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On the Atlantic Niño influence on the Pacific La Niña

Belen Rodriguez de Fonseca¹

**Irene Polo¹, Javier Garcia-Serrano¹, Teresa Losada¹, Elsa Mohino¹, Fred Kucharski²,
R. Mechoso³**

¹Departamento de Geofísica y Meteorología. Universidad Complutense de Madrid.
brfonsec@fis.ucm.es

²International Centre for Theoretical Physics. Trieste. Italy

³Department of Atmospheric Sciences. University of California at Los Angeles (UCLA)

The tropical Pacific and Atlantic El Niño are dynamically similar but independent phenomena. Most of the studies show that links between these events are modest, pointing to a Pacific lead by about six months, and no Atlantic Niño influence on its Pacific counterpart. Nevertheless, several recent papers suggest that, since the 70's, summer Atlantic Niños are statistically linked to Pacific La Niña but no dynamical hypotheses on the responsible mechanisms for such change in behaviour have been proposed so far.

The present work explores the change in the Atlantic-Pacific connection from the 70's and, on the basis of the observations, we propose a hypothesis in the framework of the tropical Atlantic warming. During recent Atlantic Niños, sea surface temperature (SST) anomalies in the eastern equatorial Atlantic are superimposed on a basic state that has been warming up. In this way, the increased deep-convection over the tropical Atlantic impacts the Walker circulation, and in the eastern Pacific surface divergence is enhanced, SST decreases, the thermocline becomes steeper and, thus, a Bjerkness feedback is triggered. To check such a relevant hypothesis ensemble integrations with an atmospheric general circulation model coupled in the Indo-Pacific basin to an ocean model and forced in the Atlantic by the observed SSTs in the period 1949-2002 are performed. The change in the Atlantic-Pacific connection from the 70's is confirmed, and also, the determinant role of the West African rainfall variability in the Atlantic-Pacific connection is shown. The results suggest that the change in Atlantic-Pacific connection discussed here is an integral part of the "climate shift" of the late 70's. The robustness of this relation emphasizes the increasing importance of the Atlantic in seasonal forecasting.