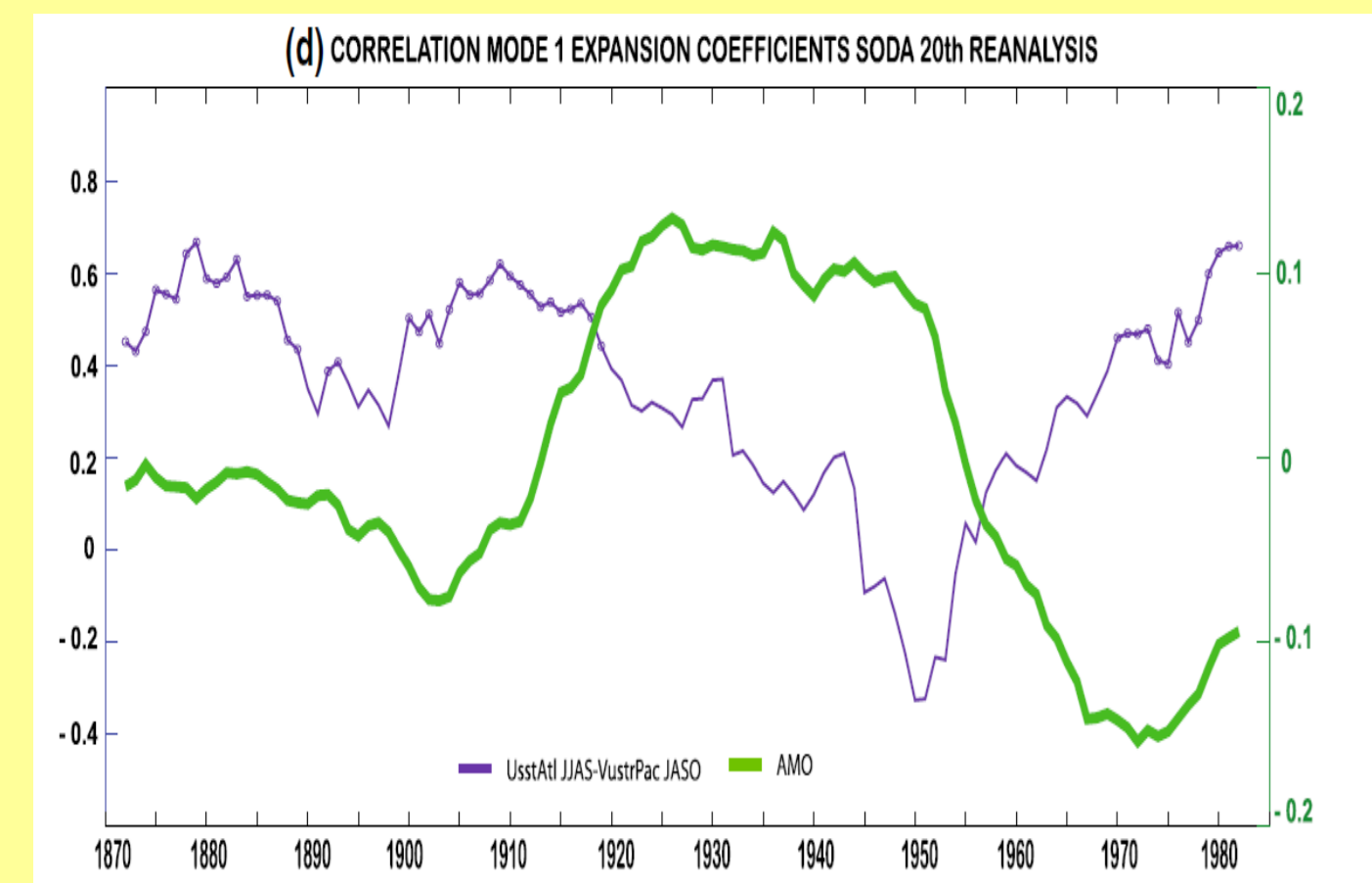
$$R(EN) = R(F) + R(\text{clim}) + R(\text{NL}) \quad **$$

\*\*The response to a SST pattern is the sum of the direct response to the anomalous heating (R(F)), plus the response to the climatology plus a non linear term.

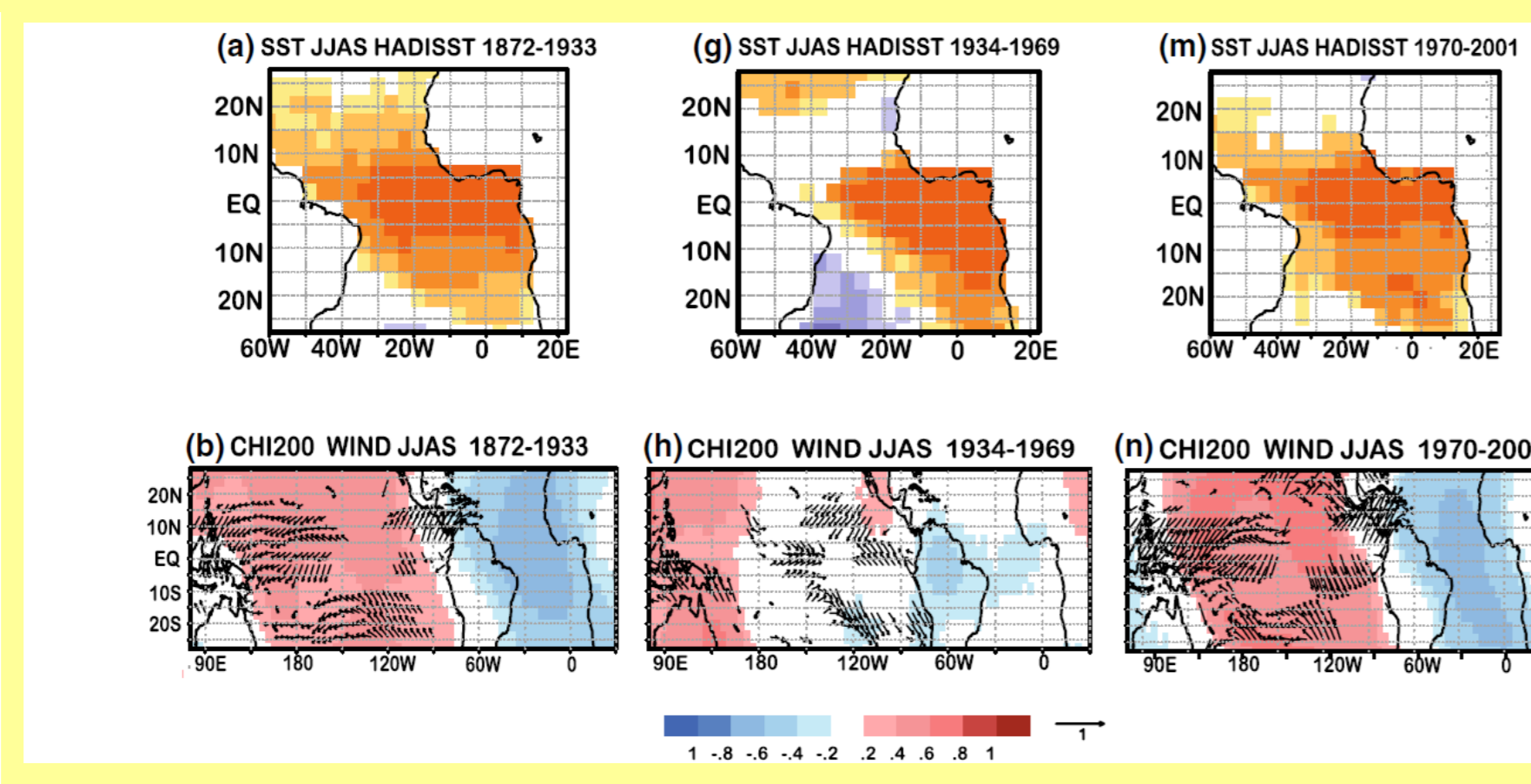
Forcing  
 Difference of climatologies



**Motivation:** important changes in the Atlantic influence on the Pacific before and after the 1970's ([1,2,3])  
 These changes can be due to changes in the ocean background state but also to modifications in the spatial configuration of the mode ([4,5])

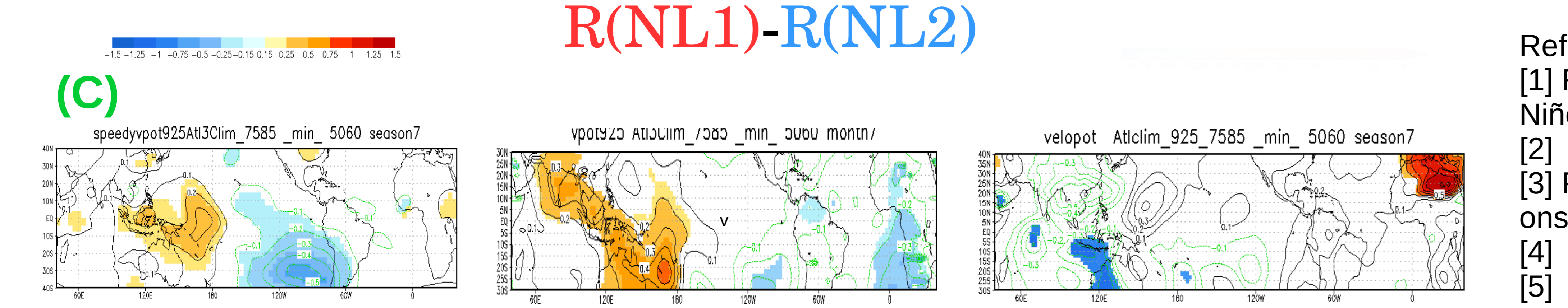
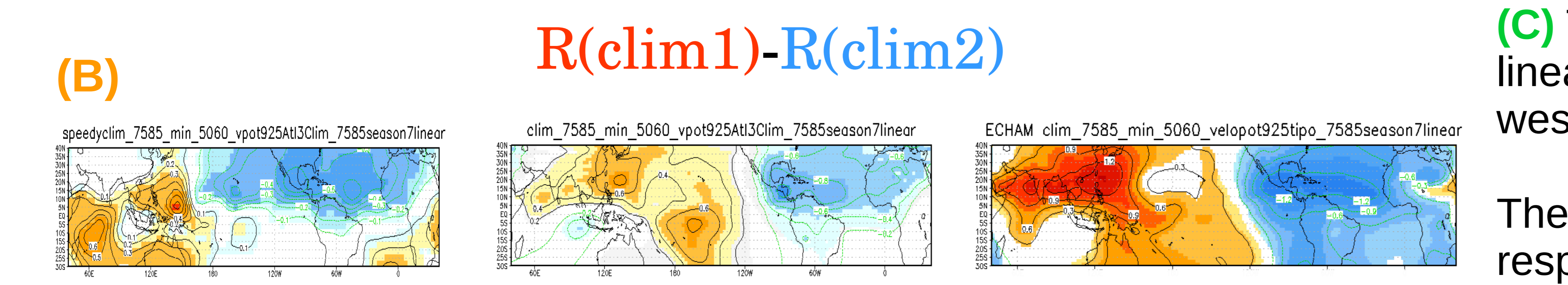
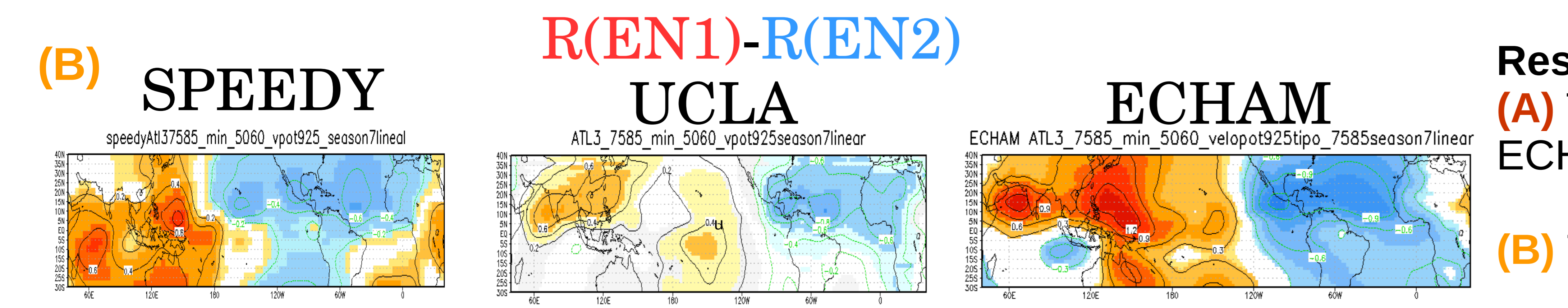
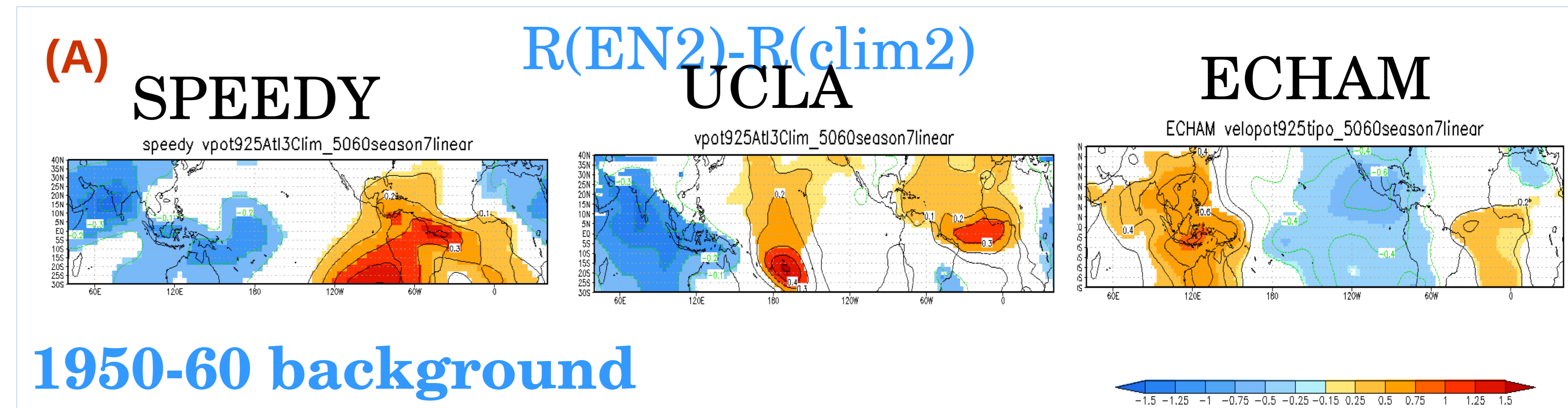
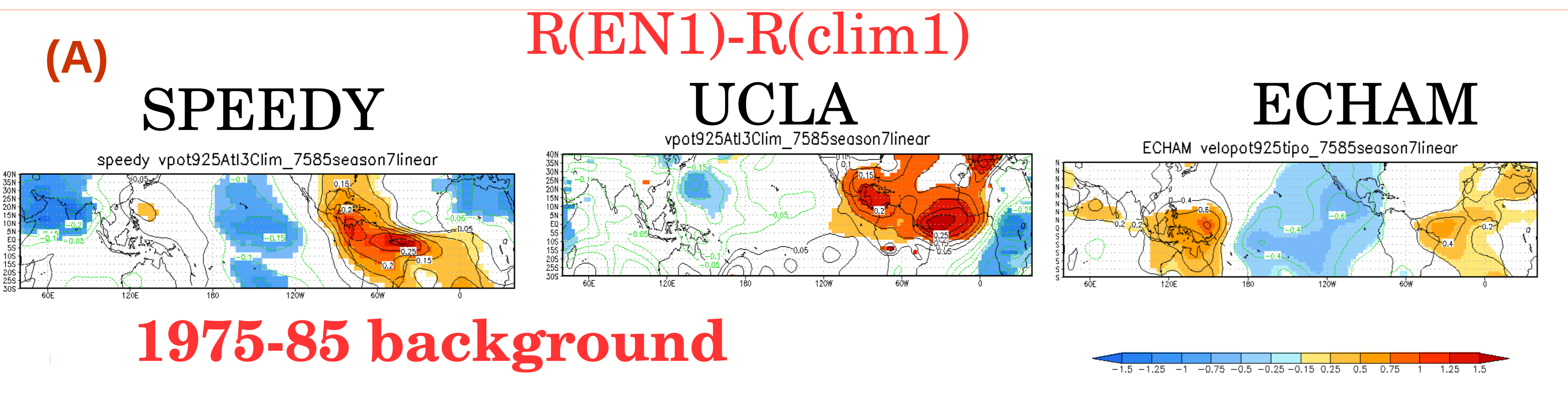


**Fig 1:** 20-yr window moving correlation between the SST expansion coefficient for the Atlantic and the Pacific mode. From [2]



**Fig 2:** leading mode of the Atlantic-Pacific connection in three different periods. Top : Atlantic SST mode. Bottom: 200 hPa velocity potential and windstress. From [2]

**95% (t-test) significant results are shaded**



**Results:**

**(A)** The anomalous response in SPEEDY and UCLA is different in each of the periods. ECHAM simulates a similar anomalous response.

**(B)** The difference in the direct response is mainly due to the difference in climatologies.

**(C)** The difference in anomalous responses between periods corresponds to the non linear terms which are significant for SPEEDY and UCLA and enhance the trades in the western Pacific and a La Niña development. In ECHAM these terms are not significant.

The difference in climatologies reduces the trades and, the non linear terms are the responsible of the Atlantic-Pacific connection

References:

- [1] Rodríguez-Fonseca B, Polo I, García-Serrano J, Losada T, Mohino E, Mechoso CR, Kucharski F (2009) Are Atlantic Niños enhancing Pacific ENSO events in recent decades? Geophys Res Lett 36:L20705
- [2]
- [3] Polo I, Martín-Rey M, Rodríguez-Fonseca B, Kucharski F, Mechoso CR (2015) Processes in the Pacific La Niña onset triggered by the Atlantic Niño, Clim Dyn
- [4]
- [5]