

# **Nonlinear Processes Responsible for El Nino-La Nina Amplitude Asymmetry**

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Asymmetries between El Nino and La Nina are the fundamental feature of El Nino-La Nina phenomena. So far, various mechanisms causing for El Nino-La Nina amplitude asymmetry have been proposed, and yet those are mainly focusing on one aspect. Here, we took more comprehensive approach to compare various factors within one framework, namely Bjerknes Stability Index analysis (BJ index). To do so, BJ index analysis, which measures a growth rate due to a linear stability, applied separately for El Nino and La Nina events. As expected, the growth rate, of the El Nino is larger than that of the La Nina. Its difference is mainly due to an increased positive dynamical feedback, and it is partially compensated by the enhanced negative thermodynamical feedback. The enhanced ocean's dynamic response to surface wind stress for the warm events (El Nino) is a primary cause for the increase in the positive feedbacks, which is originated from the nonlinear response of atmospheric pattern to sea surface temperature (SST) anomalies, in particular the eastward shift of the zonal wind pattern and the equator-confined wind patch associated with El Nino. The wind response to SST anomalies during El Nino is also larger than that during La Nina; however, its impact is not greater than the aforementioned effect. The damping by shortwave feedback mainly attributes to the difference in the thermodynamical damping between El Nino and La Nina.

Key words: El Nino, La Nina, Asymmetry, Nonlinear processes

## **References (if needed)**

Im, S.-H., S.-I. An, S. T. Kim, and F.-F. Jin, 2015: *Geophy. Lett. Lett. In press.*