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Is ENSO part of an Indo-Pacific phenomenon?

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The Seychelles Dome (SD) - a thermocline ridge in the West Indian Ocean - is a dynamically active region with a strong Sea Surface Temperature (SST)-atmosphere coupling and located at the origin of the Madden-Julian Oscillation. Analysis of observational data suggests that it might influence El Niño occurrence and evolution at a lead time of 1.5 years.

We find a negative correlation between SD SST in boreal summer and Nino3.4 SST about 18 months later. Such a correlation might be a mere side-effect of the fact that ENSO has influence on the SD - El Niño (La Niña) is followed by a warm (cool) SD after about 3-6 months - and of the cyclicity of ENSO with a preferred period of about 4 years. However, we find the correlation to be significantly stronger than one would expect in that case, implying that the SD contains information linearly independent from ENSO.

A Multi-channel Singular Spectrum analysis (MSSA) on tropical SST, zonal wind and zonal wind variability reveals three significant oscillations. All of these show ENSO-like behaviour in the Pacific Ocean, with East Pacific SST anomalies being followed by anomalies of the same sign in the SD region after 3-5 months. Wind patterns propagate from the Indian to the Pacific Ocean. These findings suggest that the Indian and Pacific Oceans act as a unified system.
The slower two oscillations, with periods around 4 years, have the strongest ENSO signal in the East Pacific (like a 'Cold Tongue El Niño'). Compared to them, the fastest oscillation, with a period of 2.5 years, has a stronger signal in the Central Pacific (more resembling a 'Warm Pool El Niño'). Because of the short period of the fastest mode, the time elapsed between an SD anomaly and the following ENSO anomaly (of opposite sign) is only 11 months - much less than the 18 months lag at which the correlation between SD and ENSO is minimal. This suggests that while the Cold Tongue El Niño's tend to be preceded by a cool SD event at a lead time suitable for SD-ENSO influence, Warm Pool El Niño's are not.

From the MSSA and a composite analysis we find evidence for two (possibly interrelated) physical mechanisms by which the SD might influence ENSO. In the first one, there is subsidence above the cool SD, leading to westerly winds in the Indian Ocean and inducing enhanced convection above Indonesia. The resulting inflow from the West Pacific (an easterly wind) favours the creation of a large Pacific Warm Water Volume that can be released into the East Pacific in boreal spring/summer following the cool SD event.
In the second mechanism, the cool SD favours a strong zonal wind variability above the West Pacific on intraseasonal time scales, part of which can be attributed to SD influence on the Madden-Julian oscillation. This intraseasonal variability (westerly wind bursts...) can trigger warm Kelvin waves that might initiate El Niño.