

# Influence of Indian Ocean Dipole and Pacific recharge on following year's El Niño: interdecadal robustness

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The Indian Ocean Dipole (IOD) can affect the El Niño-Southern Oscillation (ENSO) state of the following year, in addition to the well-known preconditioning by equatorial Pacific Warm Water Volume (WWV), as suggested by a study based on observations over the recent satellite era (1981-2009). The present paper explores the interdecadal robustness of this result over the 1872-2008 period. To this end, we develop a robust IOD index, which well exploits sparse historical observations in the tropical Indian Ocean, and an efficient proxy of WWV interannual variations based on the temporal integral of Pacific wind stress of the 20<sup>th</sup> century reanalysis. A linear regression hindcast model based on these two indices in boreal fall explains 50% of ENSO peak variance 14 months later, with significant contributions from both the IOD and WWV over most of the historical period and a similar skill for El Niño and La Niña events. Our results further reveal that, when combined with WWV, the IOD index provides a larger ENSO hindcast skill improvement than the Indian Ocean basin-wide mode, the Indian Monsoon or ENSO itself. Based on these results, we propose a revised scheme of Indo-Pacific interactions. In this scheme, the IOD-ENSO interactions favour a biennial timescale and interact with the slower recharge-discharge cycle intrinsic to the Pacific Ocean. A set of experiments further allow us to better understand the mechanisms at play. The possible links with ENSO diversity will be discussed.