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The role of Indonesian convection in the interaction between the Indian Ocean and ENSO

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In recent years it has been discussed whether a cool West Indian Ocean (WIO) or negative Indian Ocean Dipole (IOD) in boreal autumn favours El Niño at a lead time of 15 months (Izumo et al, 2010; Wieners et al, 2016). Observational evidence suggests that a cool WIO or negative IOD might be accompanied by easterlies over the West Pacific, though it is hard to disentangle influences of the Indian Ocean and ENSO through data analysis.
Such easterlies can enhance the West Pacific Warm Water Volume, thus favouring El Niño development from the following boreal spring onward.
However, the Gill response to a cool WIO (negative IOD) forcing would lead to westerly (nearly zero) winds over the WPO. We hypothesise that a cool WIO or negative IOD leads to low-level air convergence and hence enhanced convectional heating over the Maritime Continent (MC), which in turn amplifies the wind convergence such as to cause easterly winds over the West Pacific. This hypothesis is tested by adding a simplified Indian Ocean and a simple convective feedback over the MC to a Zebiak-Cane model. We confirm that for a sufficiently strong convection feedback a cool WIO or negative IOD indeed leads to easterlies over the WPO. The response IO cooling over the whole zonal width of the basin (negative Indian Ocean Basinwide warming / IOB) is still westerly, with the direct Gill response dominating over convection-induced winds.
Positive (negative) IOB events typically occur a few months after El Niño (La Niña) - observed correlations are about 0.9 - and cause easterlies (westerlies) over the Pacific, facilitating the switch to the opposite ENSO phase, hence IOB variability dampens the ENSO mode and reduces its period. The IOD, on the other hand, tends to be positive (negative) a few months prior to El Niño (La Niña) and trigger westerlies (easterlies) favouring ENSO development. However, the observed correlation between IOD and ENSO is only about 0.6, i.e. the IOD is less closely liked to the ENSO cycle. On the one hand, this means that its influence on ENSO does not occur as systematically on certain phases of the ENSO cycle, hence the net effect of the IO on the spectral properties of ENSO is dominated by IOB variability (damping and period shortening, which is in agreement to Frauen et al, 2012 and Kajtar et al, 2016). On the other hand, this makes the IOD a more promising ENSO predictor, offering information on future ENSO development that is independent of the current state of ENSO.