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The impact of ENSO on coastal ocean productivity

Fukuivenator Rhumba Maestoso - La Niña



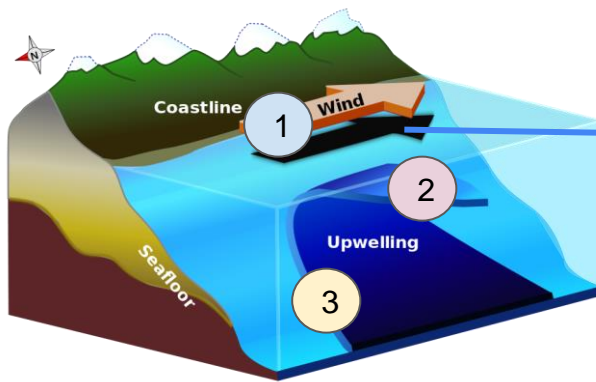
Climatematch
Academy

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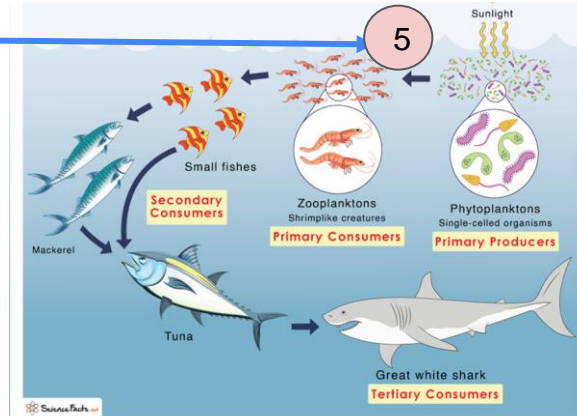
Introduction

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Coastal upwelling enhances ocean productivity by bringing nutrient-rich waters to the surface



Coastal upwelling (from satellite)



Research question

- Identify the impact on **ENSO** driven variation on coastal upwelling using **SST** as a proxy of coastal **upwelling**

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Hypothesis

- The phases of ENSO have a differential impact on coastal upwelling in the Eastern Boundary Upwelling Systems (EBUSs.)

	Wind	Upwelling	Productivity
El-Niño	Weak	Weak	Low
La-Niña	Strong	Strong	High



Data & Methods

SST

Sea surface temperature

Source: NOAA OISST

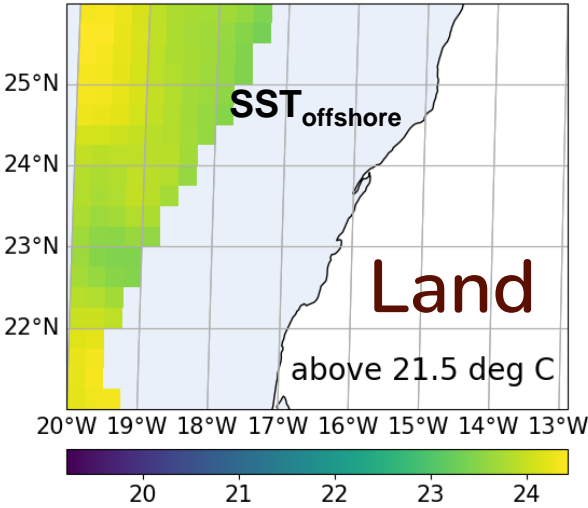
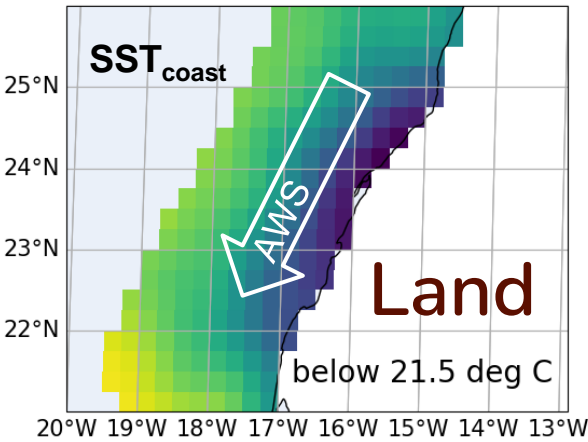
$$UI_{SST} = SST_{coast} - SST_{offshore}$$

Winds

Source : ERA5

ONI

ENSO index

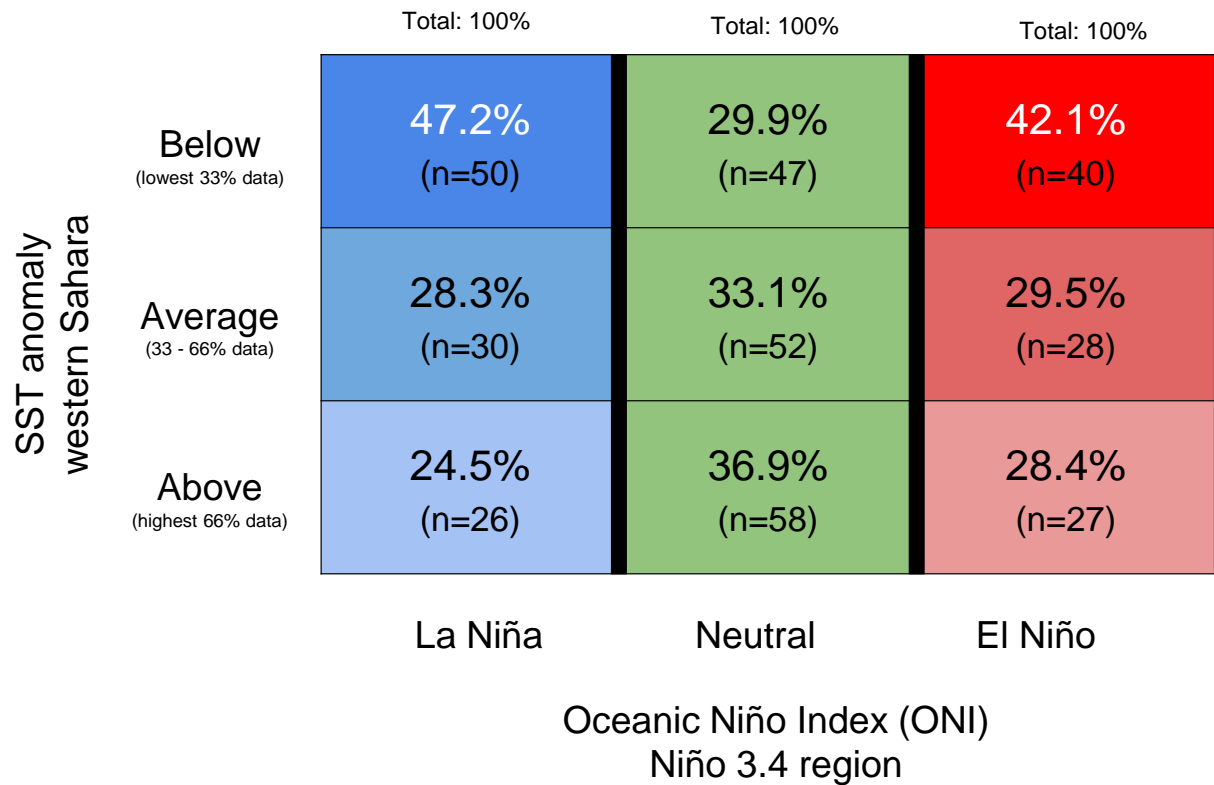


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Comparison SST anomaly from western Sahara with Niño 3.4 region

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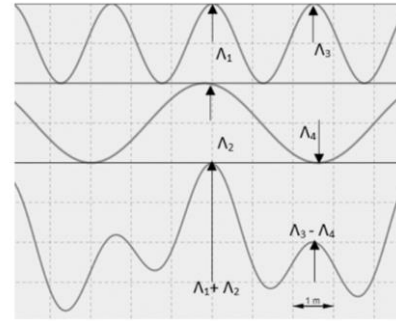


Total N = 358 months
Years: 1982 to 2011

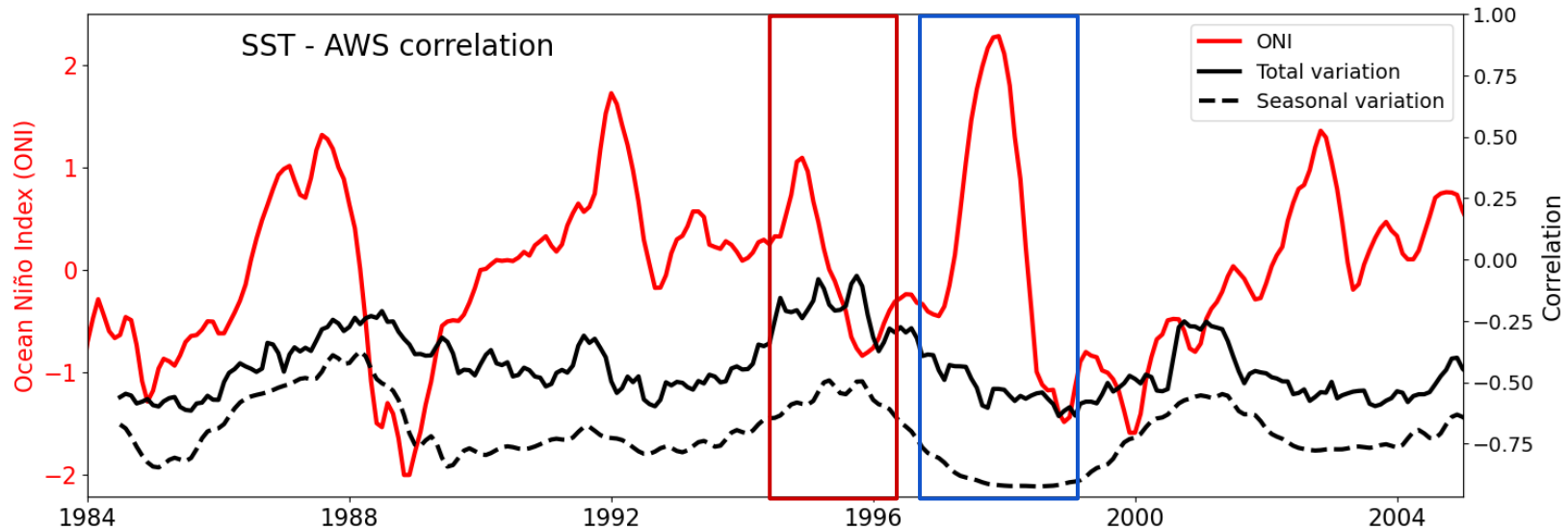


Comparison with ENSO

- Correlation between SST and Coastal Wind (AWS)
- Potential link with ENSO

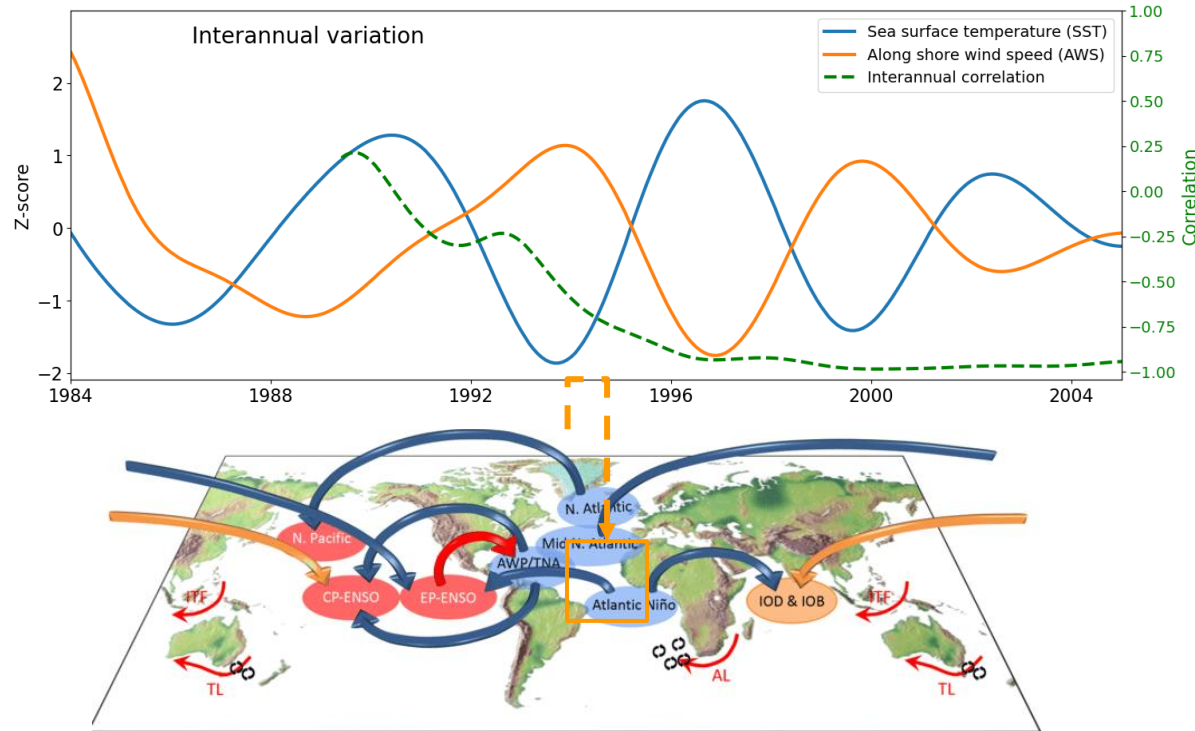


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Conclusions & future work / Results from western Sahara coast

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Wang, 2019, *Climate Dynamics*

Conclusions

- The coastal upwelling off western Sahara is (almost entirely) driven by ENSO-scale winds over long timescales (2-5 yrs).

Future Work

- This mechanism potentially came into existence between 1992-1996.

Thank you!

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Do you have a job for us? write us :)

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Figure sources

- Upwelling Schematic: <https://earthobservatory.nasa.gov/images/84095/phytoplankton-bloom-off-the-pacific-northwest>
- Phytoplankton Bloom: <https://earthobservatory.nasa.gov/images/84095/phytoplankton-bloom-off-the-pacific-northwest>
- Marine Food Web: <https://www.sciencefacts.net/ocean-food-chain.html>

References

- Atmospheric Bridges: Wang, C. (2019). Three-ocean interactions and climate variability: a review and perspective. *Climate Dynamics*, 53(7-8), 5119-5136.
- Kämpf, J., & Chapman, P. (2016). Upwelling systems of the world (pp. 31-42). Springer International Publishing Switzerland.
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- Roy, C., & Reason, C. (2001). ENSO related modulation of coastal upwelling in the eastern Atlantic. *Progress in Oceanography*, 49(1-4), 245-255.

