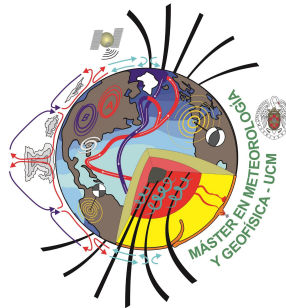


# NextGEMS Hackaton 2022

Oceanic team

Pablo Ortiz Corral, Sergio Pérez Montero, Alba Santos Espeso

2022.04.06



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## Objective and region of study

- Study of the seasonal cycle in the tropical ocean

- Region

- 2°N to 2°S

- **Atl3 index**

- 20°W→0°

- 3°N→3°S

- **Niño3 index**

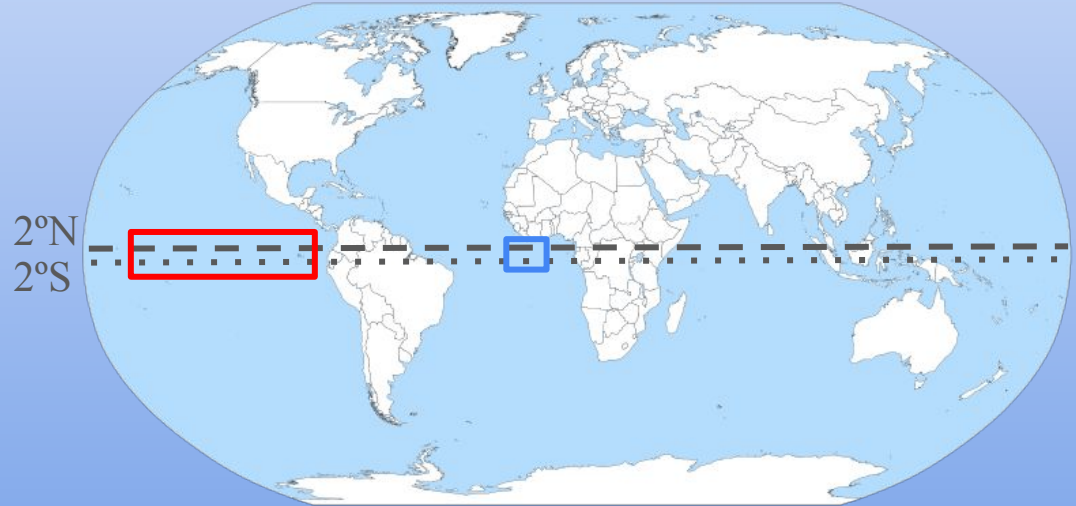
- 150°W→90°W

- 5°N→5°S

- Time period

- March 2020 to February 2021

- First month (February) was discarded in order to have a full year



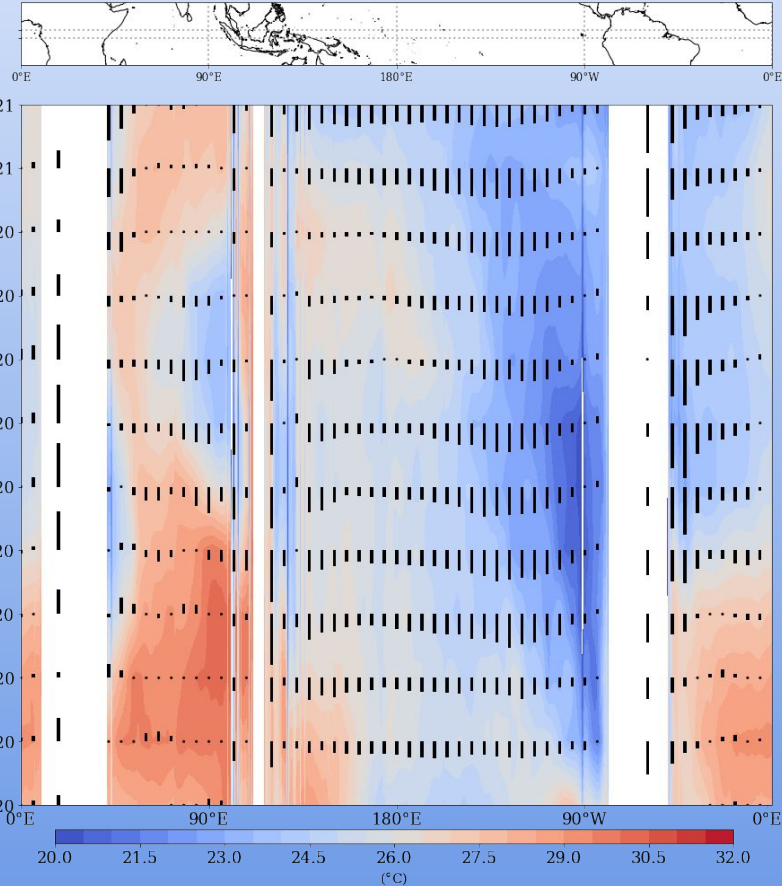
Source: Adapted from Wikimedia

# Context | Results | Conclusions

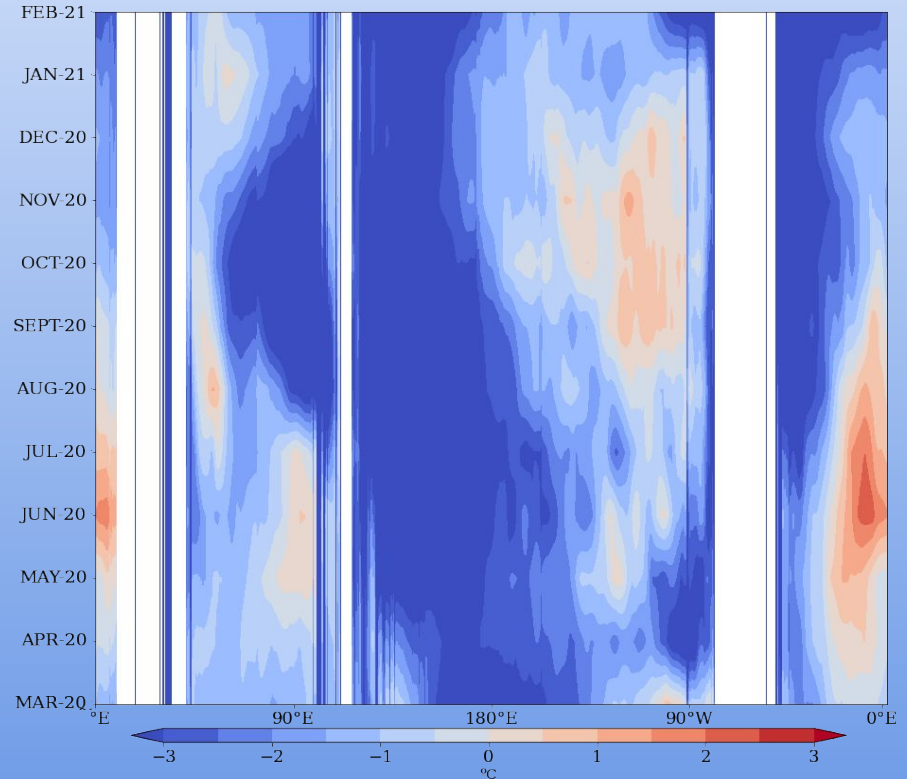
3

0.1 N/m<sup>2</sup>

SST Zonal Stress -ICON (2N-2S)



## ICON minus ERA5



## Niño 3 and Atlantic 3 indexes

- SST

- Seasonal cycle

- Colder in winter for Atl3

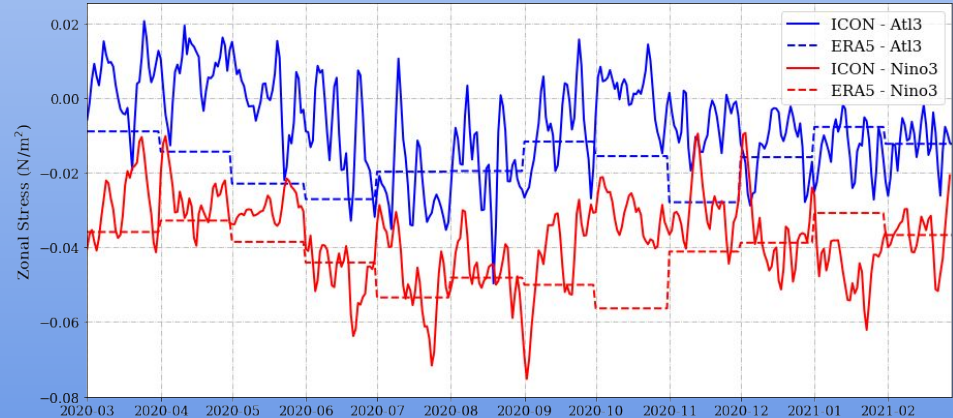
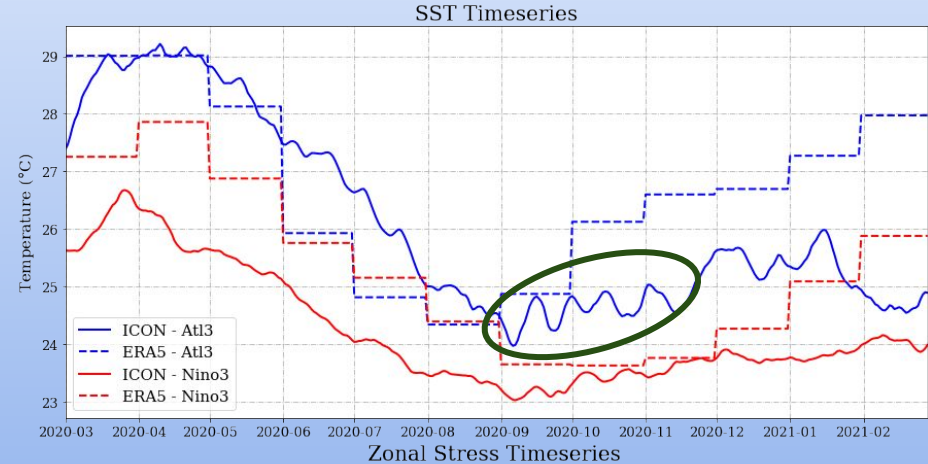
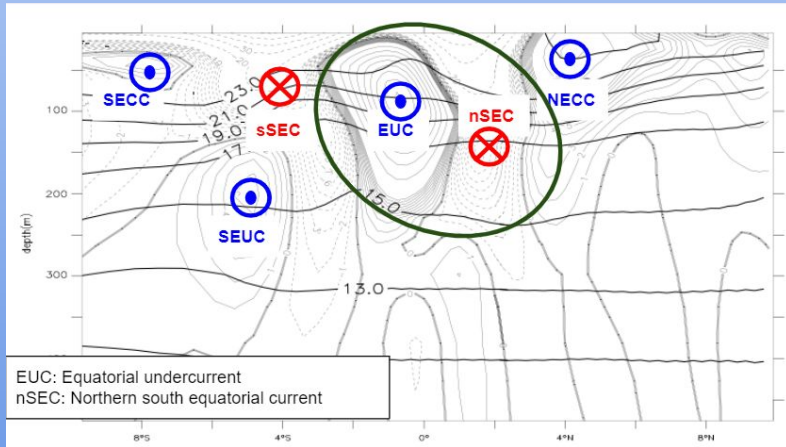
- **High frequency variability (Atlantic)**

- Period < 1 month

- Tropical instability waves (TIWs) in the Atlantic ocean?

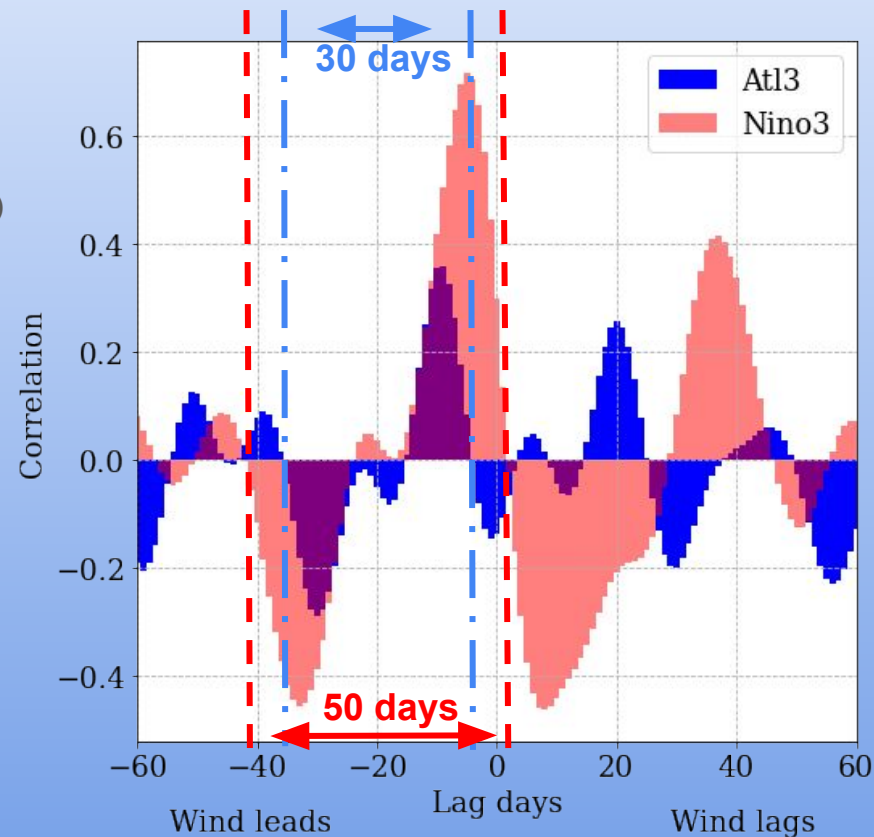
- Zonal wind stress

Source: Jochum et al., 2007



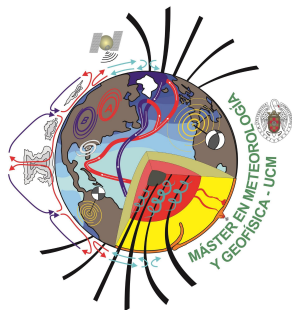
## Filtered Niño 3 and Atlantic 3 indexes

- Butterworth band pass filter
  - Between 10 (noise) and 100 days (seasonal cycle)
- Correlation SST-Wind stress
  - Maximum value when wind leads ( $\sim -10$  days)
    - Major in Pacific ocean
  - Pattern periods
    - Atl3  $\rightarrow \sim 30$  days
    - Niño3  $\rightarrow \sim 50$  days
- Lag between Atl3 and Niño3 patterns





1. Warm bias in Atlantic ocean
  - a. Cloud-induced?
2. Colder Pacific and Indian basins
3. SST and wind stress indexes
  - a. Highest correlation: 10 day lag (when wind leads)
  - b. Higher coupling in the Pacific ocean

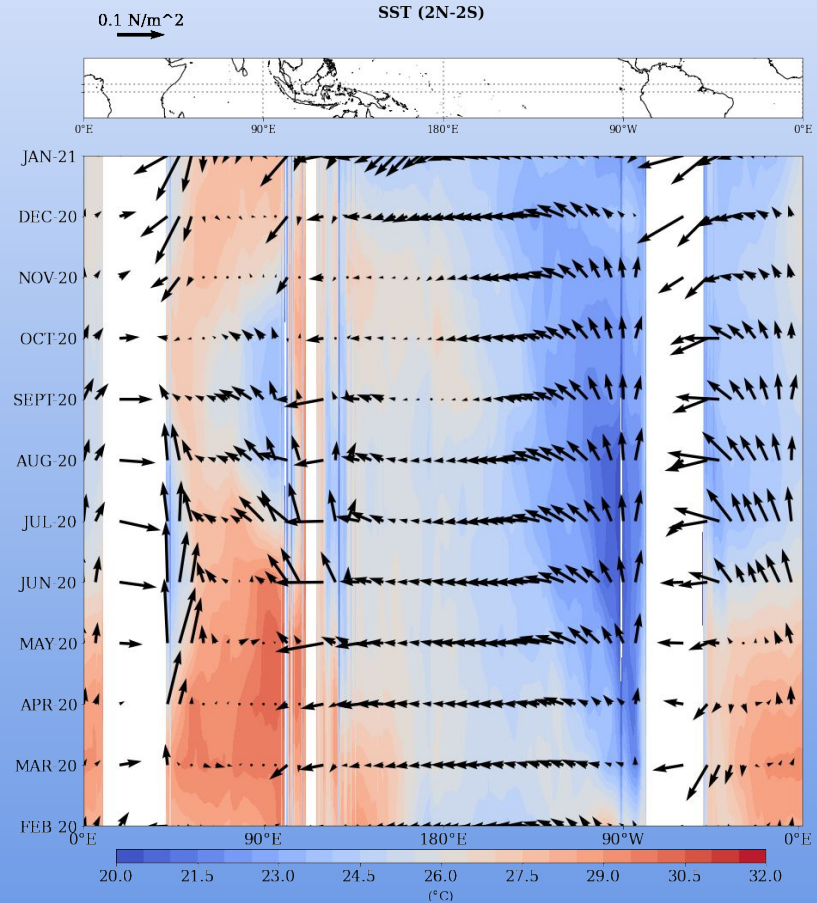


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# EXTRA

## SST(lon, month) between 2°S and 2°N for ICON

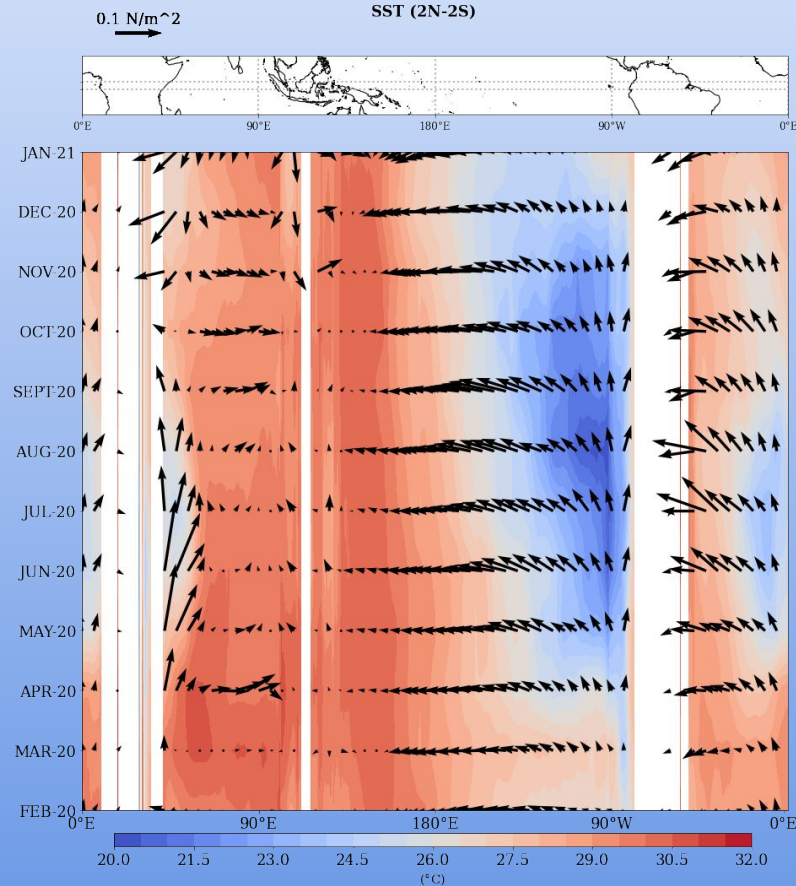
- Note: arrows denote wind direction and magnitude



# EXTRA

## SST(lon, month) between 2°S and 2°N for ERA5

- Note: arrows denote wind direction and magnitude

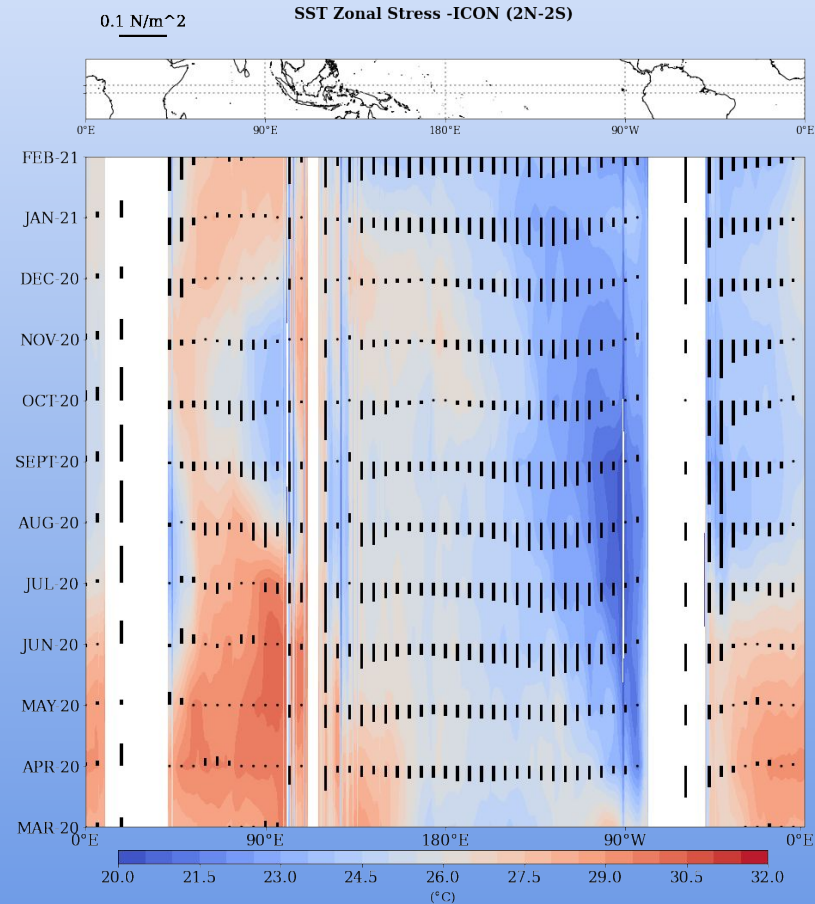




# EXTRA

## SST(lon, month) between 2°S and 2°N for ICON

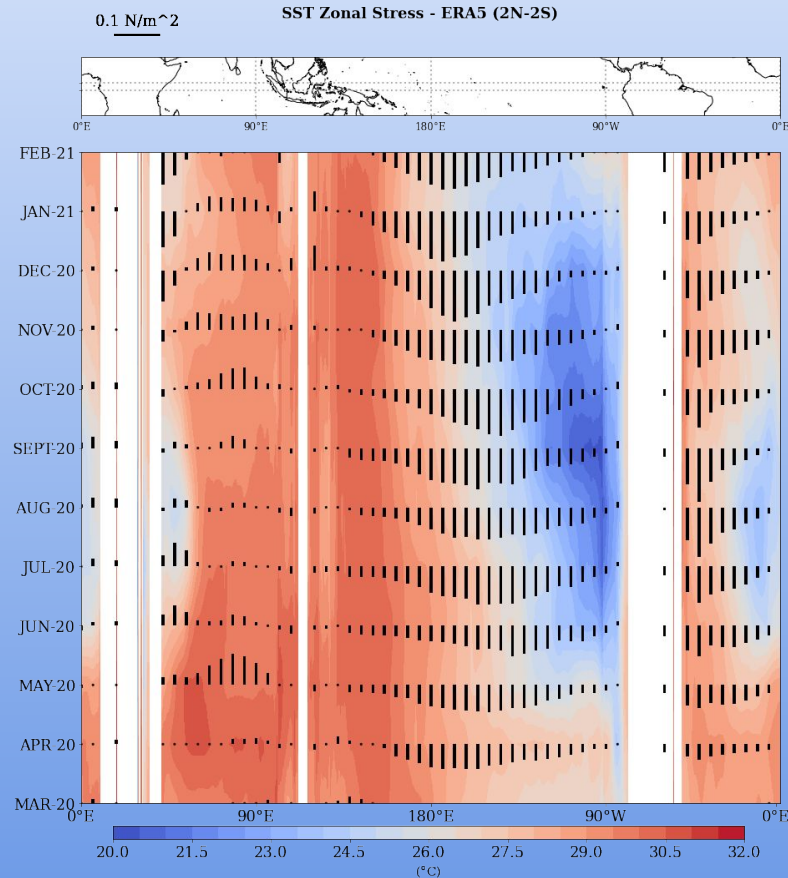
- Note: bars indicate the magnitude of zonal wind



# EXTRA

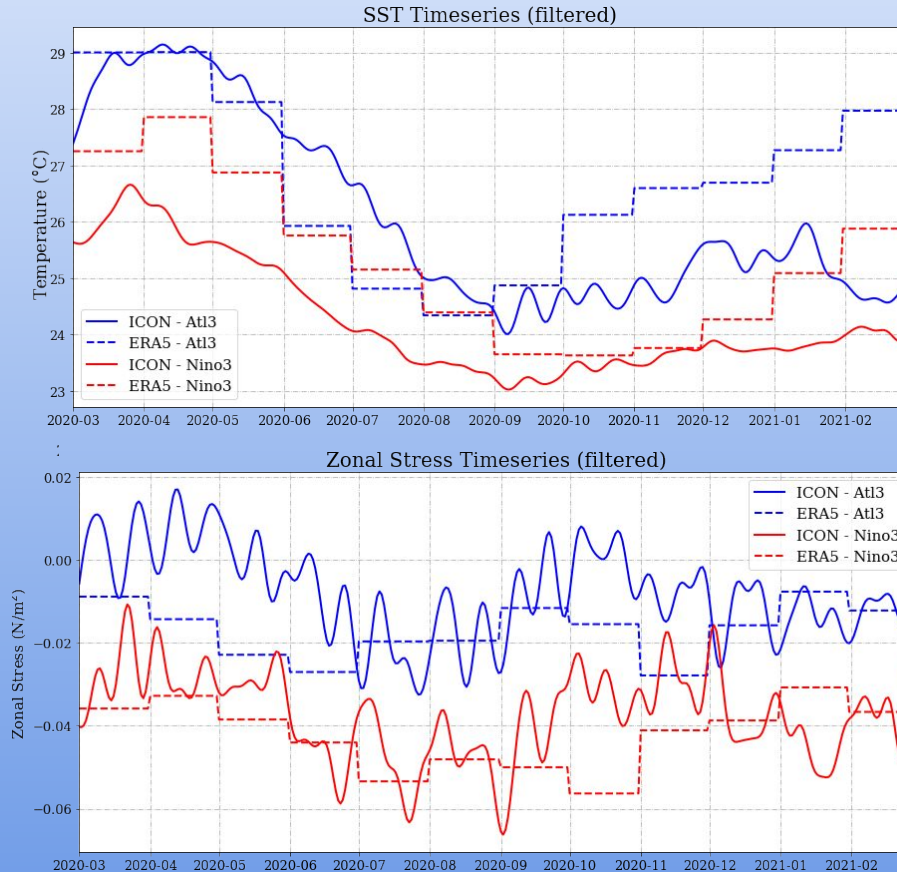
## SST(lon, month) between 2°S and 2°N for ERA5

- Note: bars indicate the magnitude of zonal wind



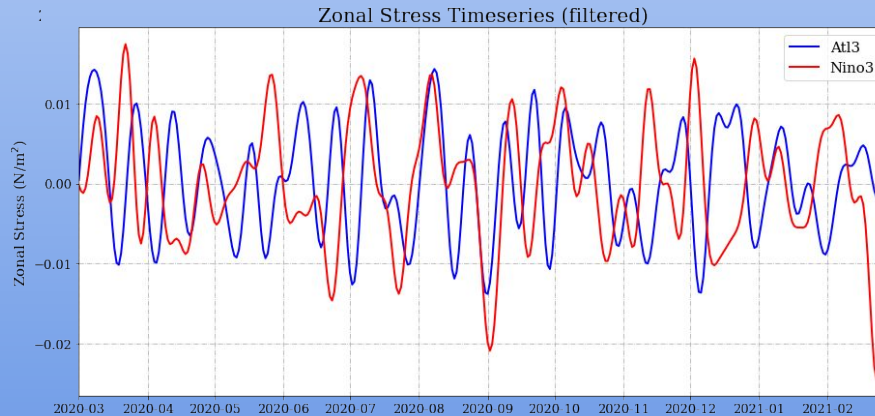
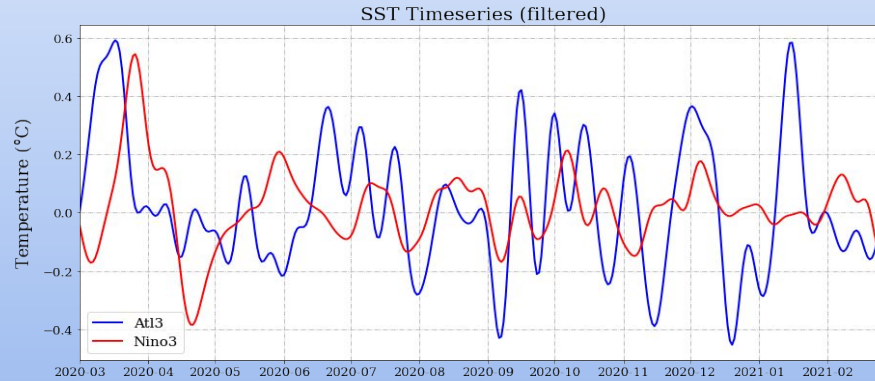
# EXTRA

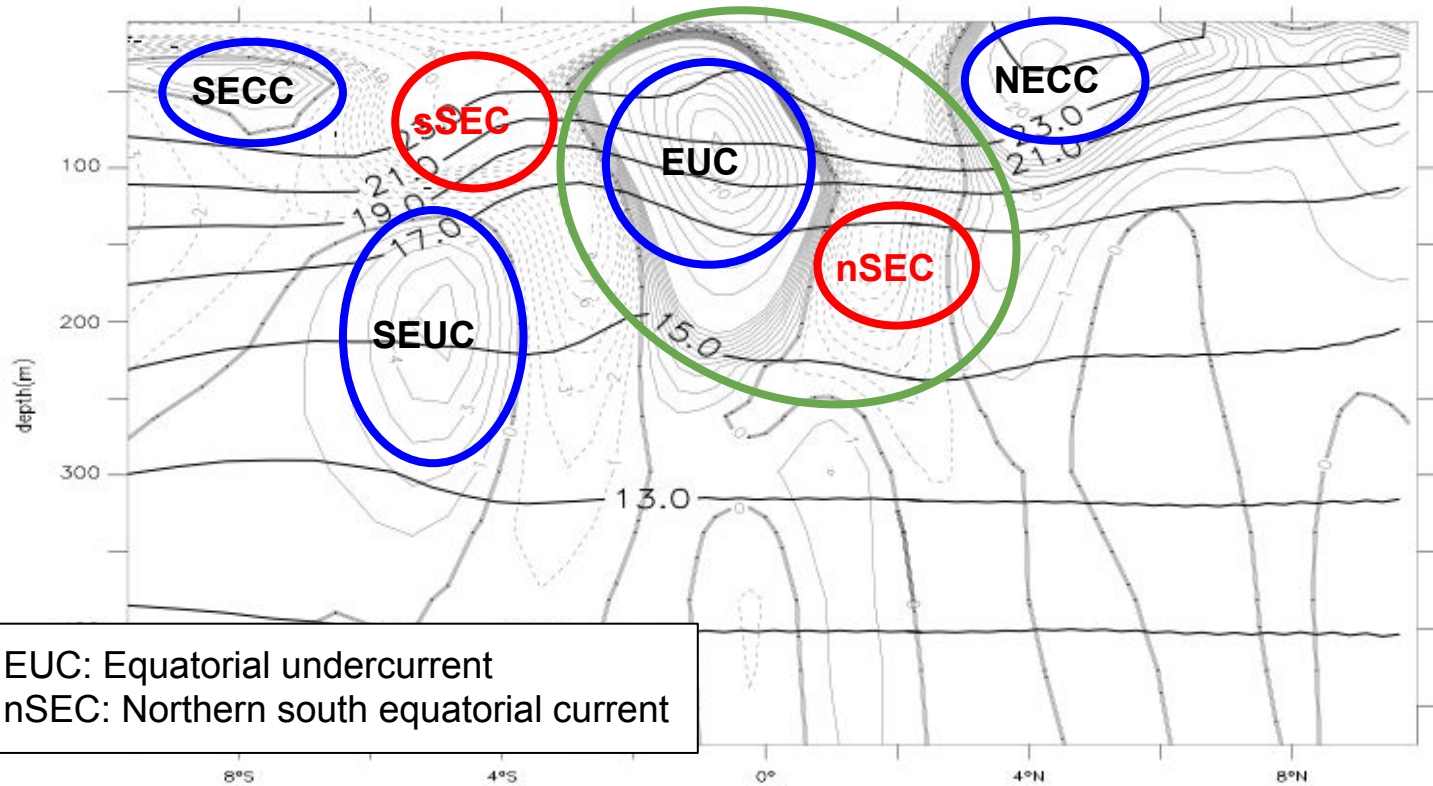
## Niño 3 and Atlantic 3 indexes (filter = 10 days)



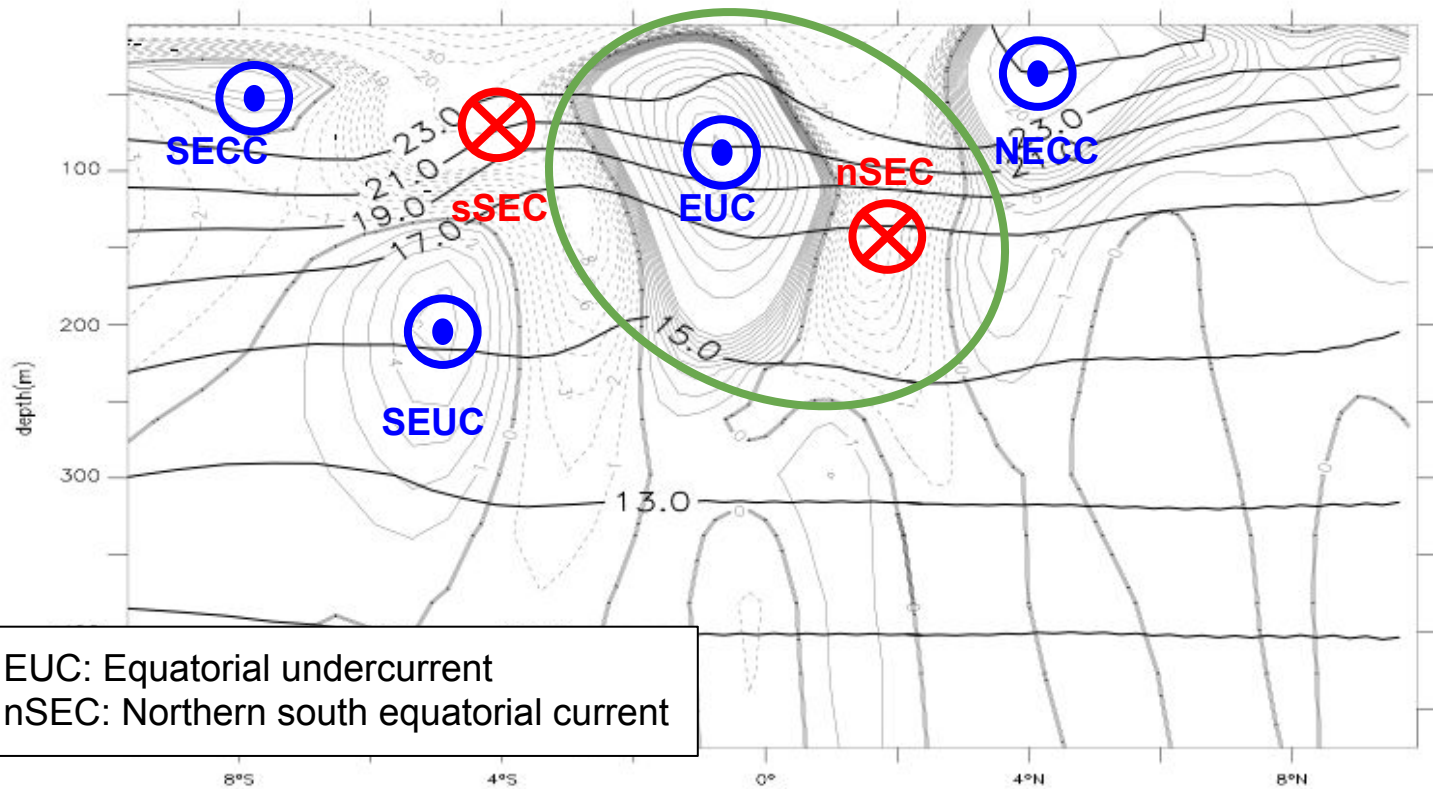
# EXTRA

## Niño 3 and Atlantic 3 indexes (filter = 10 days)

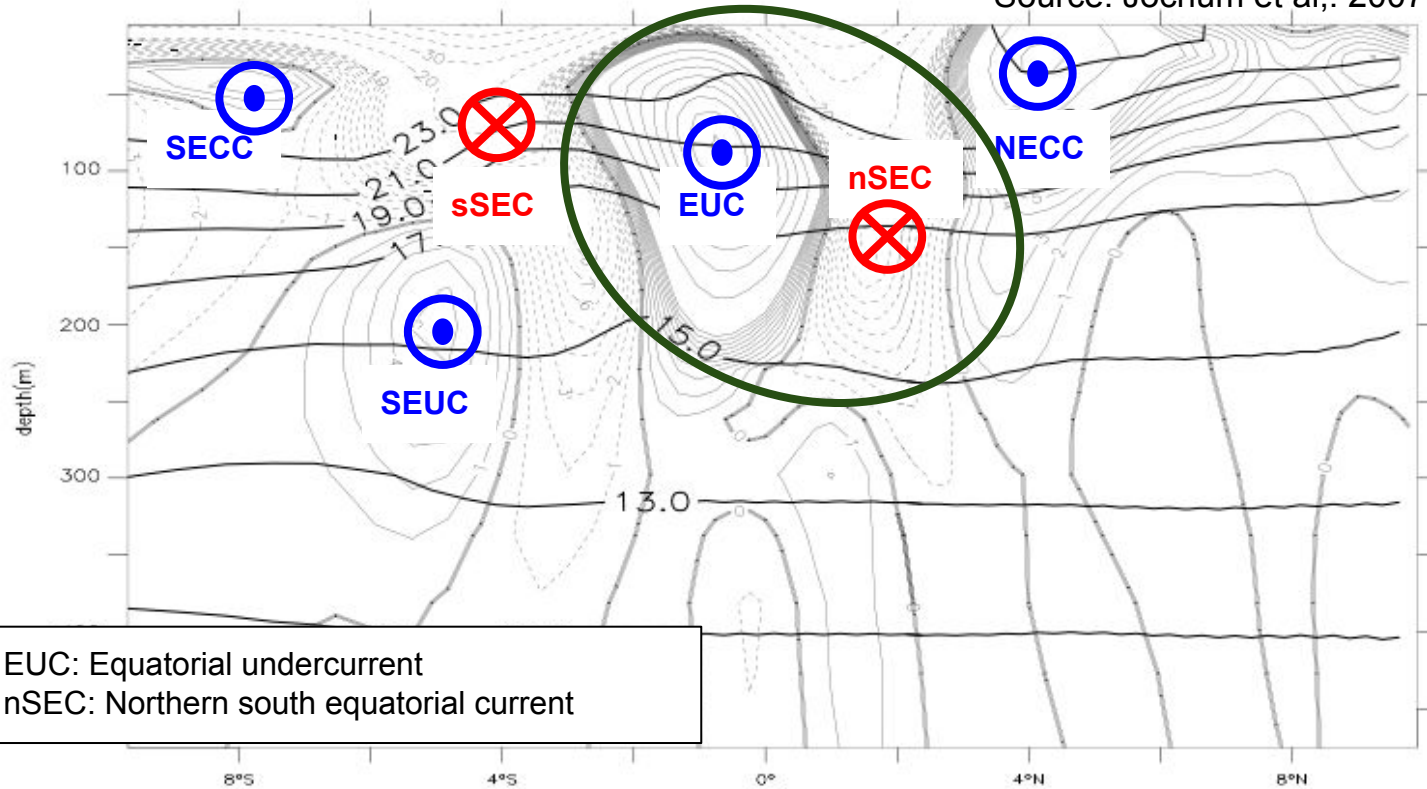


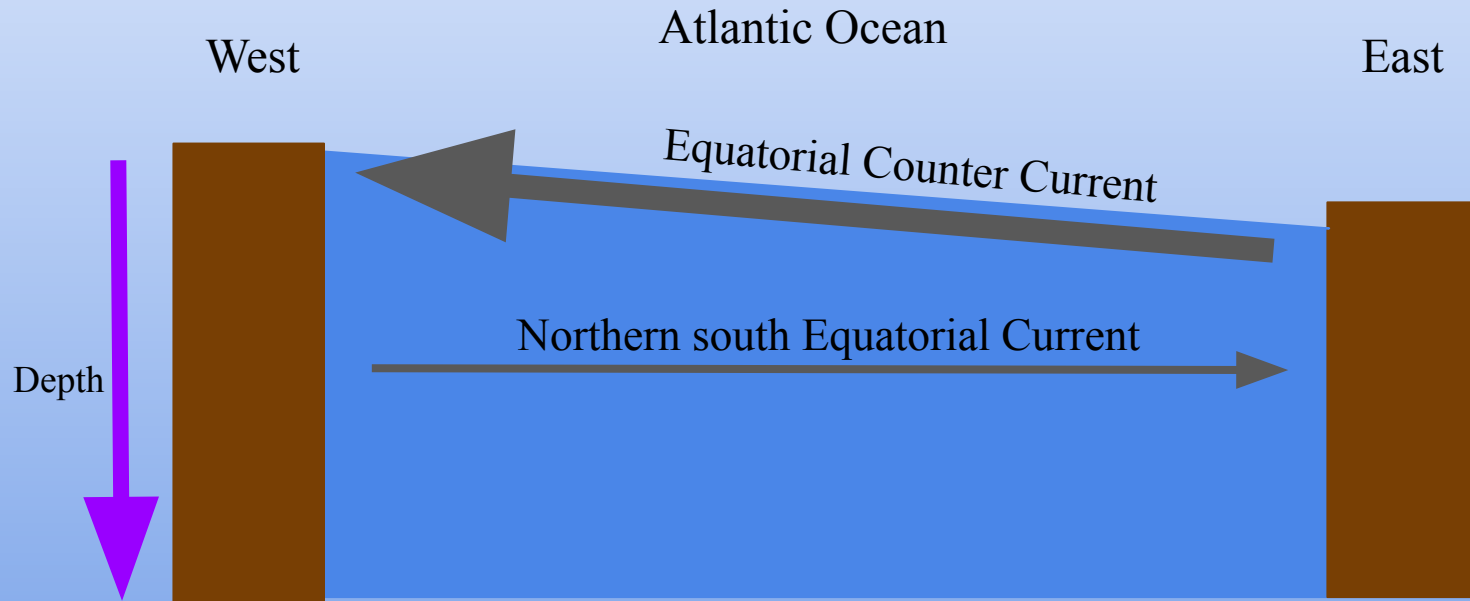






Source: Jochum et al., 2007





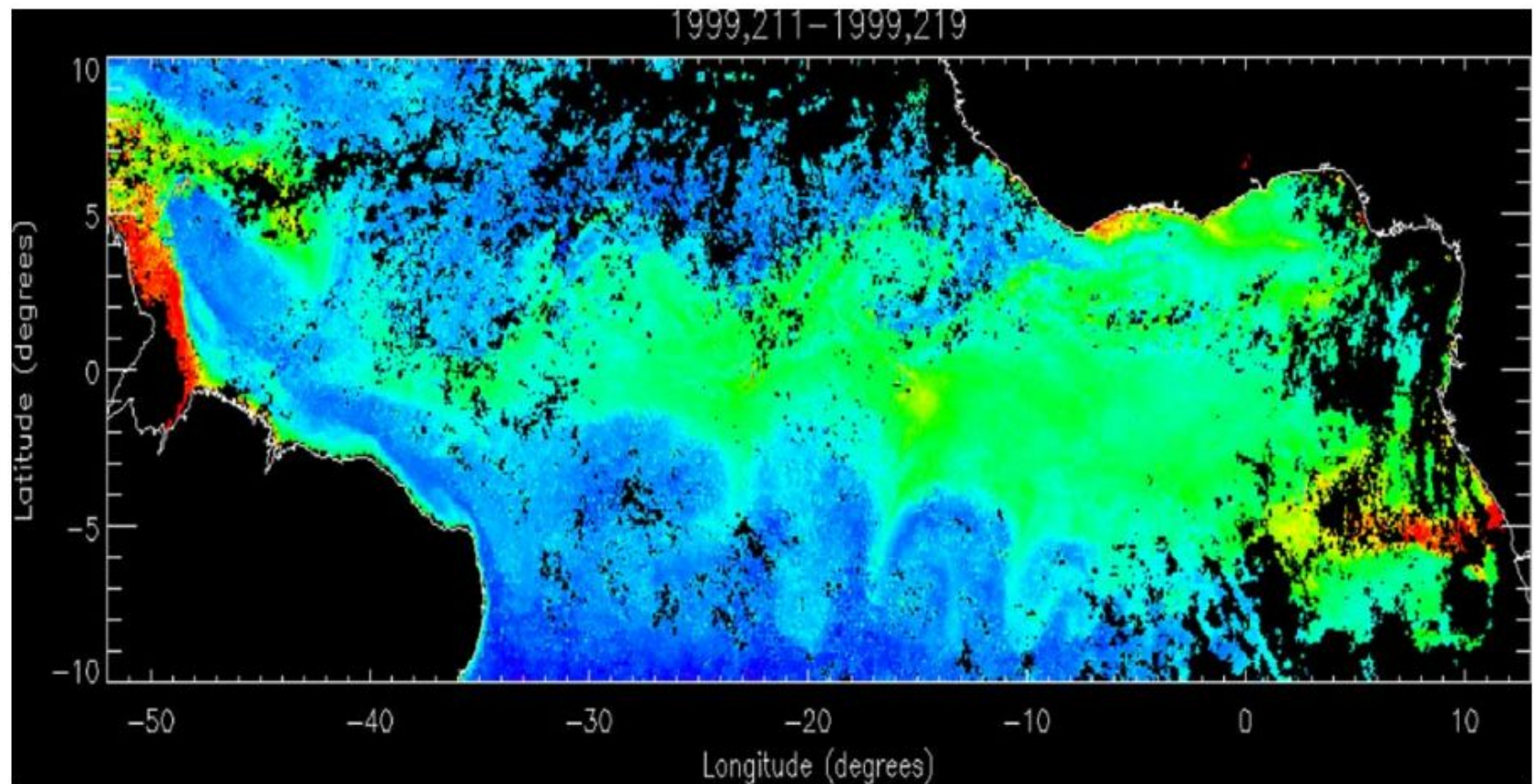


Fig. 1. TIWs as seen by SeaWiFS (courtesy of M. Uz). Note the cusps in ocean color along  $4^{\circ}\text{S}$  and  $4^{\circ}\text{N}$ .