



The role of WWEs in the contrasted evolution of El Niño in 2014 and 2015

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Short-lived wind events in the equatorial Pacific strongly influence the El Niño/Southern Oscillation (ENSO). Contrasting the tropical Pacific evolution in 2014 and in 1997 or 2015 provides a compelling illustration of the key role of westerly wind events (WWE) on ENSO. Despite similar favourable oceanic conditions for the development of El Niño, and the occurrence of WWEs during the end of boreal winter, these three years experienced a very different subsequent evolution, with one of the largest El Niños on record in 1997-98, a comparable extreme El Niño in 2015/16, but only a weak event in late 2014.

In this study, we investigate the predictability of the ocean-atmosphere system in boreal Spring/Summer to WWEs using the CNRM-CM5 coupled model when the initial oceanic conditions are similar to those in early 1997, 2014 and 2015. Dedicated ensemble simulations demonstrate that despite favourable large-scale oceanic conditions, the occurrence of WWEs in Spring/Summer was responsible for the large spread of the ensemble members. Among the 80% of members that simulate an El Niño, 20% of the members exhibit an extreme El Niño, comparable to that of 1997 and 2015, and show stronger-than-normal WWEs activity in Spring/Summer. On the other hand, only few members (5%) show an evolution similar to the non El Niño event of 2014 with, similarly, a less-than-normal WWEs activity. These results suggest that despite favourable conditions for the occurrence of WWEs and the development of a warm event, the stochastic part of WWEs leads to an inherent limitation of the predictability of the characteristics or even occurrence of El Niño events.