

## Evidence from palaeoclimate records and modeling results for an El Niño-like climate mean state during the Last Glacial Maximum

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Glacial-interglacial contrasts in palaeoproductivity and upwelling intensities in the Timor Trough reflect the strength of the Indonesian Throughflow, which is coupled to the ENSO dynamics of the Pacific Ocean. New palaeoclimate records of elevated productivity and increased upwelling off northwest Australia during the Last Glacial Maximum (LGM) suggest a mean climate state similar to that occurring during an El Niño event. An El Niño event is characterised by wind anomalies in the western Pacific that are westerly, and wind anomalies in the eastern Indian Ocean that are easterly. The thermocline in the eastern Indian Ocean becomes shallower, cold upwelled nutrient-rich water is prevalent off northwest Australia and productivity increases. Similar to an El Niño event, during the LGM, the Western Pacific Warm Pool was reduced in size, the Indonesian Throughflow was restricted, upwelled nutrient-rich water was prevalent and productivity was elevated. The main evidence is from low TM15N values which suggest low relative nutrient utilization when productivity was elevated.

The westerly wind anomalies in the western Pacific, typical of an El Niño event, are evident in atmospheric general circulation modeling results for the LGM. The prescribed sea surface temperatures are based on the temperatures reconstructed from marine cores (CLIMAP 1976), whose anomaly pattern has some similarities to El Niño conditions. The consistency between the atmospheric results and these new records of paleoproductivity in the Timor Trough add credence to the possibility of El Niño-like mean conditions during the LGM. Elemental ratios for the sediments (Mg/Al, K/Al, Ti/Al) in the Timor Trough show increased aelioan input in the form of dune sands eroded from mainland Australia and increased input of clay minerals from regolith. These findings support evidence that Australia was drier at the LGM. They are also in agreement with the LGM modeling study which shows strengthened southeasterly/easterly winds over northwestern Australia and increased sand shifting

potential.

Keywords: El Niño; Last Glacial Maximum; Indonesian Throughflow; Western Pacific Warm Pool

## References

[1] CLIMAP Project Members, 1976. Science 191, 1131 (1976).