

# ATOC4500

# Data Science Laboratory

# Application Lab 2

Instructor:

Prof. Jennifer Kay

[Jennifer.E.Kay@colorado.edu](mailto:Jennifer.E.Kay@colorado.edu)

Spring 2022  
T/Th 11:30 am-12:45 pm

# Plan this week....

- 1) Application Lab #2
- 2) Start Homework #3

*You should finish Application Lab #2 and have started Homework #3 by the end of class on Thursday.*

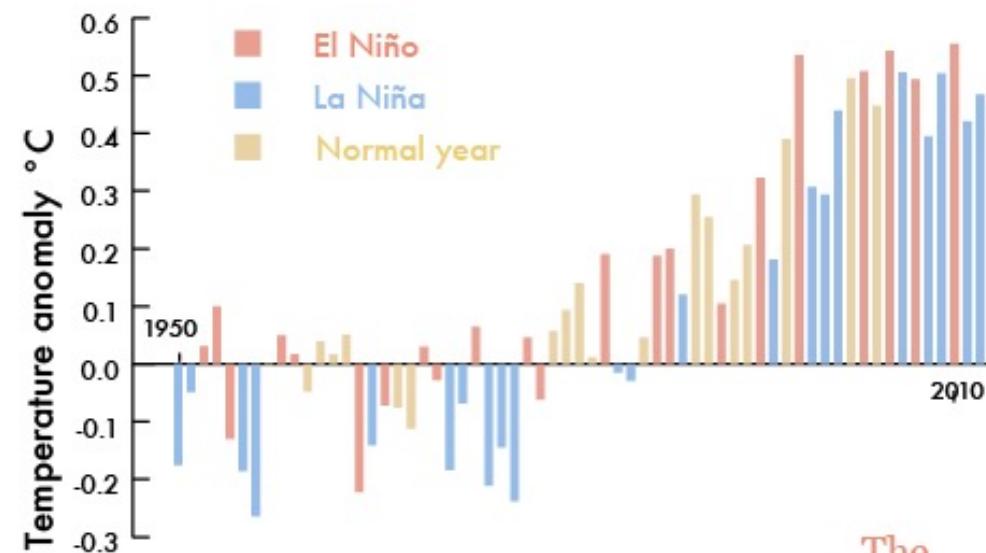
*Let Prof. Kay and Giovanni know how it is going...Ask lots of questions! Coding, science, etc. - We are here to help and will be roaming around...*

# Interactive: How much does El Niño affect global temperature?

## Hottest years

During an El Niño, the ocean releases heat into the atmosphere. Added to greenhouse gases, that's why El Niño years are usually among the hottest on record.

In periods with more El Niños, atmospheric warming tends to happen faster than periods with more La Niñas.



The  
Carbon  
Brief

<https://www.carbonbrief.org/interactive-much-el-nino-affect-global-temperature>

El Niño is a naturally-occurring phenomenon affecting weather and climate worldwide.

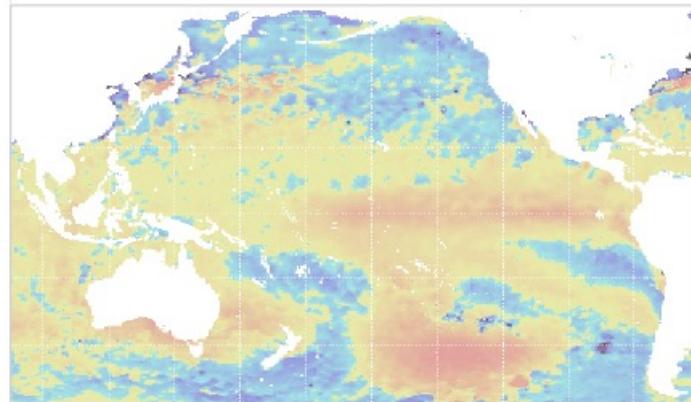
## A normal year

Normally, trade winds blow strongly from east to west in the tropical Pacific. This causes cool, nutrient-rich water to upwell from the deeper ocean along the Peruvian coast, giving a boost to local fisheries.

Rainfall is heaviest around Australia and Indonesia, while South America stays relatively dry.



Temperature anomaly °C



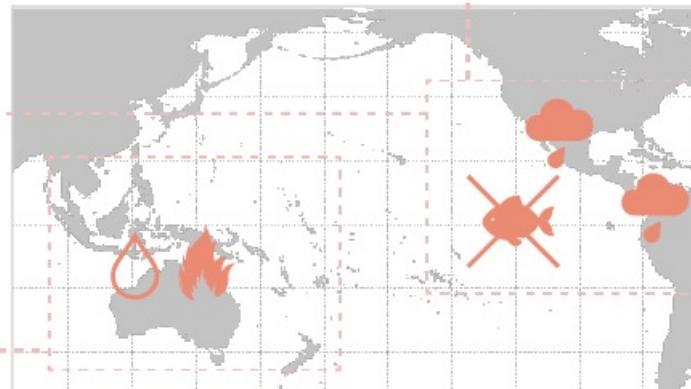
## El Niño

During an El Niño, the trade winds relax, cutting off the supply of cool water to the sea surface.

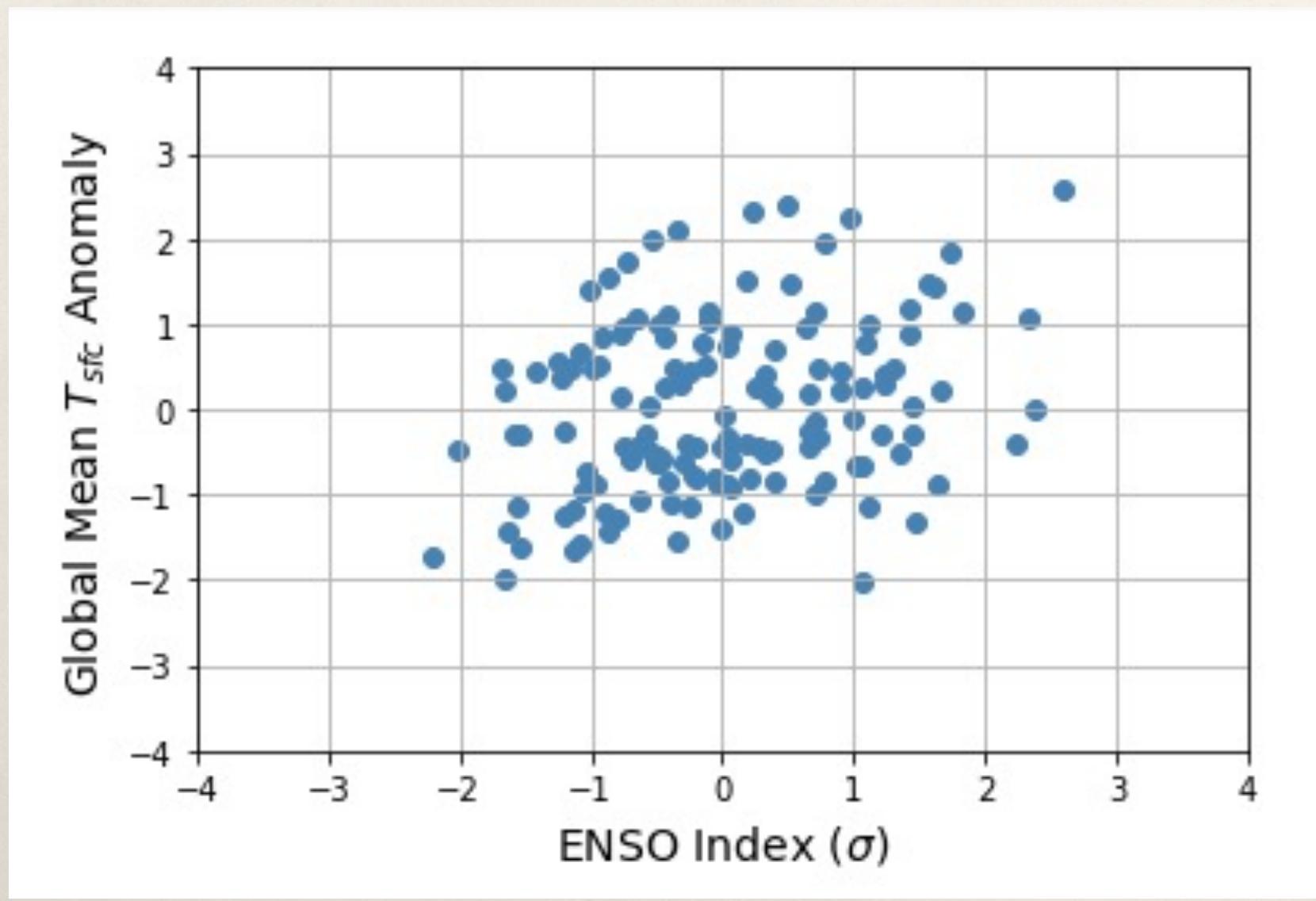
The result is a pool of unusually warm and nutrient poor water in the East Pacific, spelling bad news for fisheries.

The warmer-than-usual water shifts rainfall patterns, bringing rain and flooding to the Southern US and Peru.

Australia and Indonesia are drier than usual, raising the risk of drought and wildfire.



**Application Lab #2 – Linear Regression:** Can Pacific Ocean sea surface temperatures (i.e., ENSO) anomalies ( $X$ ) be used to predict global mean surface temperature anomalies ( $Y$ )?



## Looking forward:

- Homework #3 is due next Thursday March 3.
- Next week we'll start machine learning - Unit #3.
- Contact Prof. Kay or Giovanni if you have any questions or concerns. Office hours are on this week:
  - Giovanni Monday 3-4 pm  
<https://cuboulder.zoom.us/j/96536534549> Passcode: letscode!
  - Prof. Kay Wednesday 4-6 pm <https://cuboulder.zoom.us/j/99769486583> Passcode: help

# **Assigned Groups - ATOC4500:**

## ***Application Lab #2, Homework #3***

**Group #1: Laura, Jackie, Gillian, Erica**

**Group #2: Sean, Sam, Sydney, Alyssa**

**Group #3: Daphne, Devon, Fergus**

**Group #4: Rachel, Victoria, Ania**

**Group #5: Ben, Jacob, Nate**