[Speaker Zoom video]

Environmental impacts of ENSO flavours along the California Current System

Yangchuanosaurus_Dandiya_sostenuto

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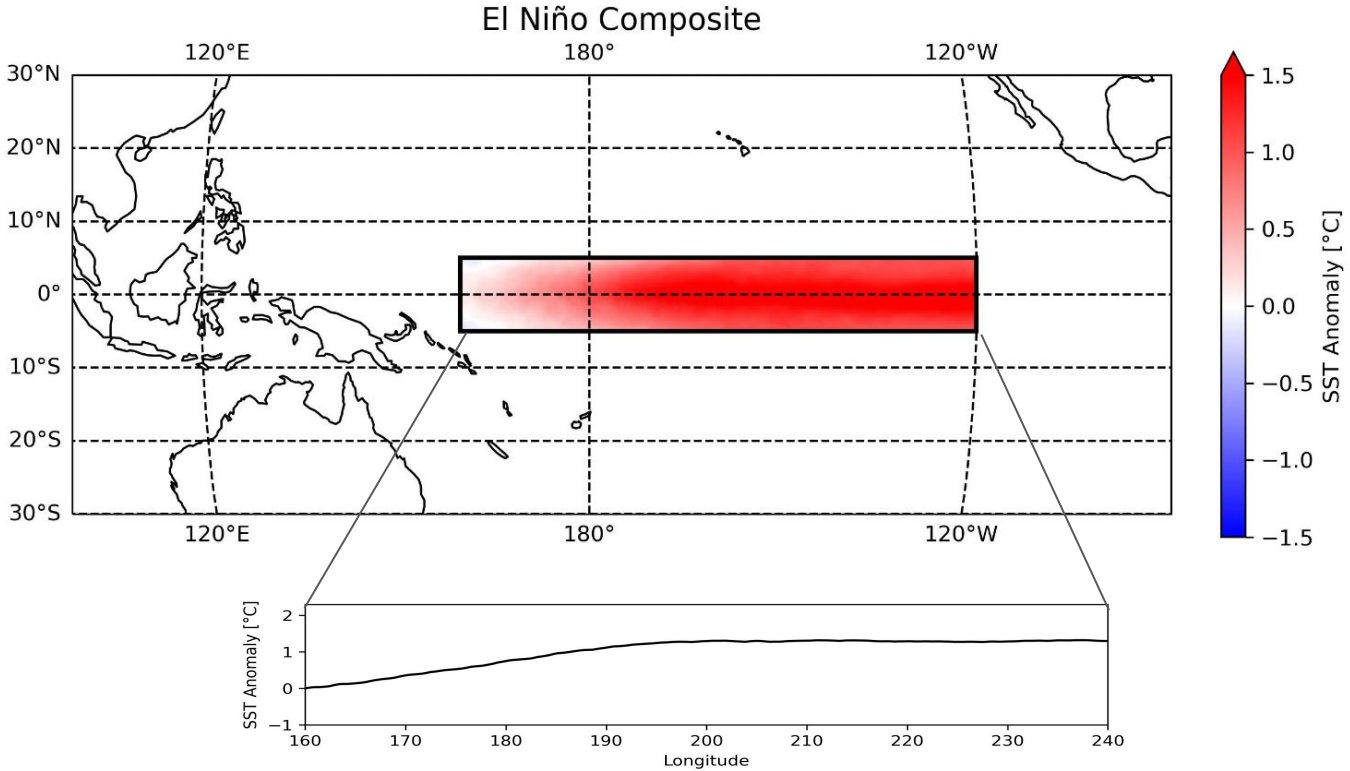
El Niño Southern Oscillation (ENSO)

[Speaker Zoom video]

- ENSO is one of the most important climate phenomena
  - Promote changes to the global atmospheric circulation
  - Global impacts on climate variables such as precipitation

El Niño Southern Oscillation (ENSO)

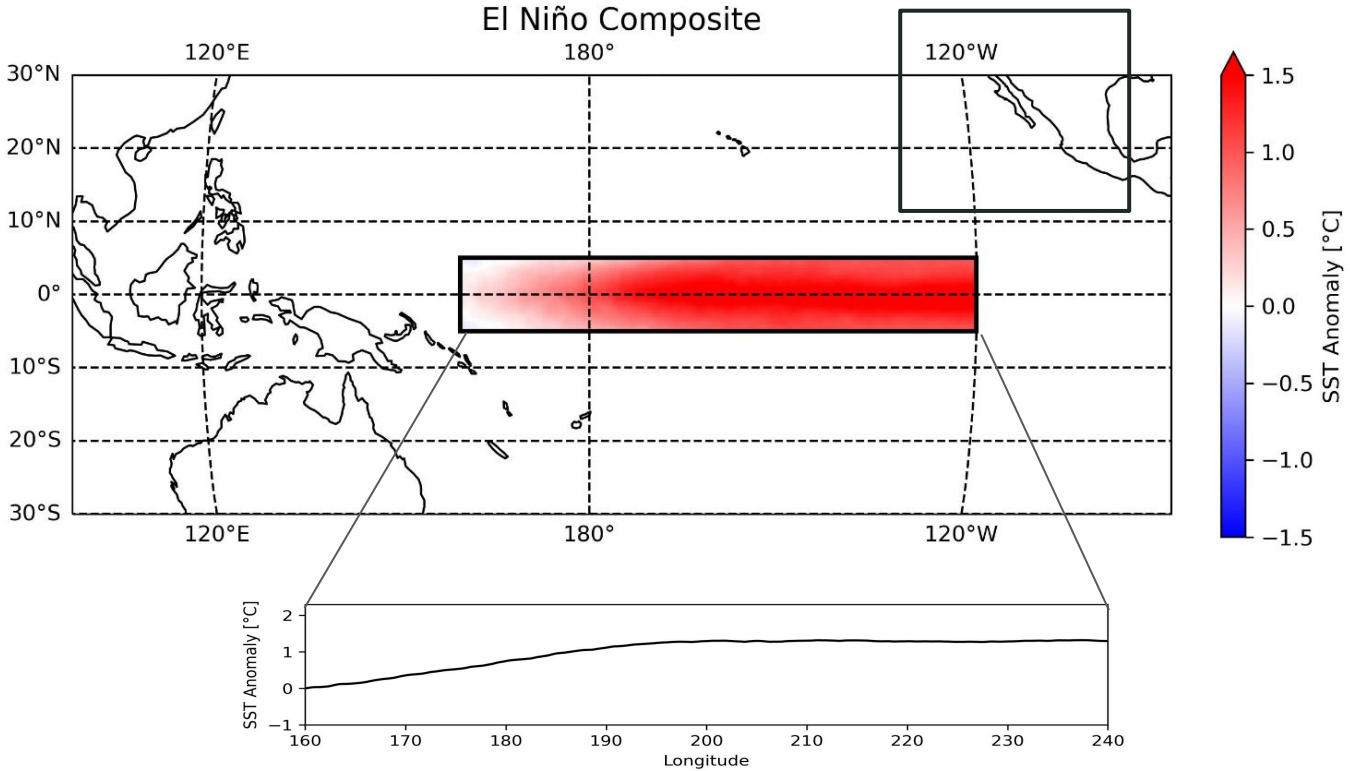


[Speaker Zoom video]

El Niño Years

1982	2004
1986	2006
1987	2009
1991	2014
1994	2015
1997	2023
2002	

El Niño Southern Oscillation (ENSO)



[Speaker Zoom video]

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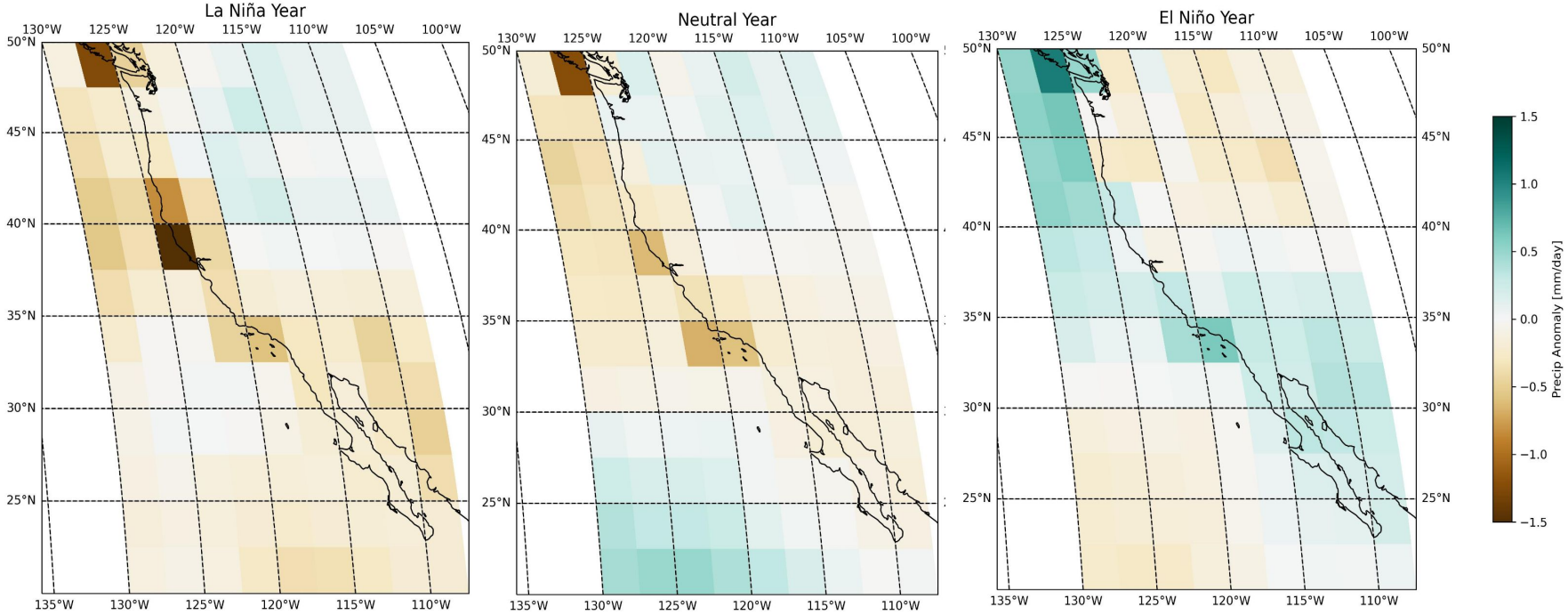
El Niño Effects on precipitation

[Speaker Zoom video]

- In the California Current System…

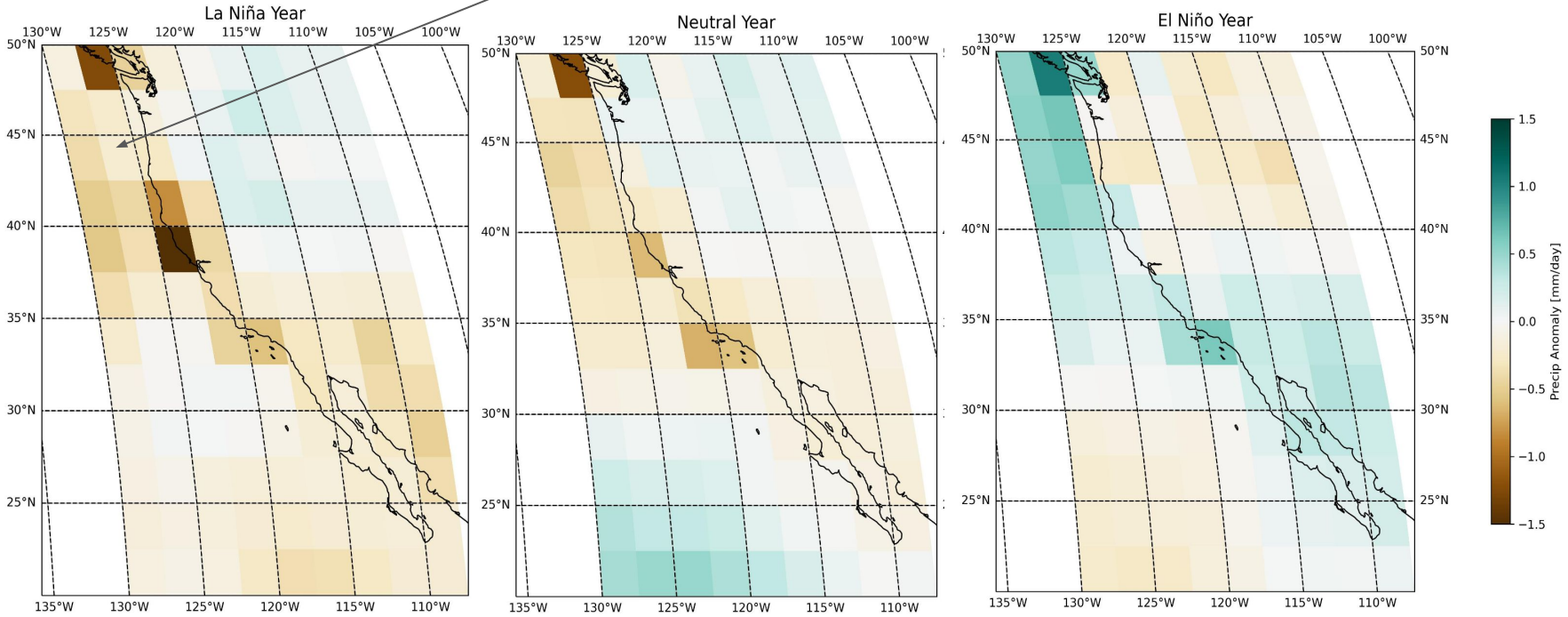


El Niño Effects on precipitation

[Speaker Zoom video]

- In the California Current System…

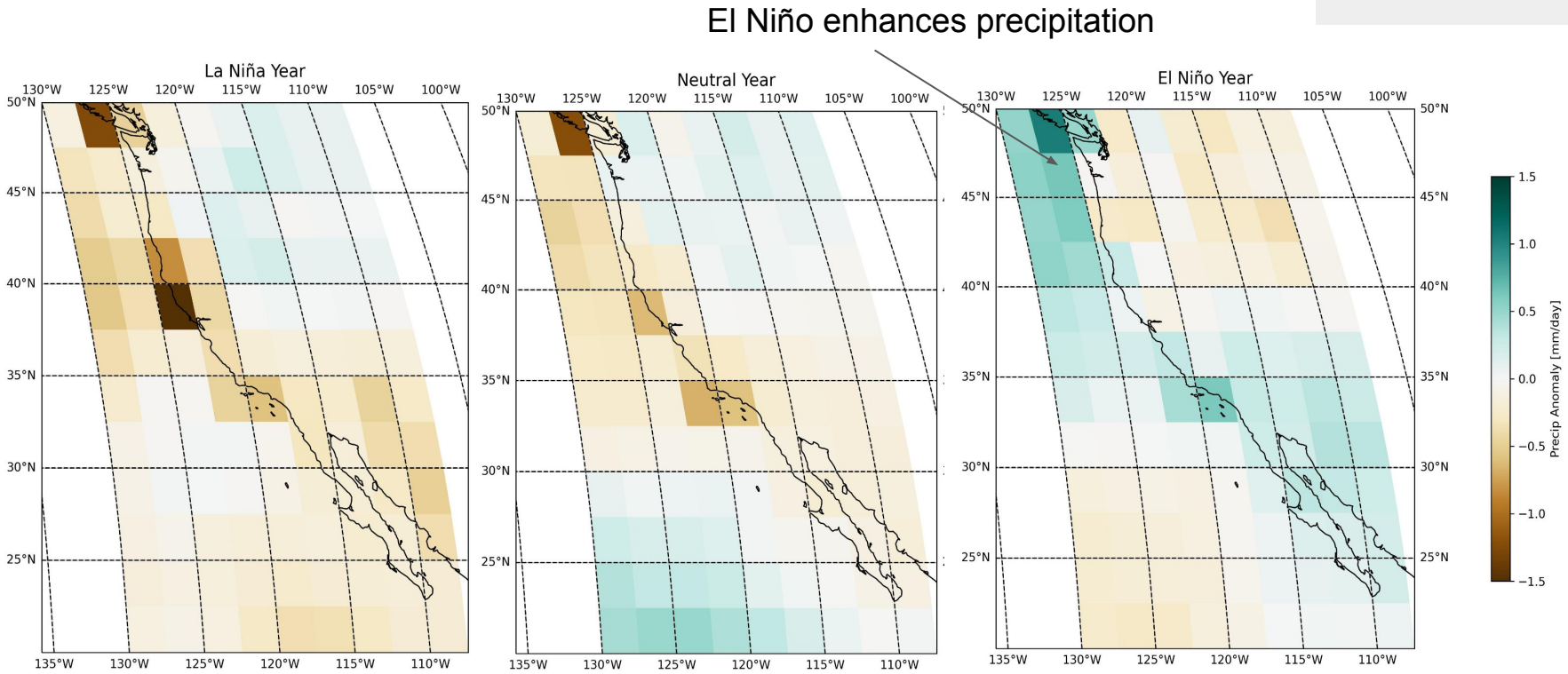
La Niña diminishes precipitation



El Niño Effects on precipitation

[Speaker Zoom video]

- In the California Current System…



This is not the full story though....

[Speaker Zoom video]

- El Niño events can be broadly classified into two different type of events:
  - Central Pacific (CP)
  - Eastern Pacific (EP)
  - Based on the location of the peak anomaly in the sea surface temperature (SST)
  - This is called ENSO diversity

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  - This is called ENSO diversity

Let's now take a look at some of this different types of events…

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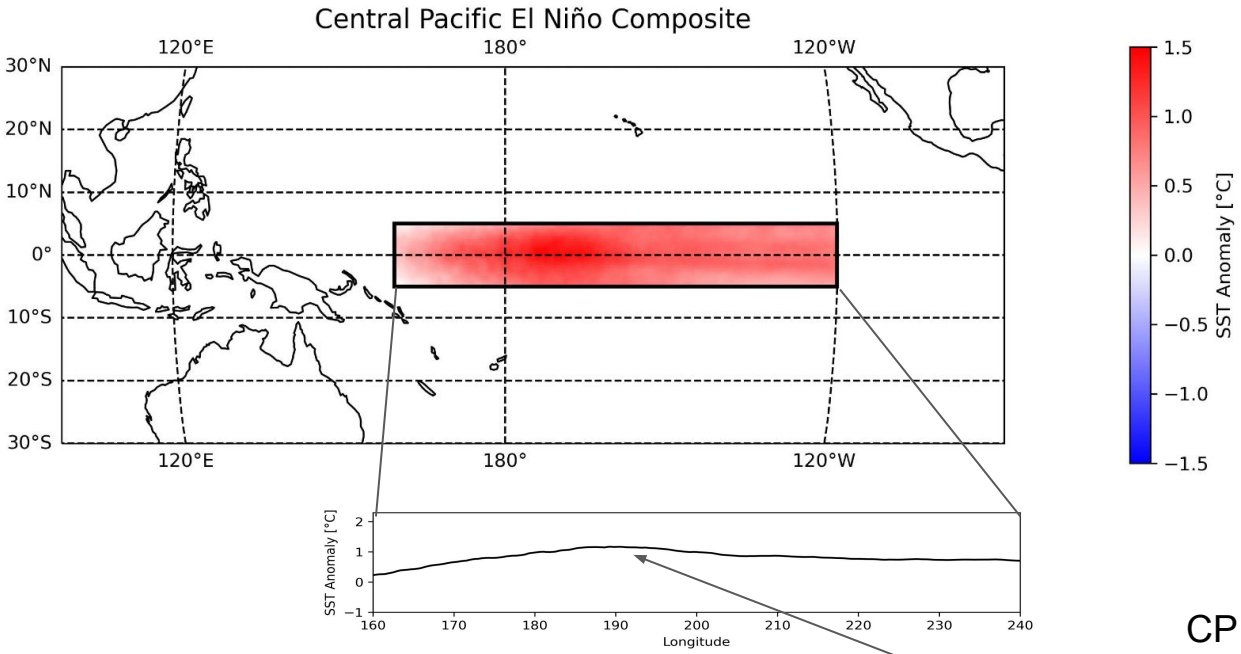
Central Pacific (CP) El Niño

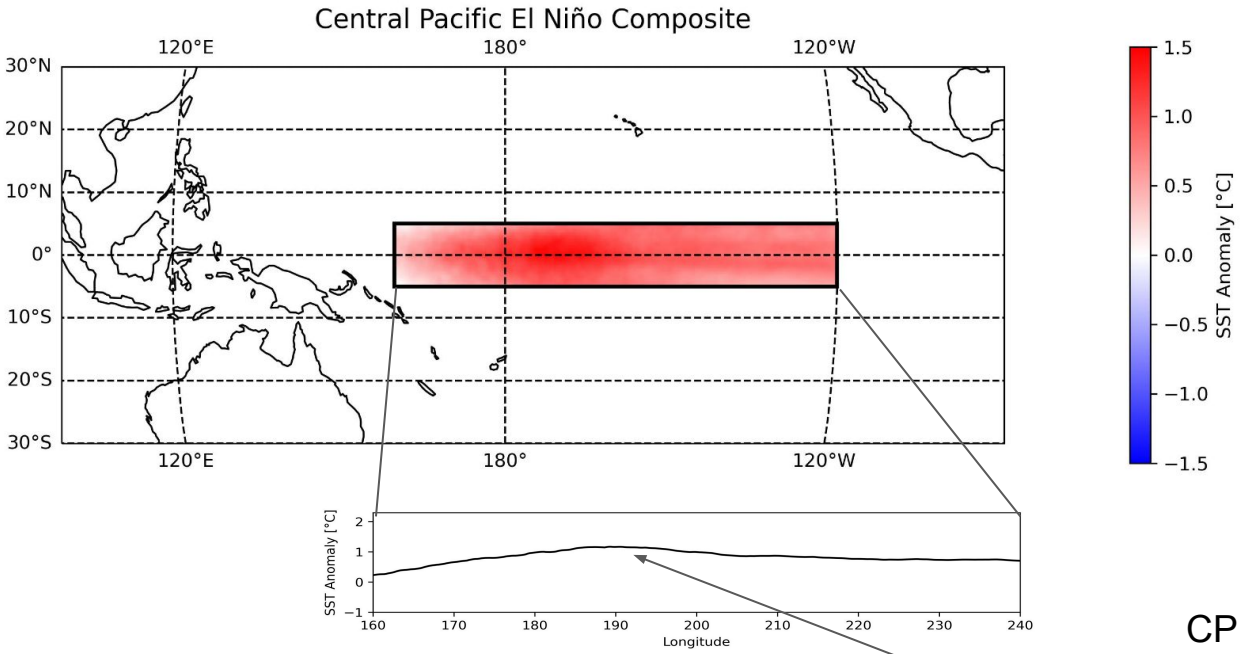
[Speaker Zoom video]



CP El Niño is characterized by a peak anomaly in the central pacific

Central Pacific (CP) El Niño

[Speaker Zoom video]



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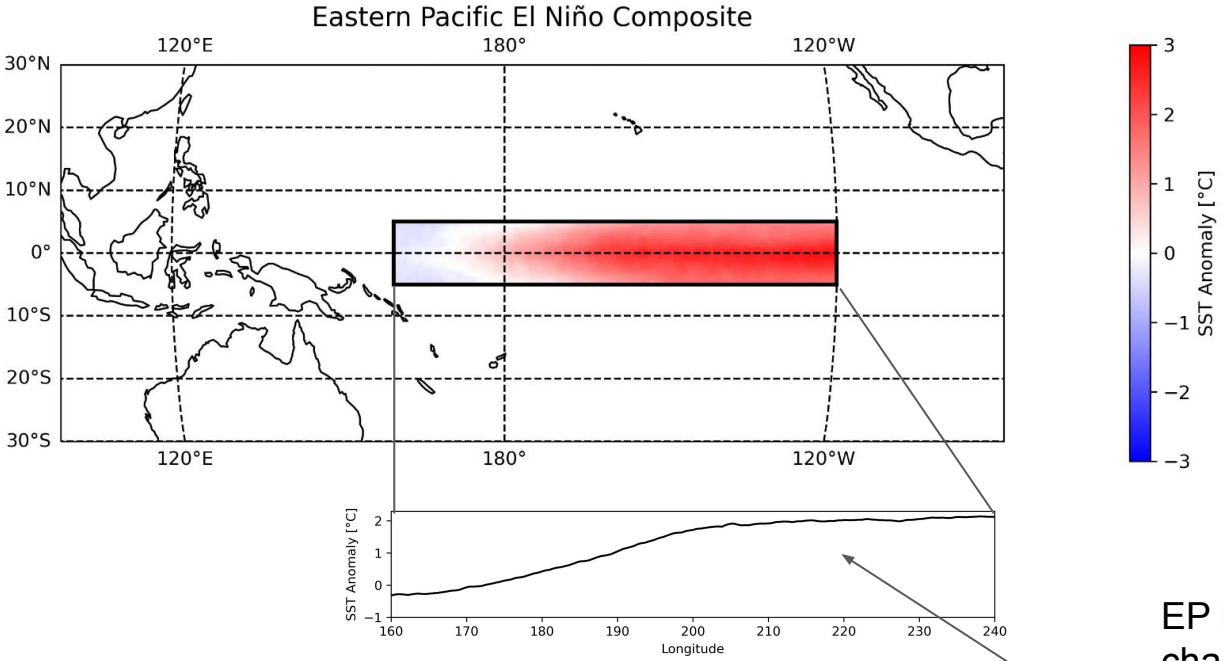
CP El Niño years

1987	1994	2002	2004	2006	2009	2014

Eastern Pacific (EP) El Niño

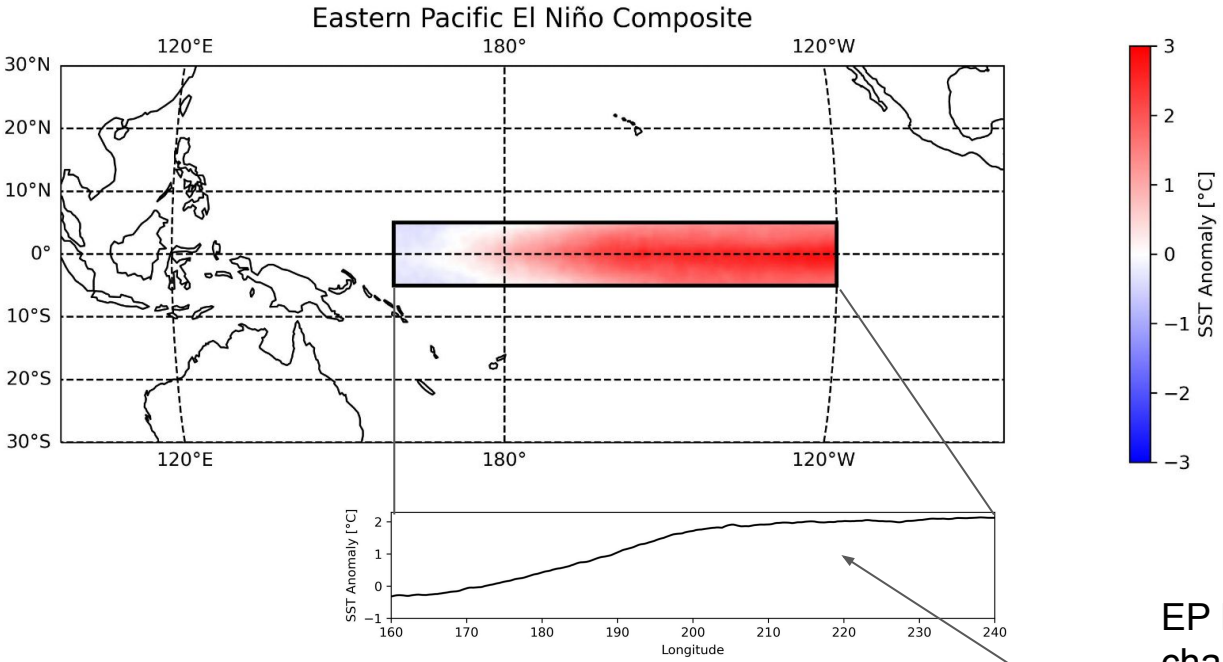
[Speaker Zoom video]



EP El Niño is characterized by a peak anomaly in the eastern pacific

Eastern Pacific (EP) El Niño

[Speaker Zoom video]



EP El Niño is characterized by a peak anomaly in the eastern pacific

EP El Niño years

1982	1986	1991	1997	2015

Aim

[Speaker Zoom video]

- Identify the effect of ENSO diversity over precipitation, SST, and chlorophyll along the California Current System

Methods

- Classify ENSO years as CP or EP according to Takahashi et al., 2011, McKenna & Karamperidou 2023

EP	1982	1986	1991	1997	2015		
CP	1987	1994	2002	2004	2006	2009	2014

Methods

[Speaker Zoom video]

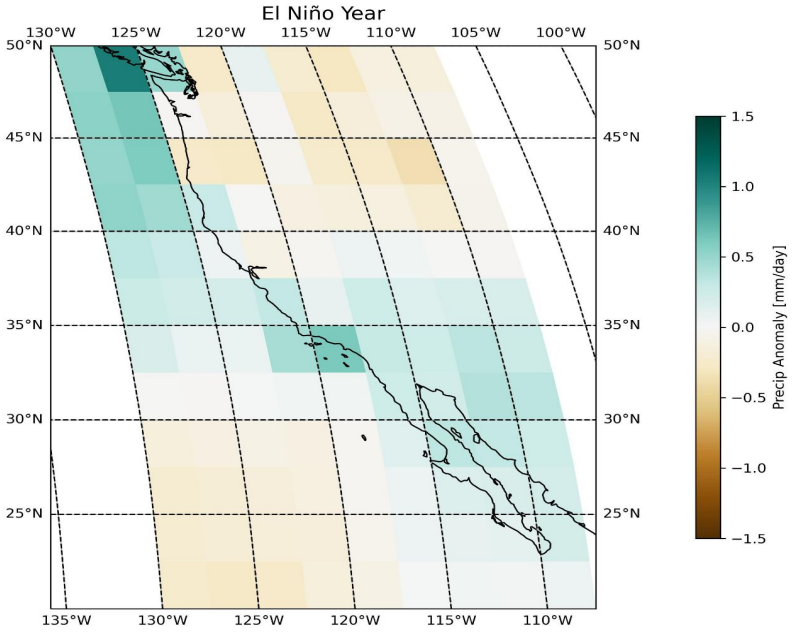
- Build DJF composites of precipitation, SST and chlorophyll anomalies for EP and CP years.
- Anomalies were computed subtracting the climatology.

Datasets:

- Global Precipitation Climatology Project (GPCP), 2.5 degree global grid 1979-present
- ESA CCI Ocean Colour Product (Chl) from the Plymouth Marine Laboratory, 0.04 degree 1997-2018
- OISST SST Climate Data Records from the NOAA CDR program, 0.25 degree global grid, Sep 1981- March 2023
- Met Office Hadley Centre, 5 degree Jan 1850 - Jun 2023

Precipitation anomaly

- Recall previously…

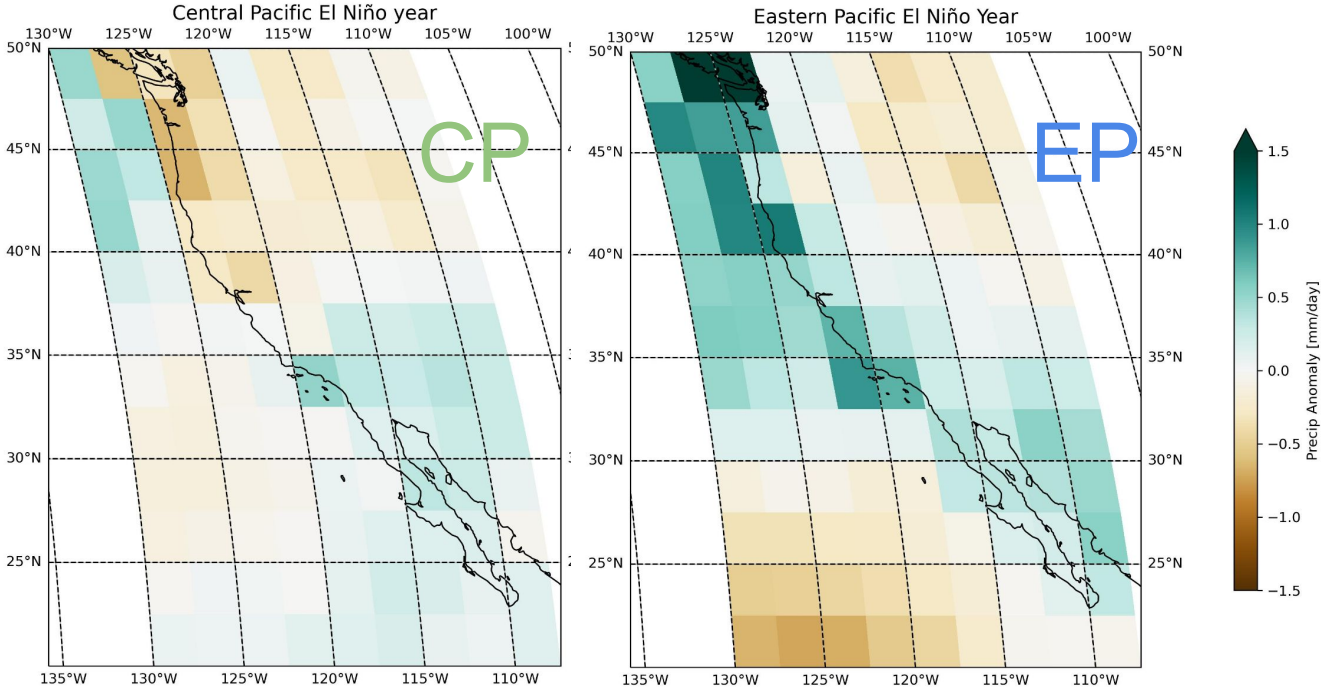


[Speaker Zoom video]

Precipitation anomaly

[Speaker Zoom video]

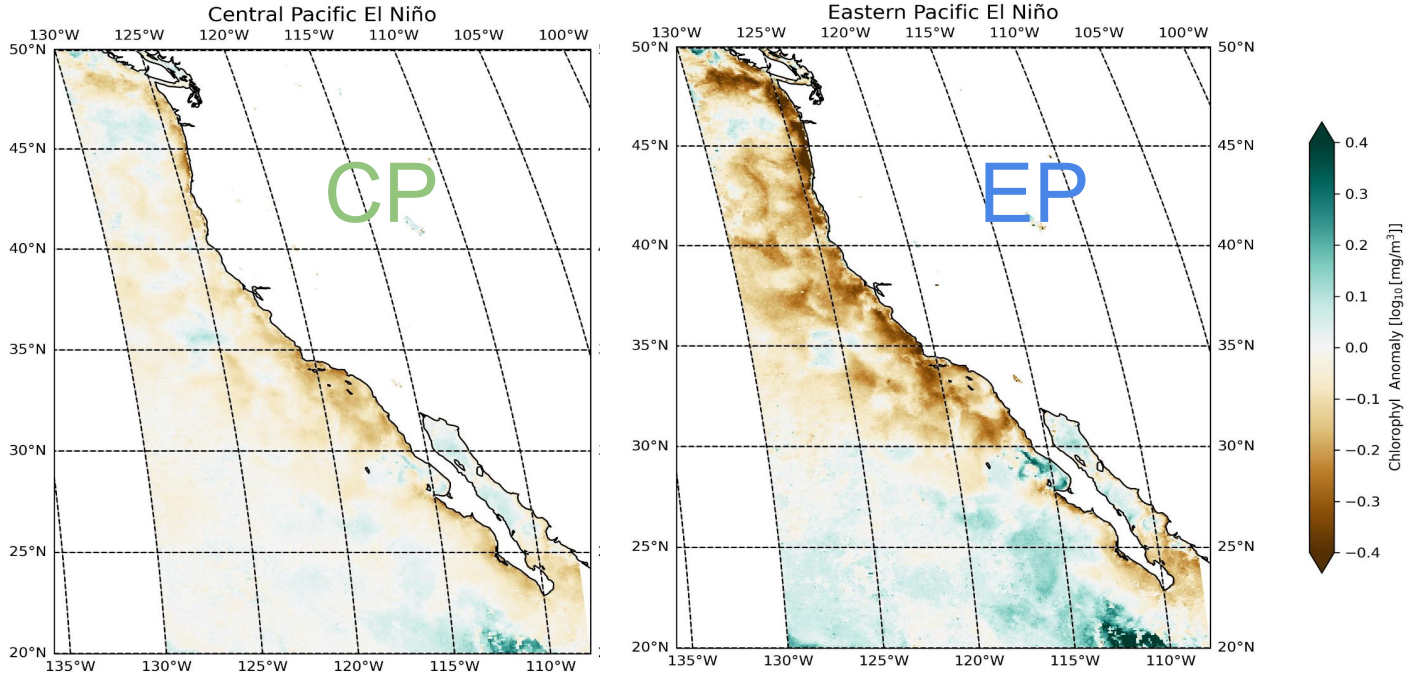
- EP has stronger impact on precipitation in the northwest
- CP decreased precipitation in northwest and increased in southwest



Chlorophyll anomaly

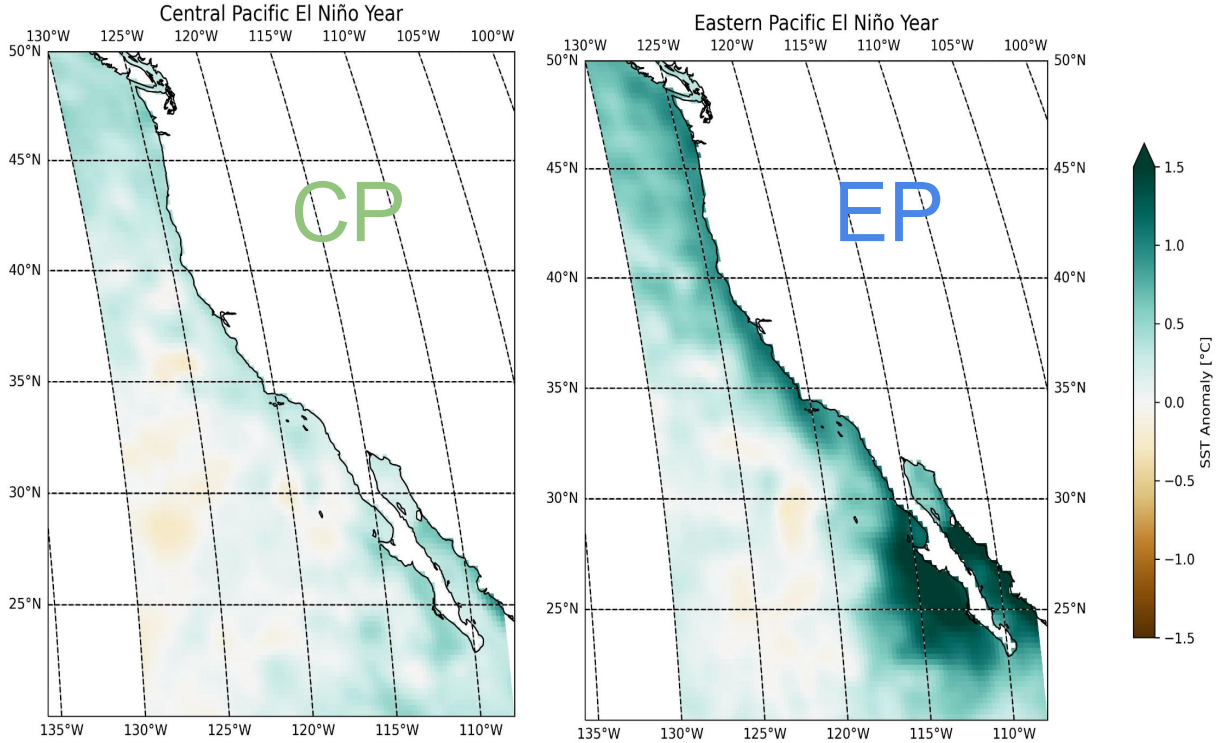
[Speaker Zoom video]

- EP has a stronger impact on Chlorophyll production than CP



SST anomaly

- EP El Niño leads to increases in temperature along CCS
- Largest anomaly in the Baja area



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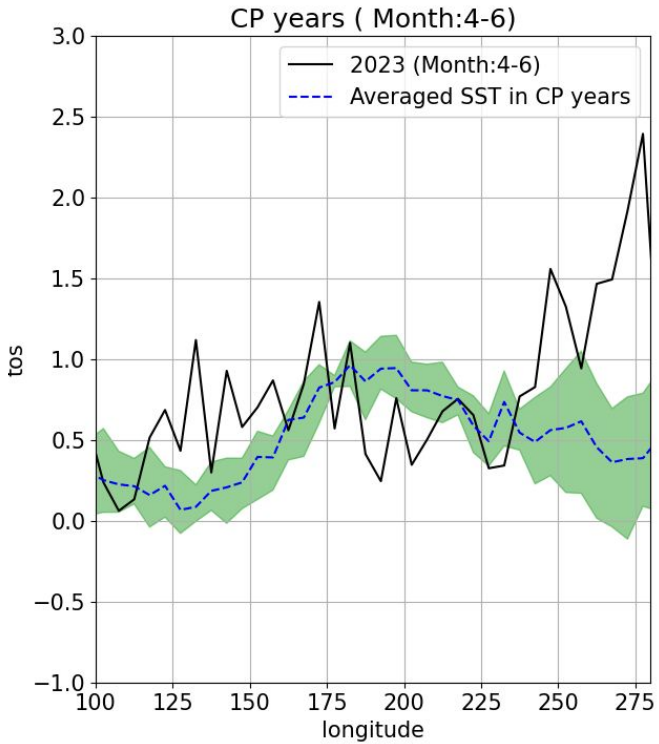
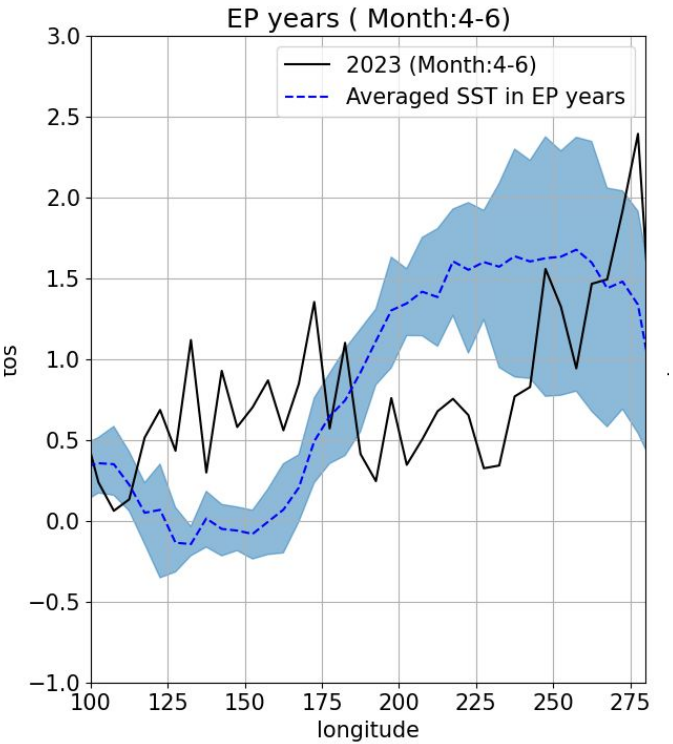
ENSO in 2023?

[Speaker Zoom video]





When comparing the 2023 ENSO average from April to June with two types of ENSO years (EP and CP), it appears that this year is more likely to align with an EP year.

(Thanks to Eligio for the help!)

Summary and implications

[Speaker Zoom video]

	Precipitation	Chlorophyll	SST
Eastern Pacific (EP)	Stronger anomaly	Stronger anomaly	Stronger anomaly
Central Pacific (CP)	Smaller anomaly	Smaller anomaly	Smaller anomaly

- We found that…
  - that the EP has a stronger impact on all variables examined
- Our analysis shows that 2023 ENSO shows signs of **Eastern Pacific (EP) pattern.**
  - Increased precipitation and warmer SST over the California Current System throughout the year.

References

[Speaker Zoom video]

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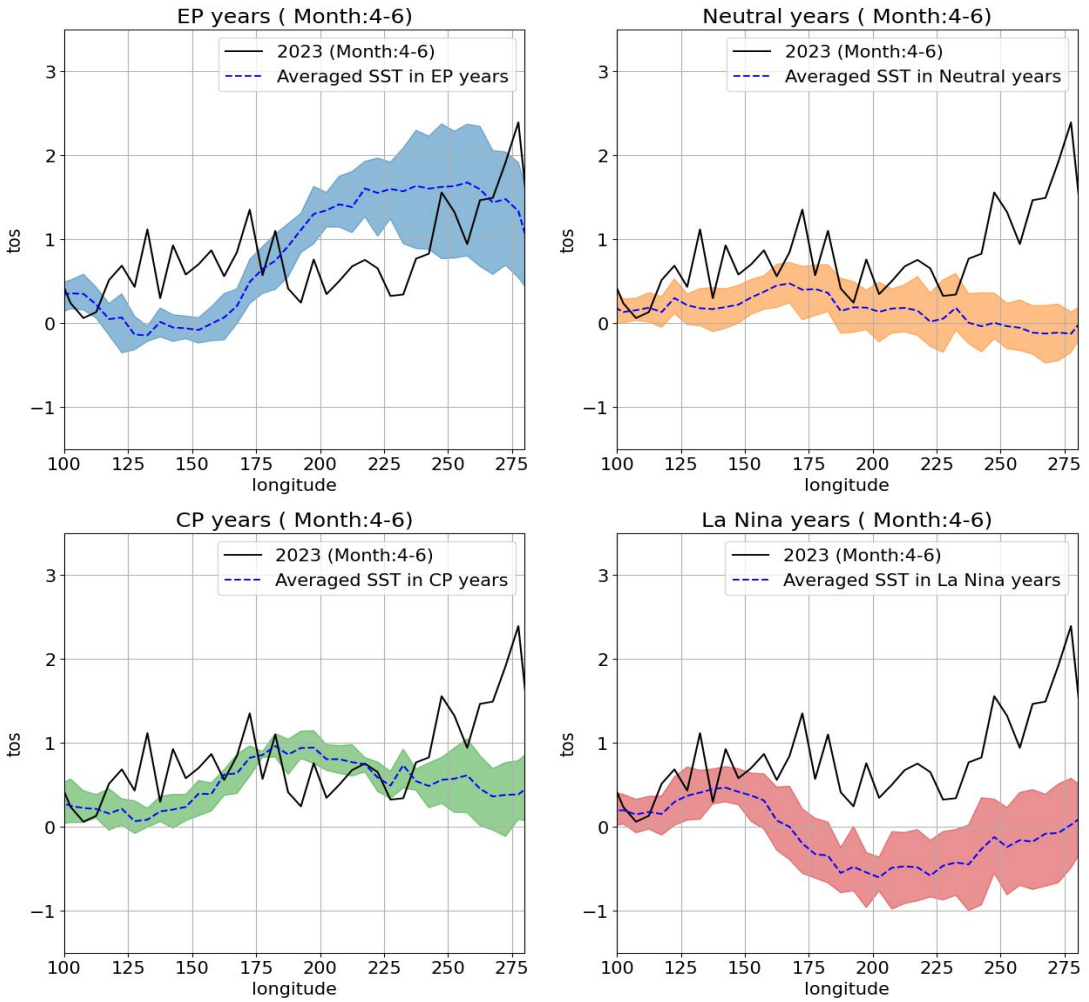

[Speaker Zoom video]

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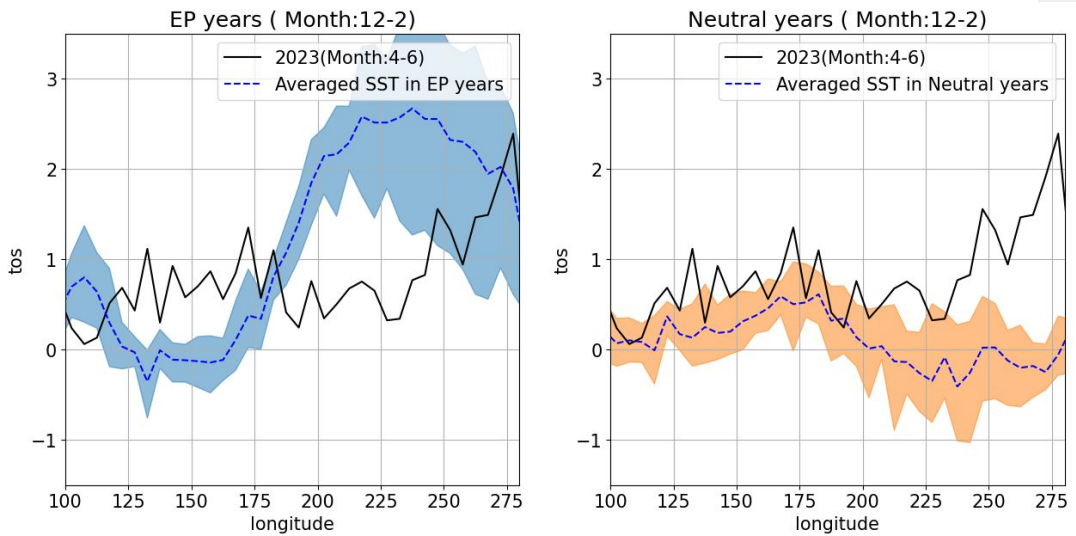

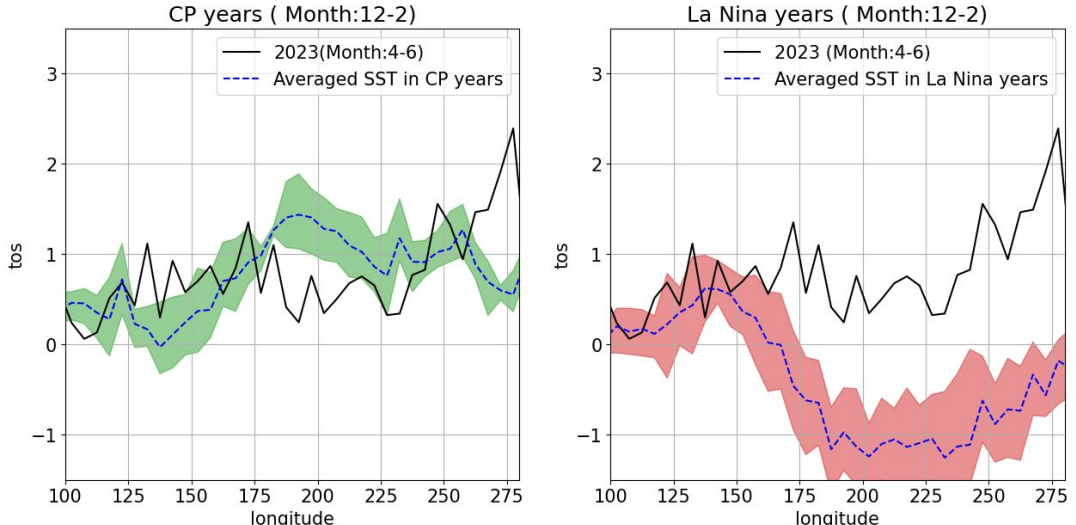

[Speaker Zoom video]