Giulio Tirabassi | UPC

Synchronization lags as possible indicators of El Niño events

El Niño/Southern Oscillation (ENSO) is the direct cause of a large number of regional extreme events, such as droughts and floods, and influences greatly the Earth's climate. For this reason, a great effort has been put into developing long-term forecasts that could be employed to anticipate the consequences of ENSO fluctuations.
In previous works, it has been shown how synchronization can be employed to anticipate the transition of a reaction-diffusion system from a stable state to another when a control parameter is changed (Tirabassi et al 2022). It has also been shown how during El Niño/La Niña events the tropical Pacific SST synchronizes (Gozolchiani et al 2011).
Here we want to show how synchronization can be used as a long-lead indicator of positive ENSO events. In particular, the mean of the lags maximizing the cross-correlation rises around one year before an El Niño event, providing an early indicator that could complement the long-term forecasts currently employed.