El Nino Diversity

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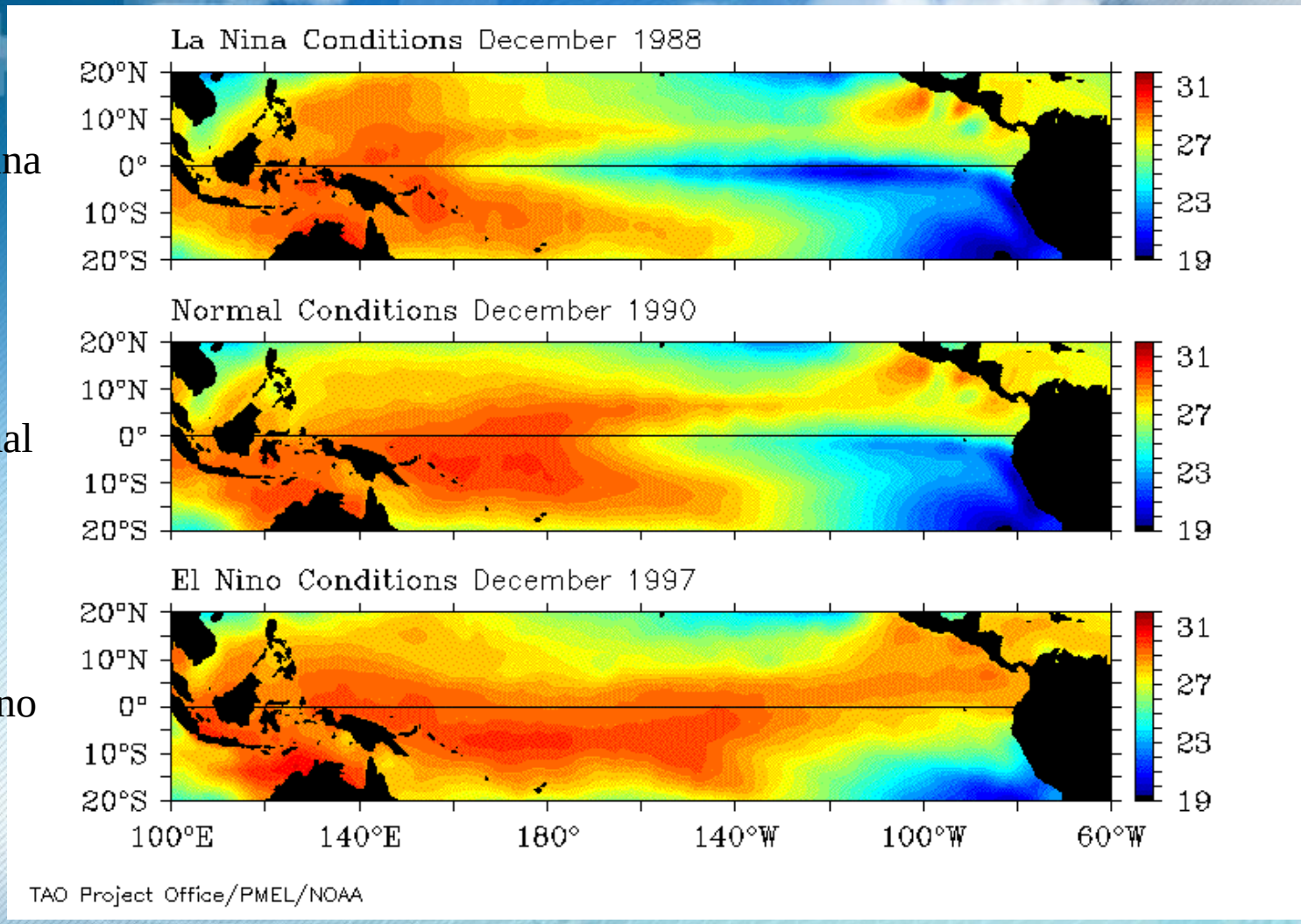
Sea Surface Temperature

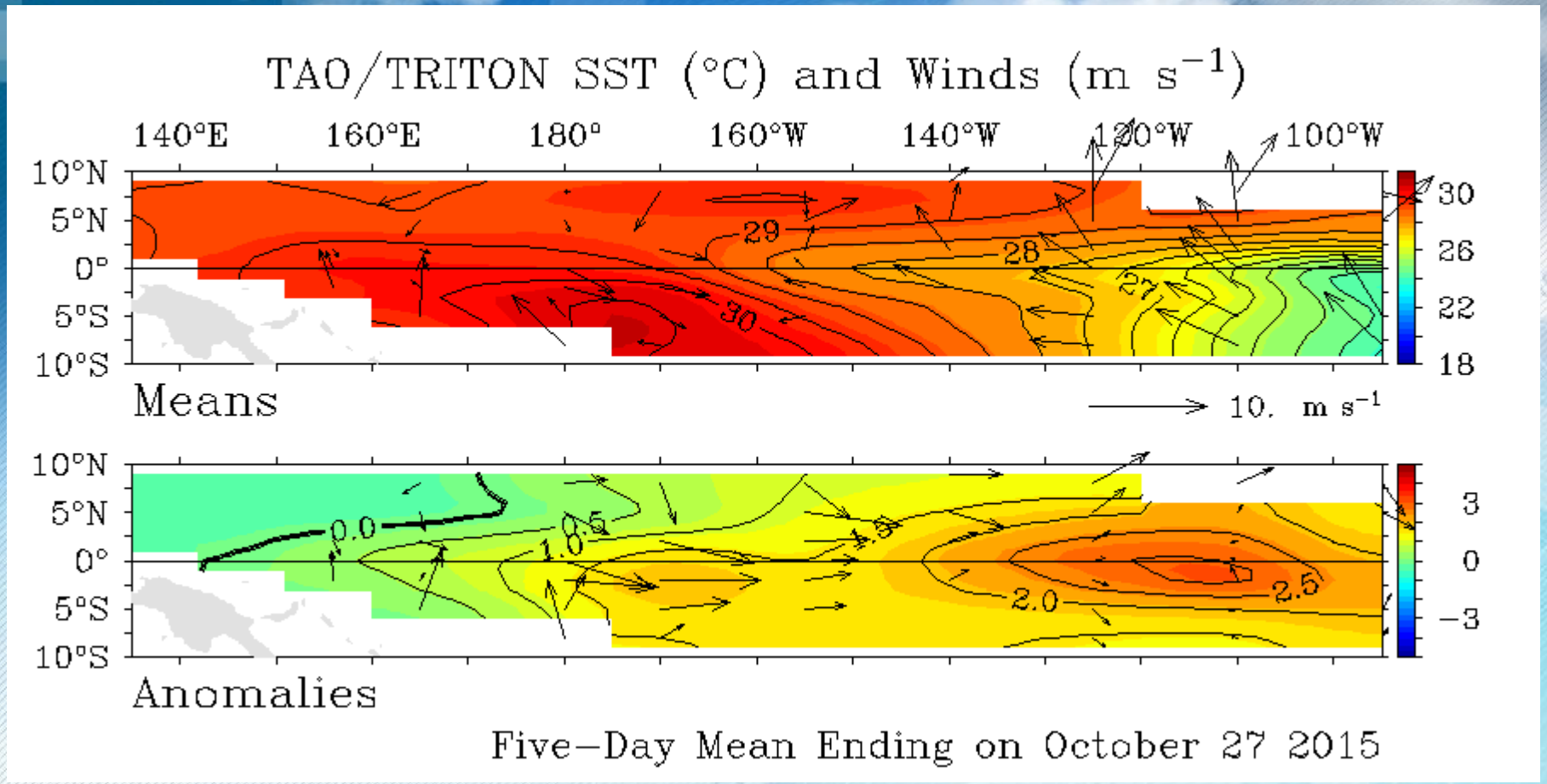
La Nina

Normal

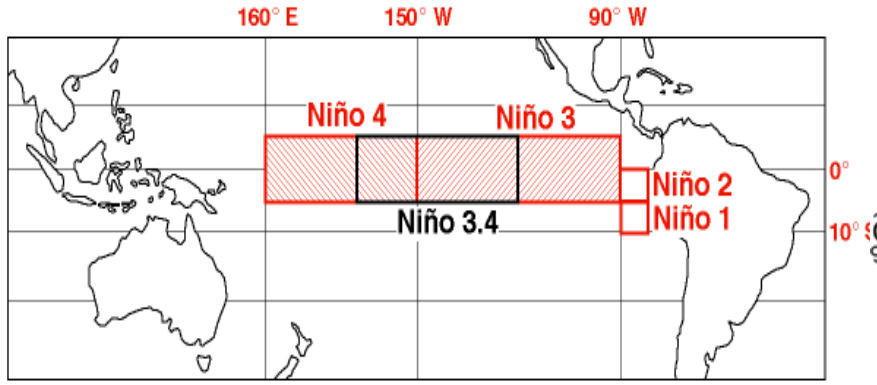
El Nino

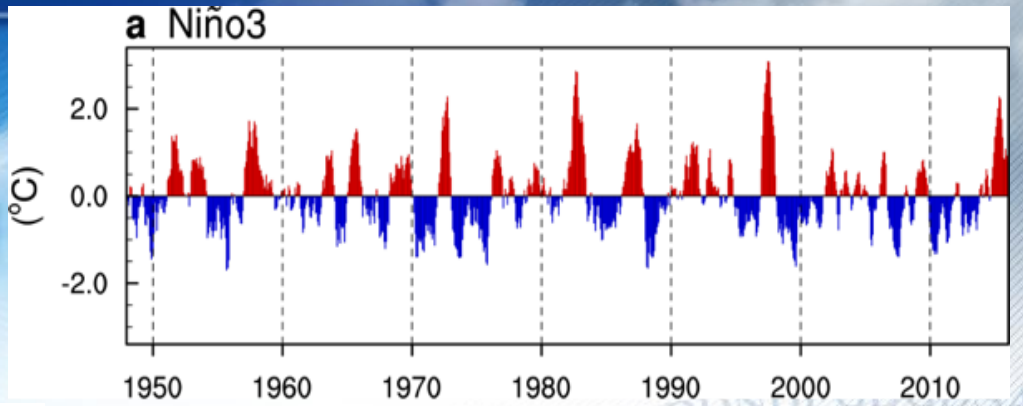


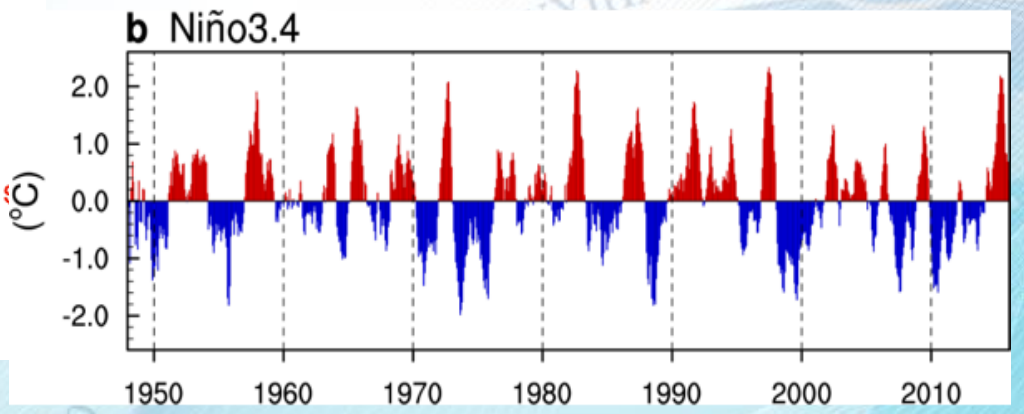
2015/16 El Nino

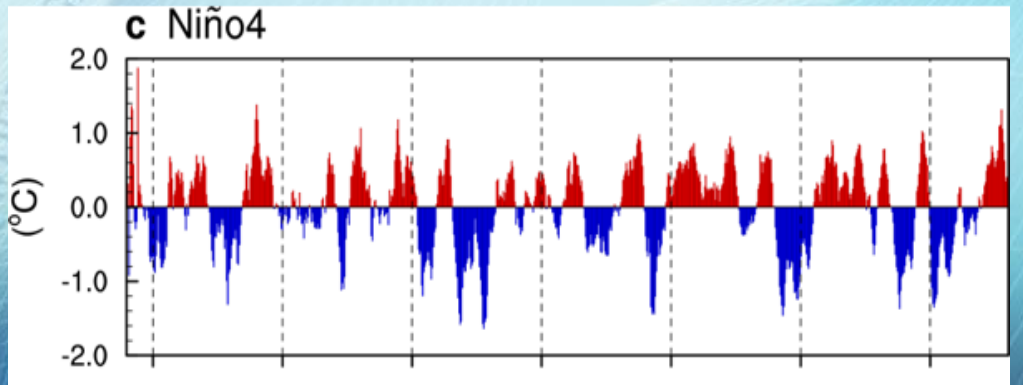


El Nino Indices

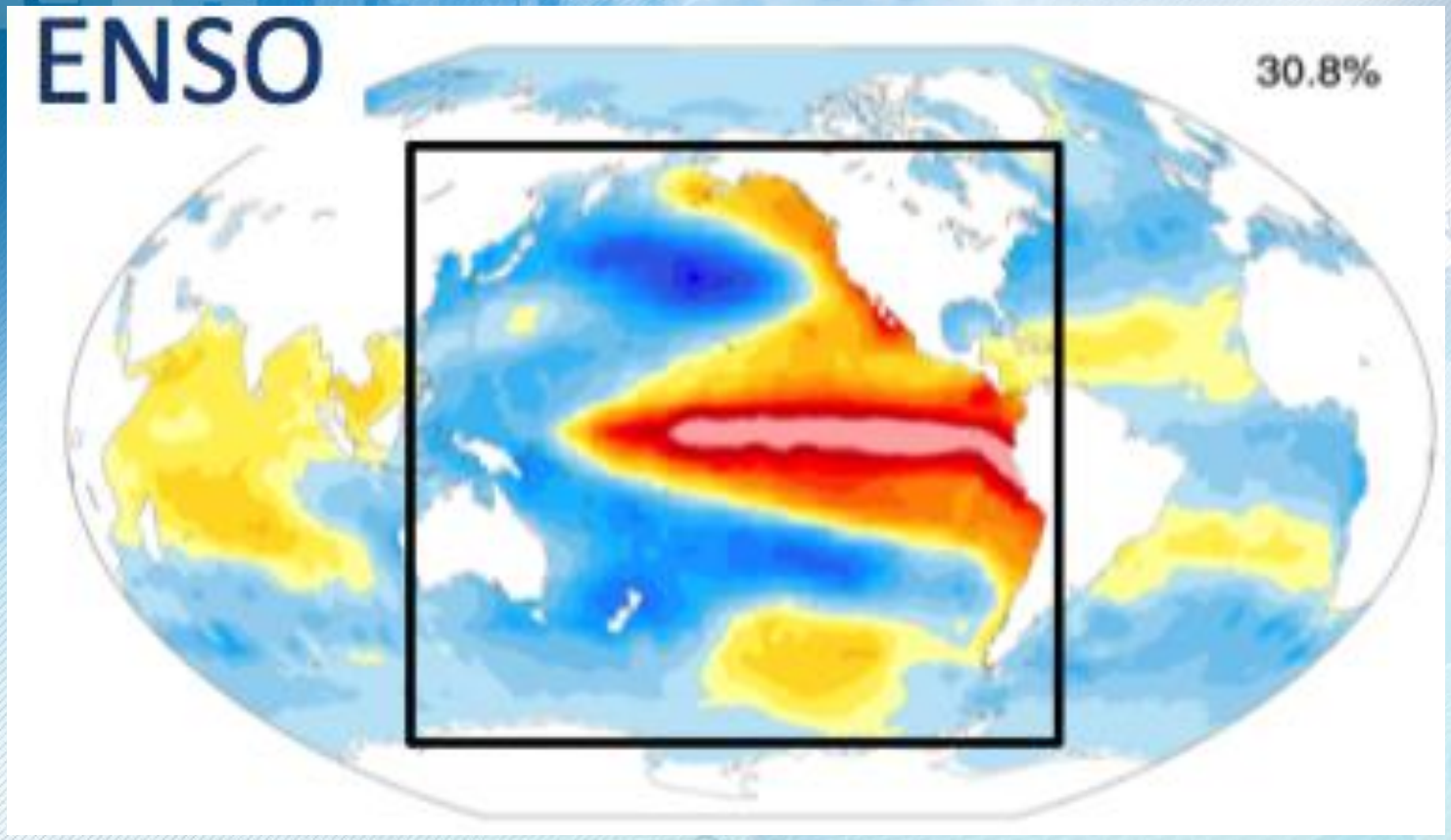




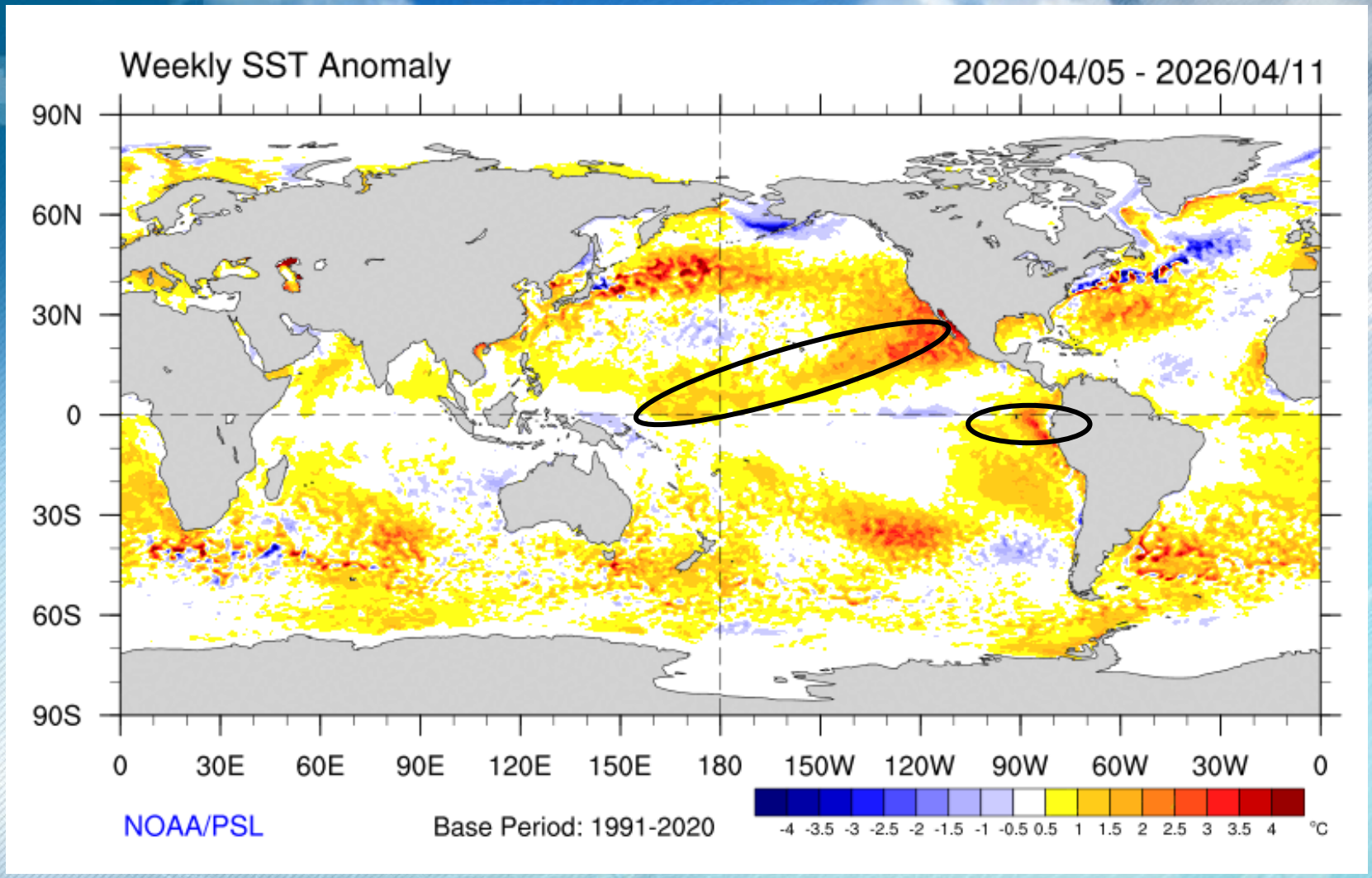




Global SST associated with ENSO



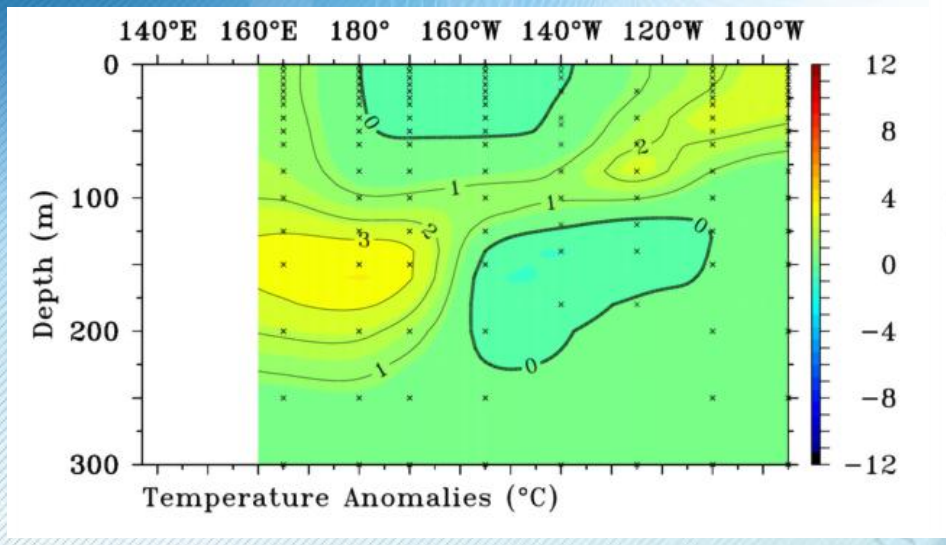
2026 El Nino is coming?



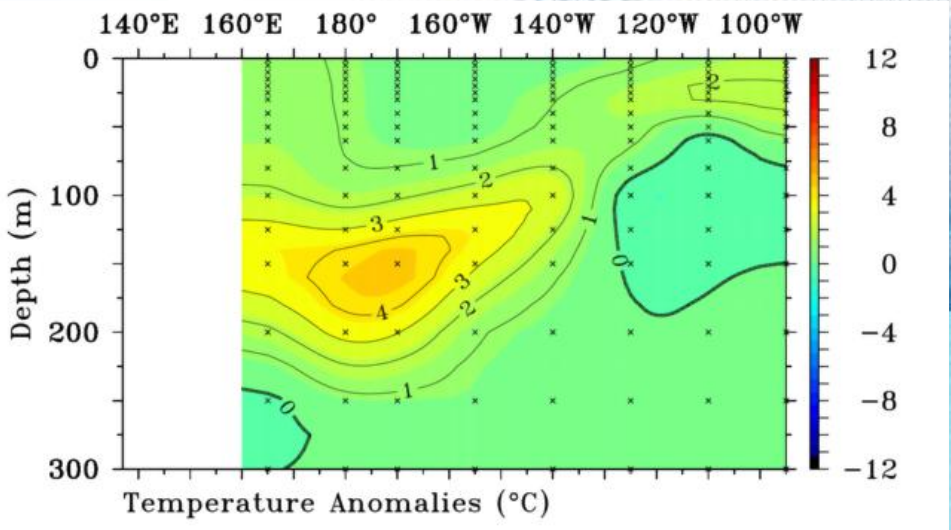
2026 El Nino is coming?

Equatorial Subsurface Temperature

MAR. 2026



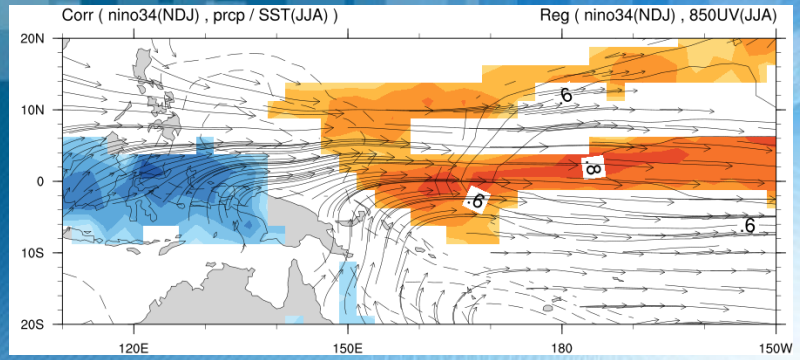
APR. 2026



Impacts of El Nino On Pacific Islands

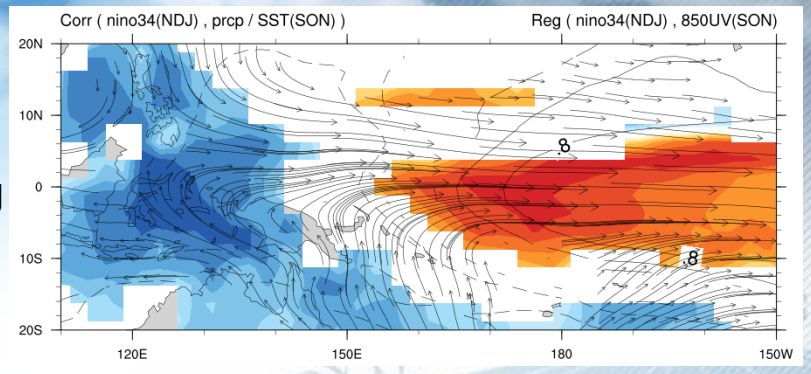
Circulation, SST, Precipitation

JJA(0)

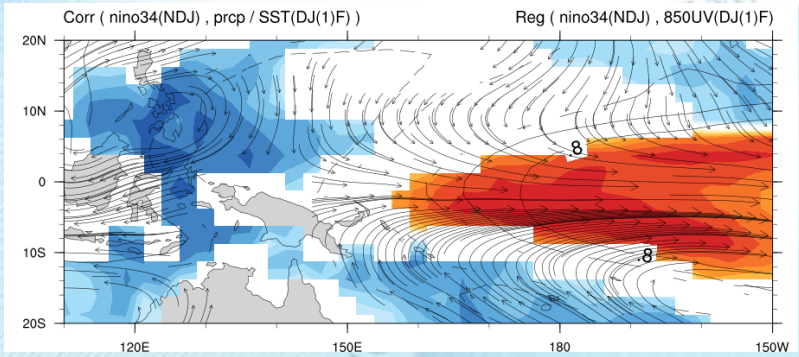


Developing

SON(0)



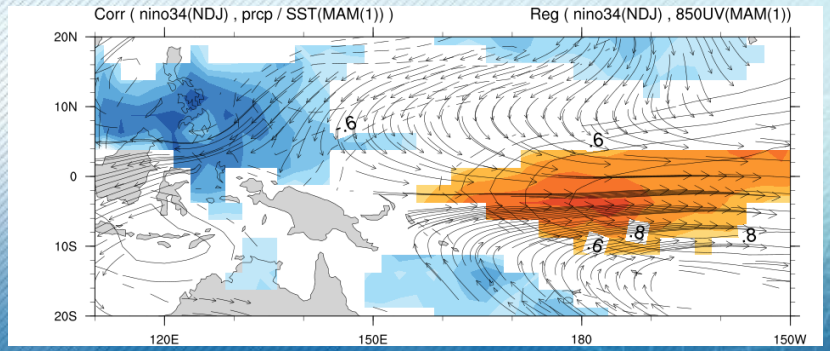
D(0)JF(1)



Mature

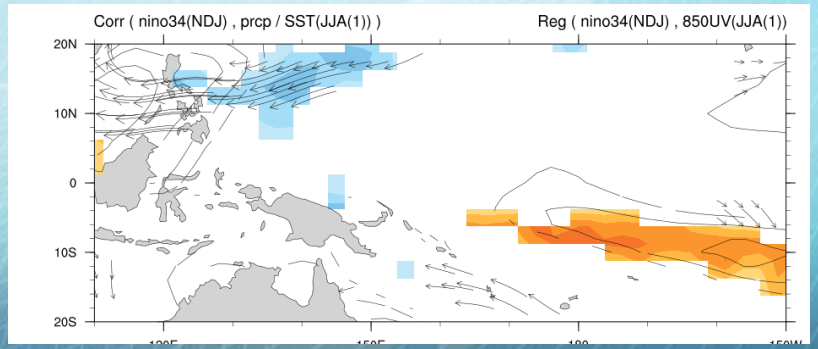
Contour: SST
Shading: Precipitation
Vector: wind at 850hPa

MAM(1)

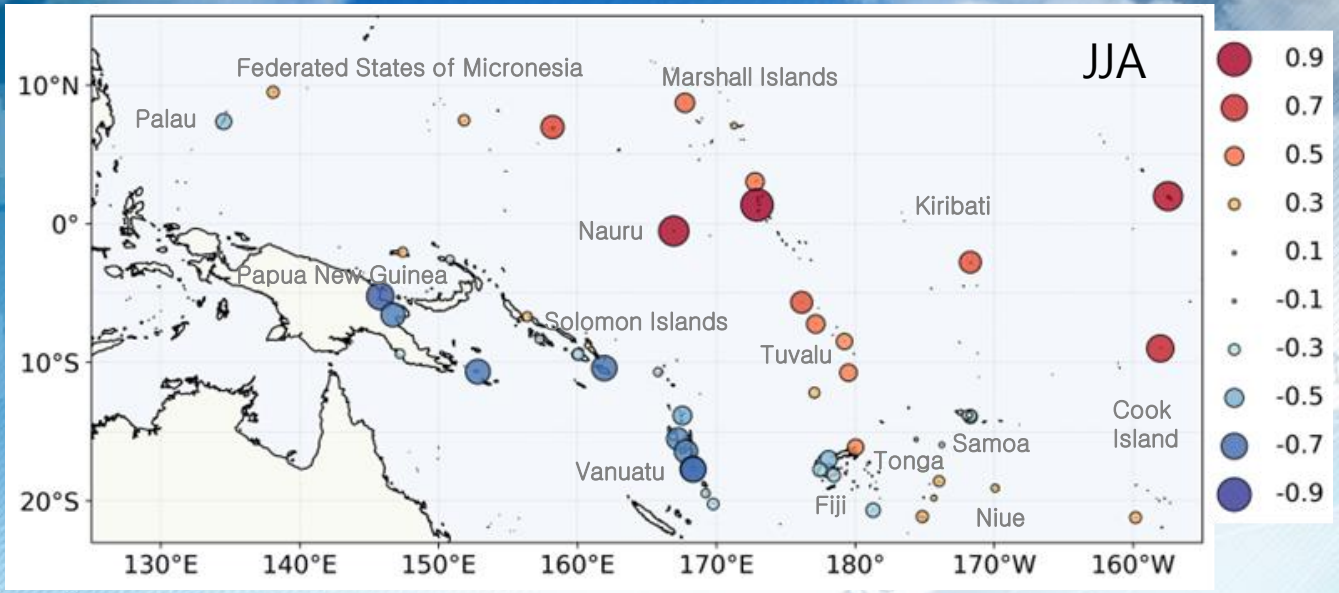


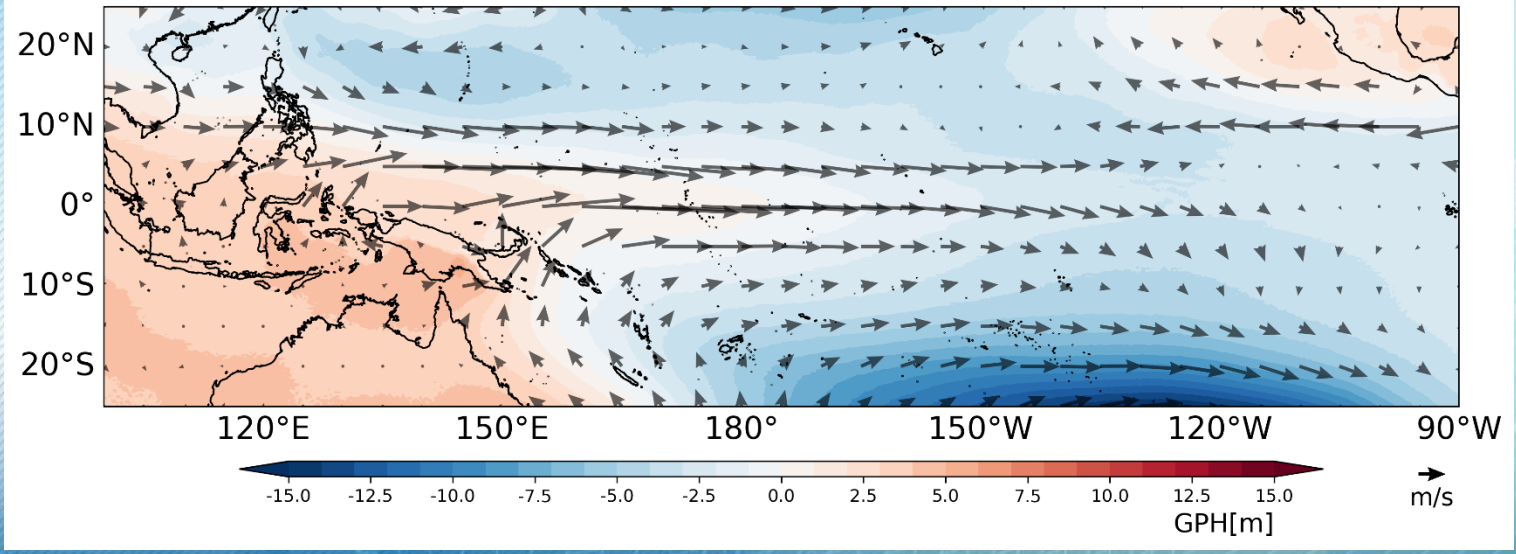
Decaying

JJA(1)

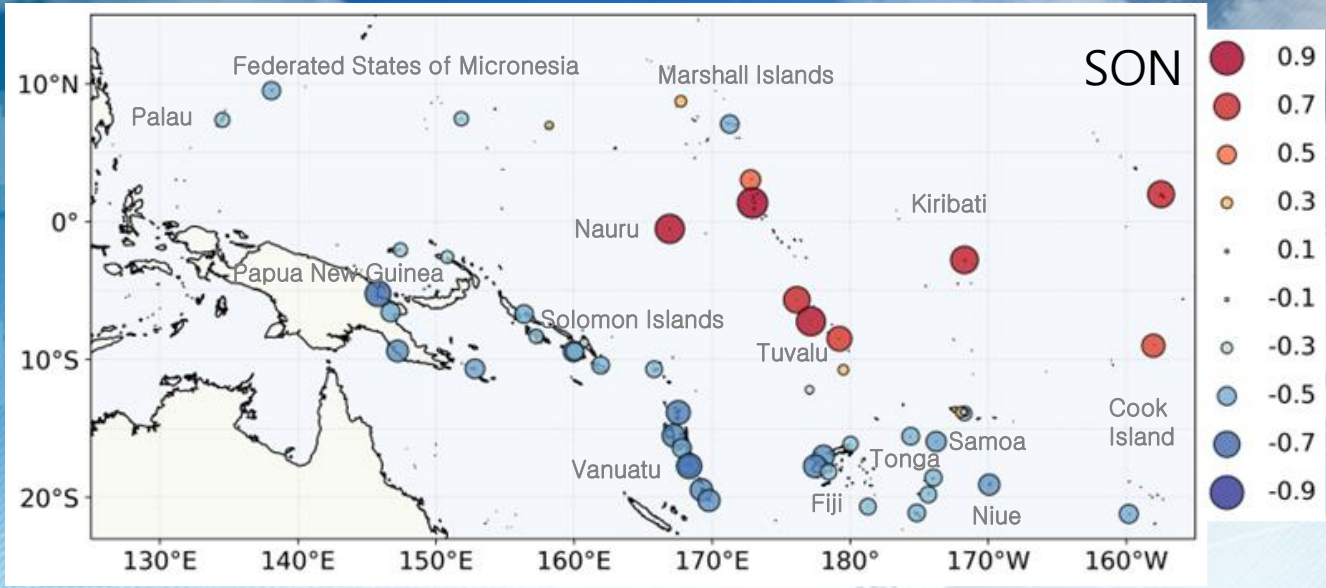


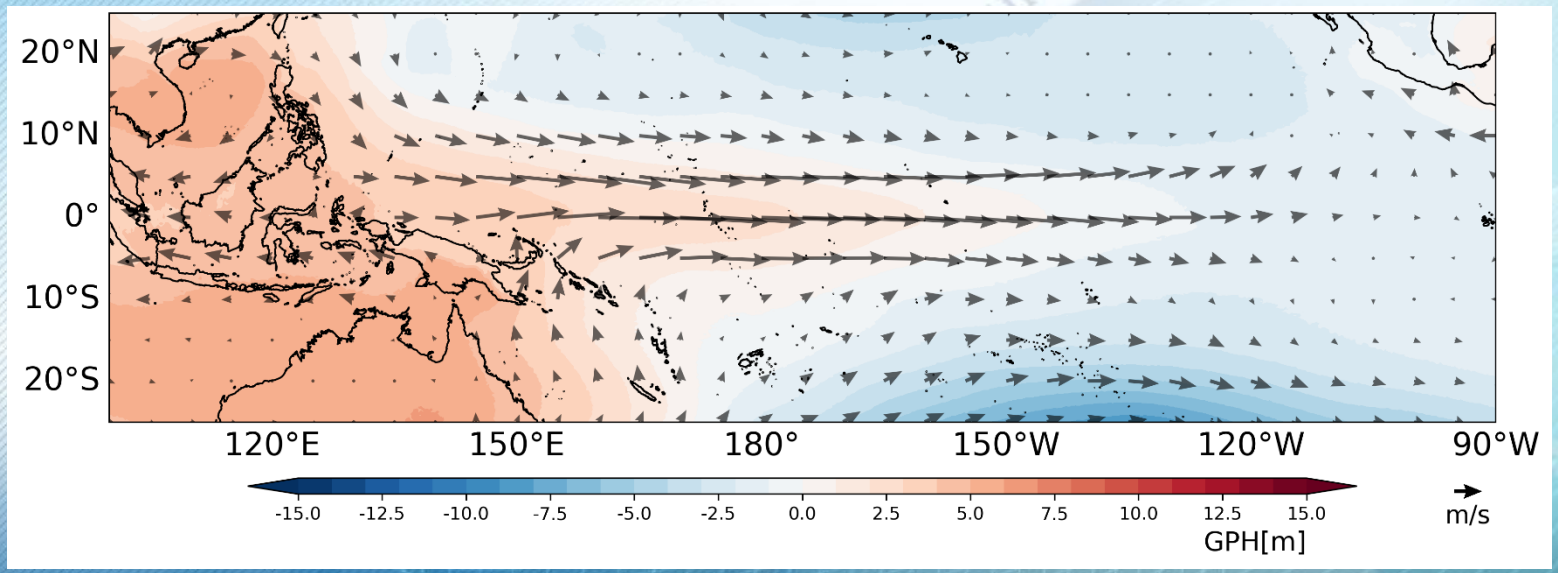
Correlation bet. Nino3.4 & Precipitation (Station data)



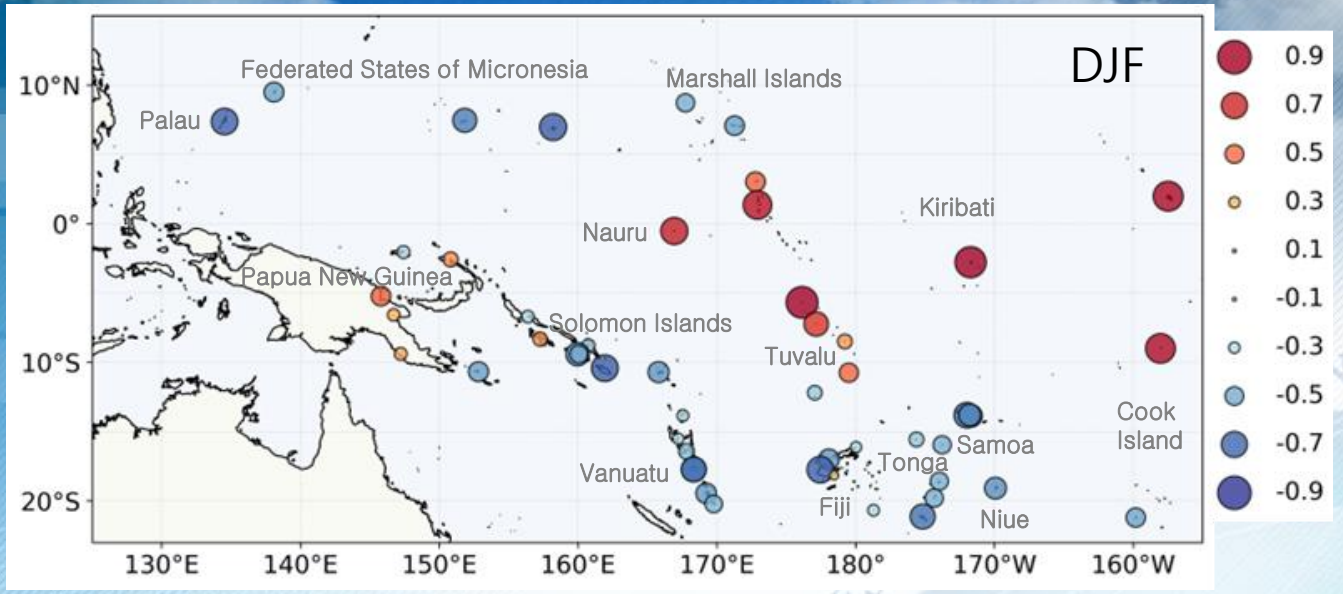


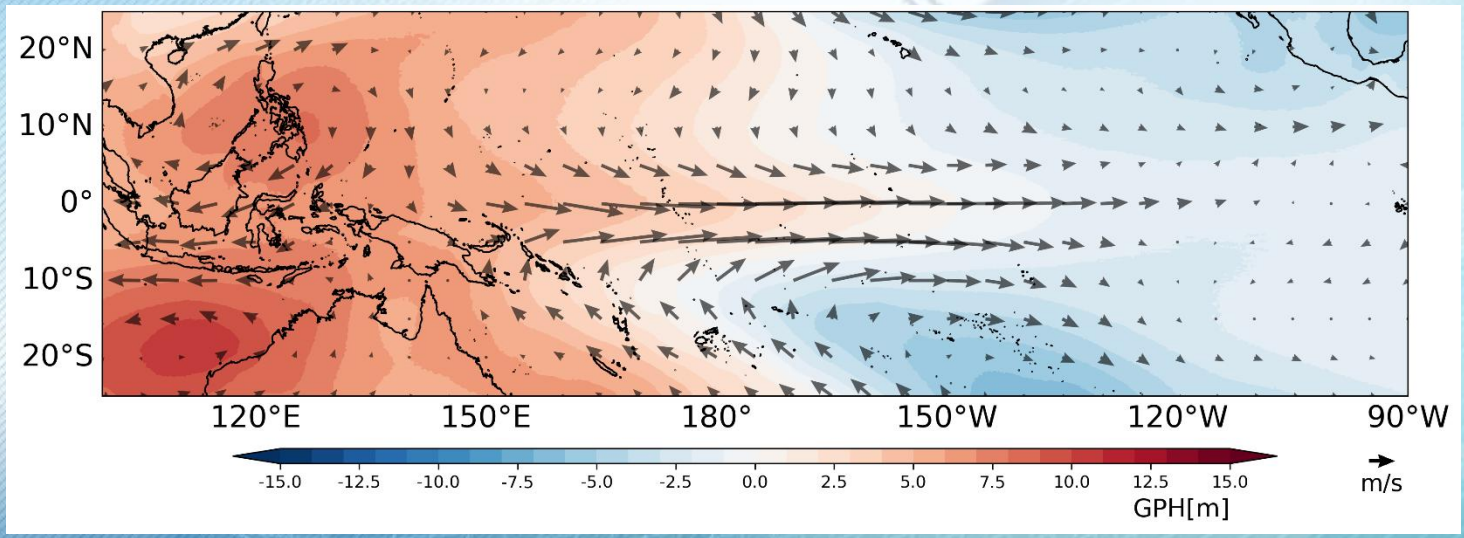
Correlation bet. Nino3.4 & Precipitation (Station data)



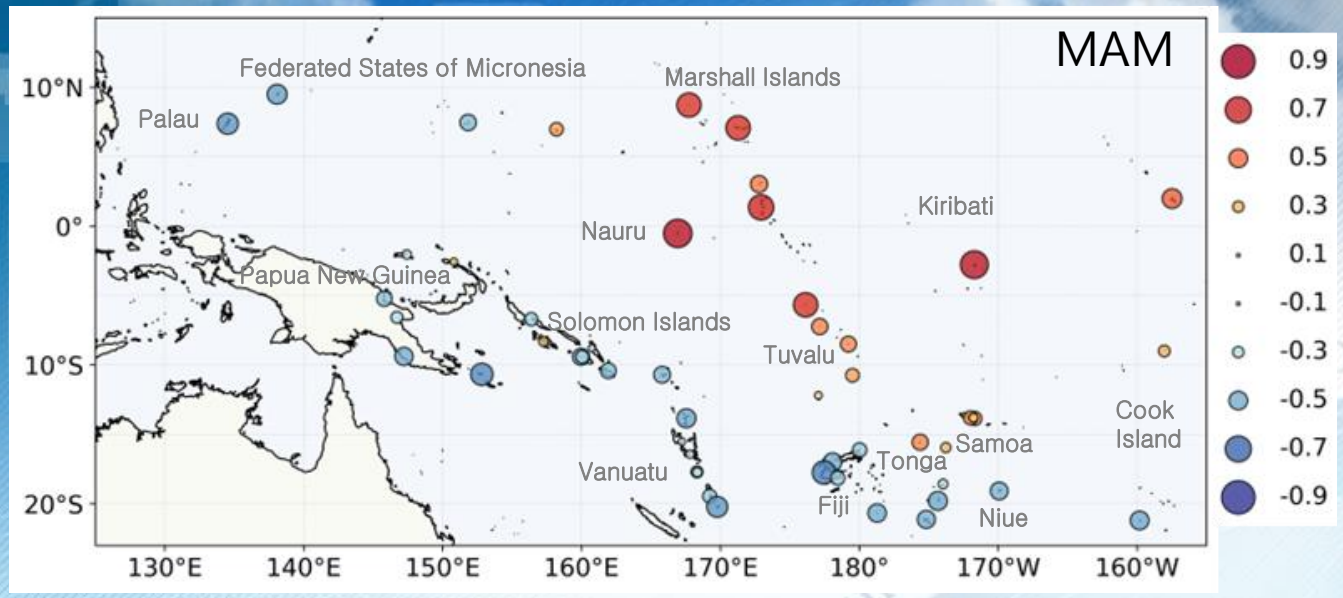


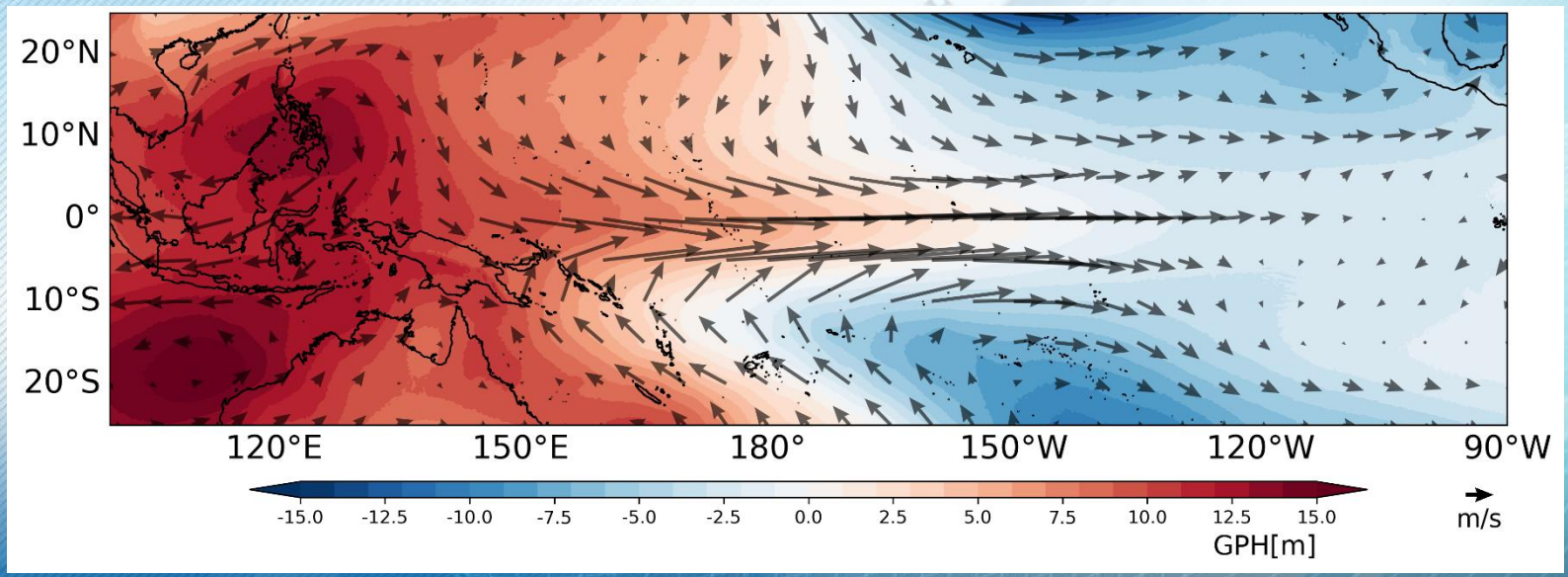
Correlation bet. Nino3.4 & Precipitation (Station data)





Correlation bet. Nino3.4 & Precipitation (Station data)





El Nino Diversity

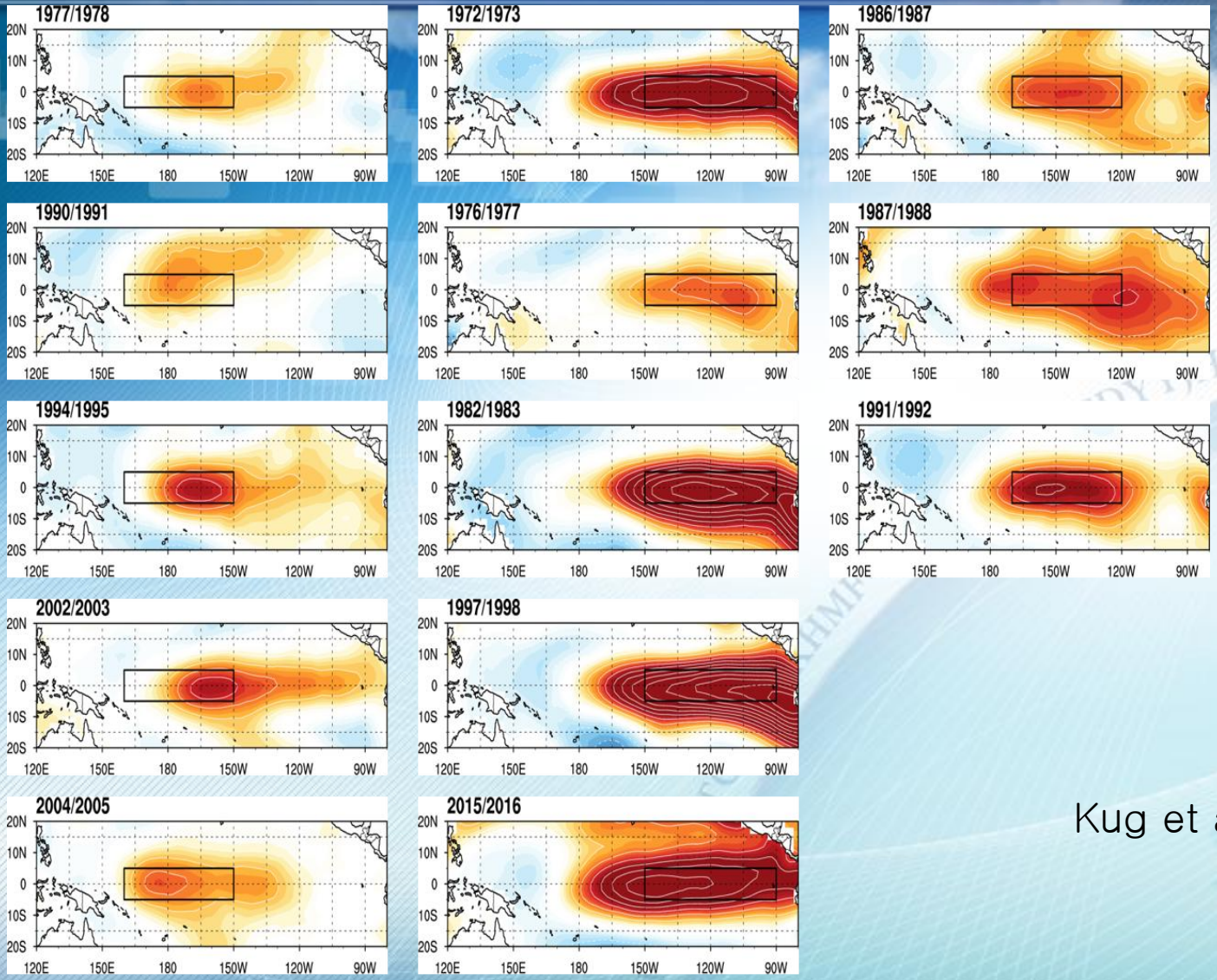
New Type of El Nino

- El Nino Modoki (Ashok et al. 2007)
- Central Pacific (CP) El Nino (Kao and Yu 2009)
- Warm Pool (WP) El Nino (Kug et al. 2009)

: Strong SST variability over the central Pacific
: Recent intensification
: Different teleconnection

Central Pacific El Nino

Eastern Pacific El Nino

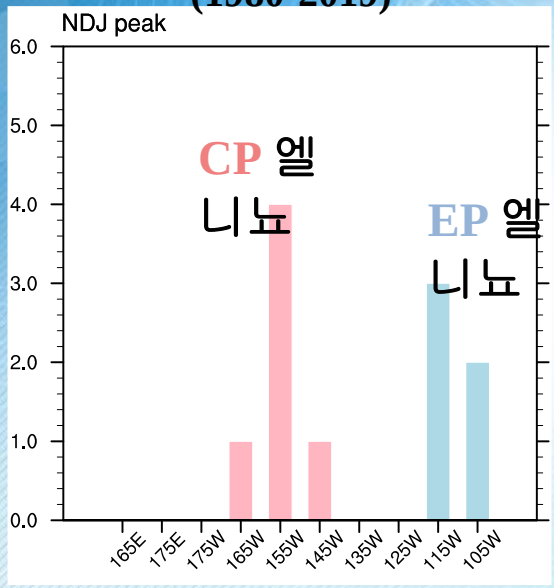


Kug et al. (2009, JC)

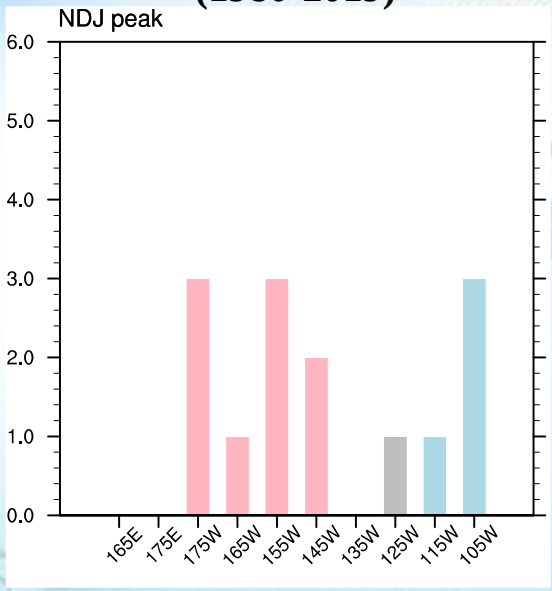
Distribution of El Nino SST Peaks

Distribution of El Nino SST Peaks

HadISST (1980-2019)



ERSST (1980-2019)

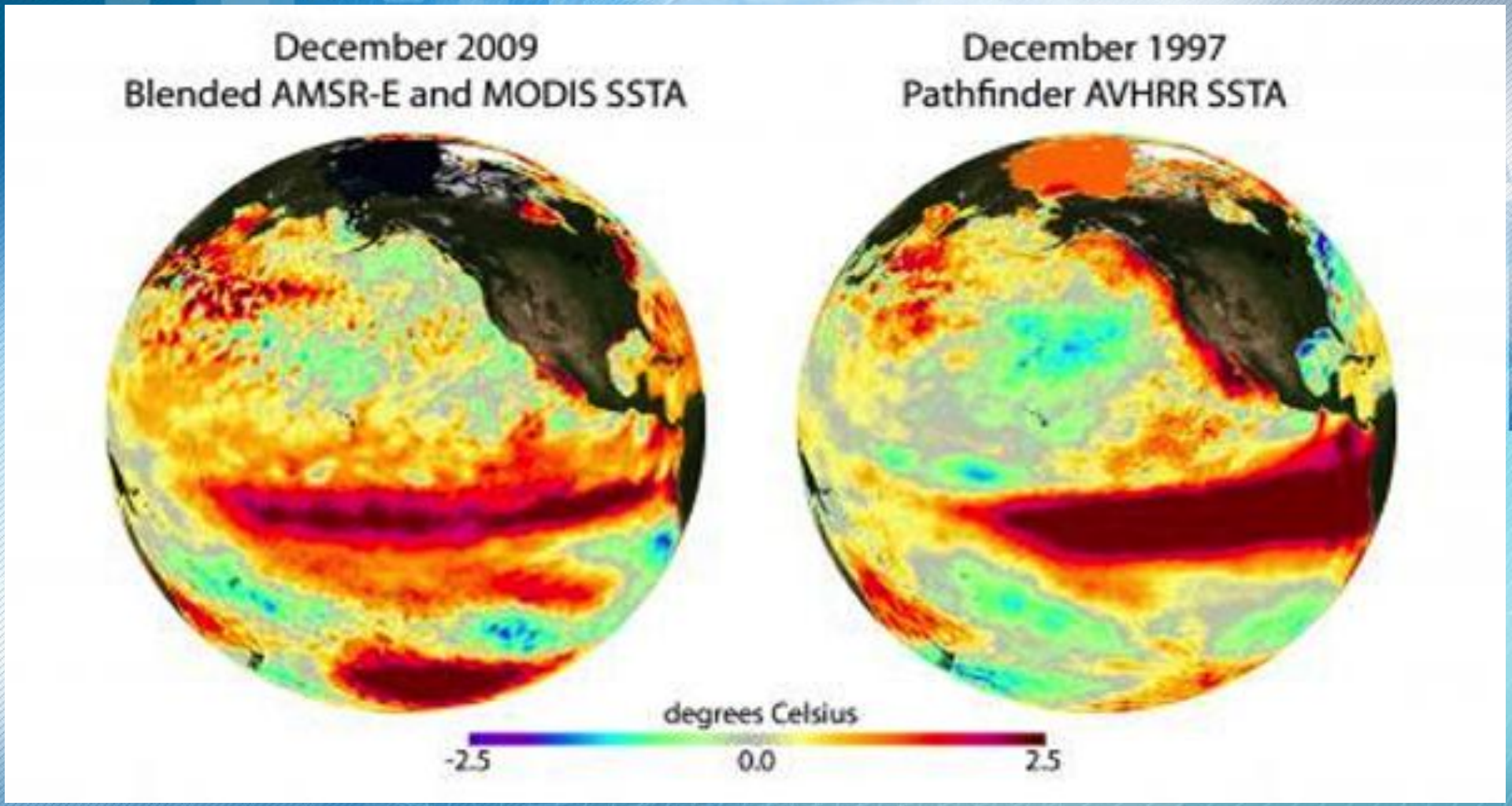


✓ **Bimodal distribution**

Two types of El Nino

Central Pacific El Nino

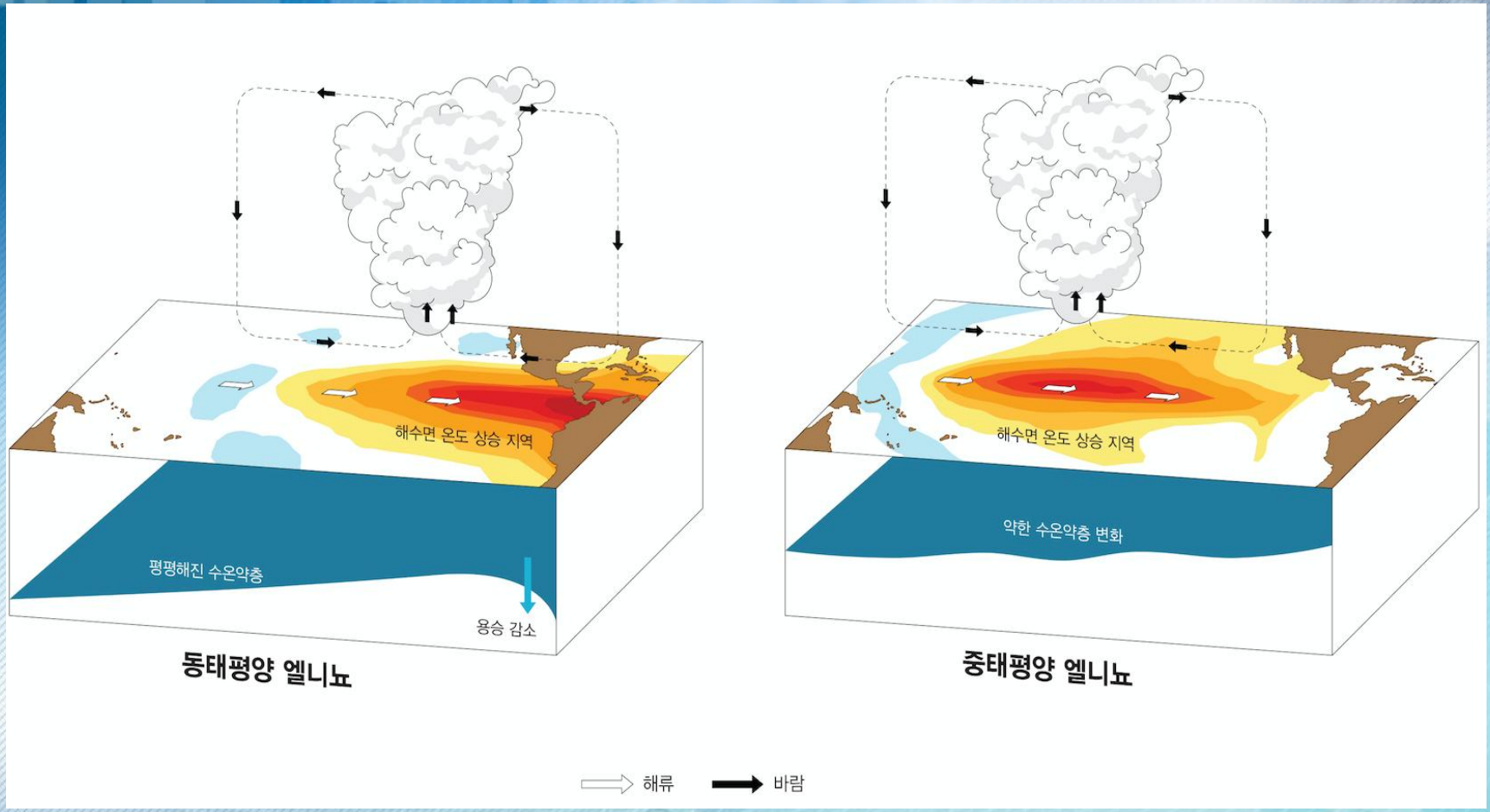
Eastern Pacific El Nino



Two types of El Nino

Eastern Pacific El Nino

Central Pacific El Nino



El Nino Diversity under global warming

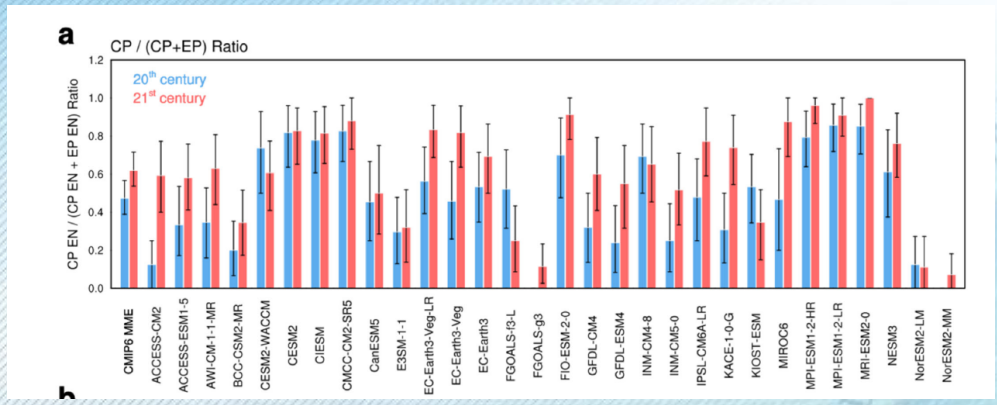
ARTICLE OPEN

Check for updates

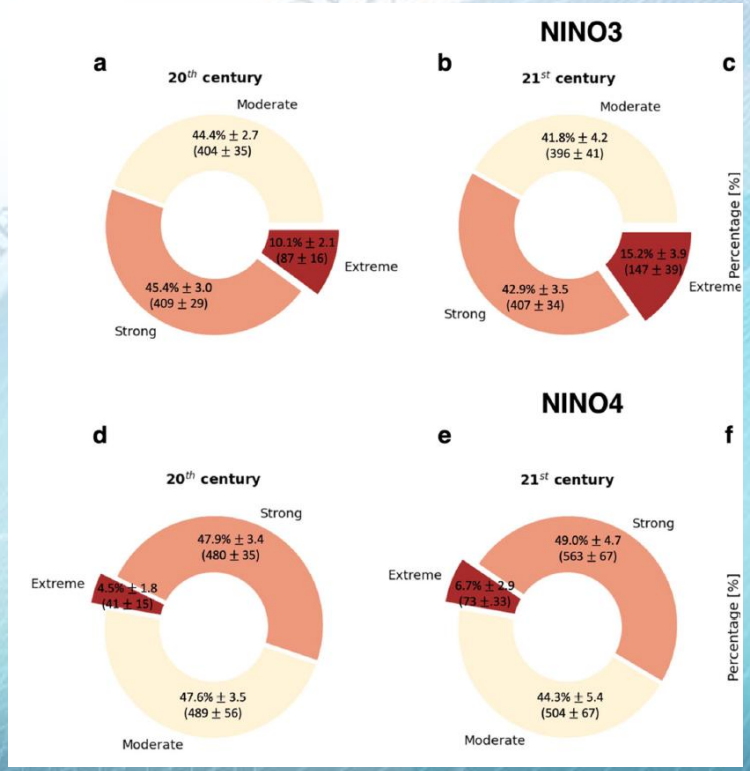
More frequent central Pacific El Niño and stronger eastern pacific El Niño in a warmer climate

Na-Yeon Shin[1], Jong-Seong Kug[1,2]✉, Malte F. Stuecker[3], Fei-Fei Jin[4], Axel Timmermann[5,6] and Geon-Il Kim[1]

More Frequent CP El Niño

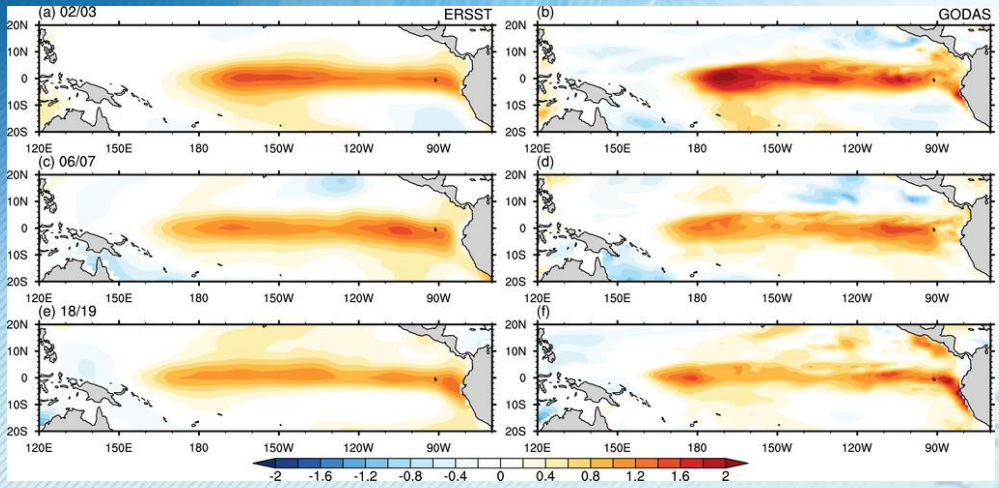


Stronger EP El Niño

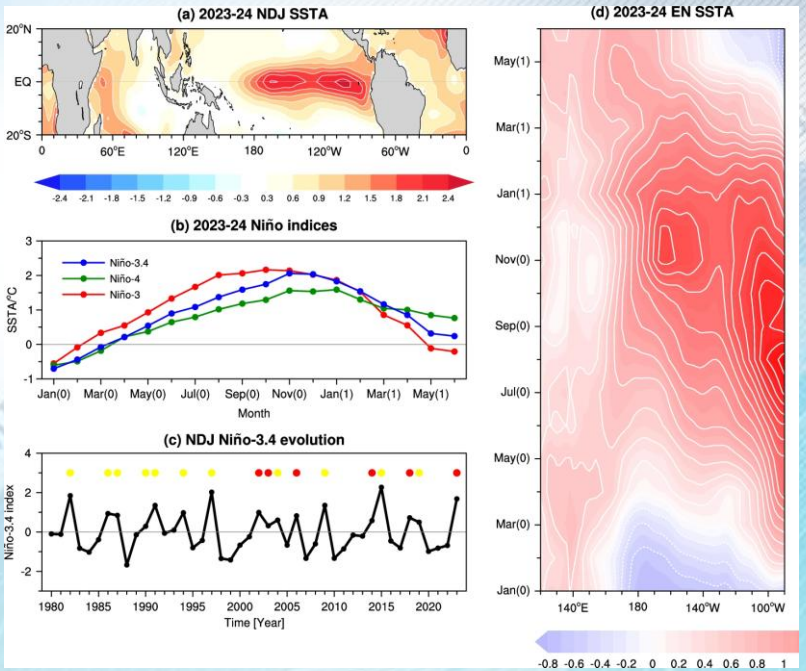


Double-Peaked El Nino

Double Peaked El Nino



Shin et al. (2021)



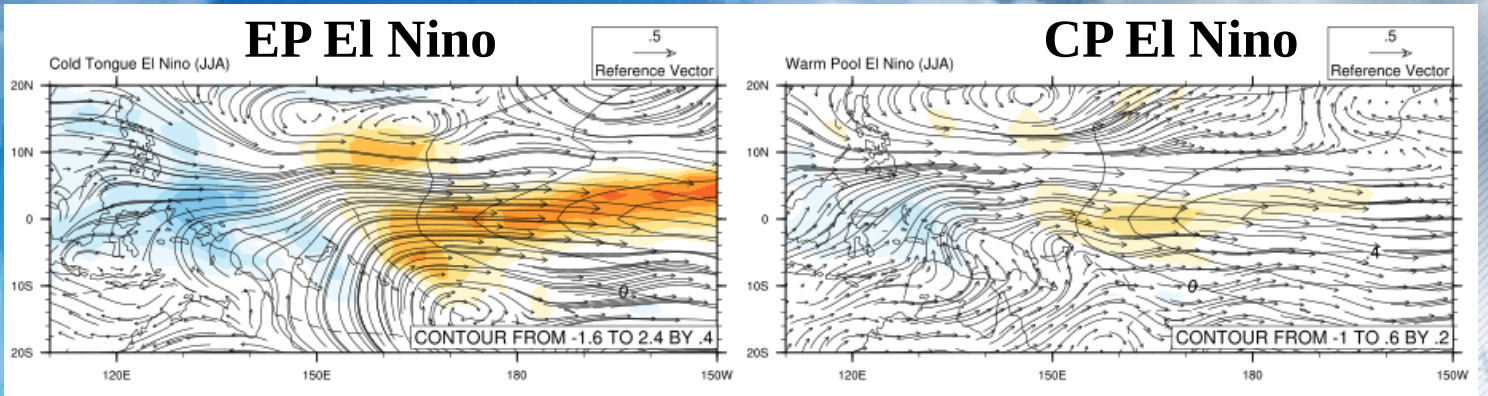
Xin et al. (2024)

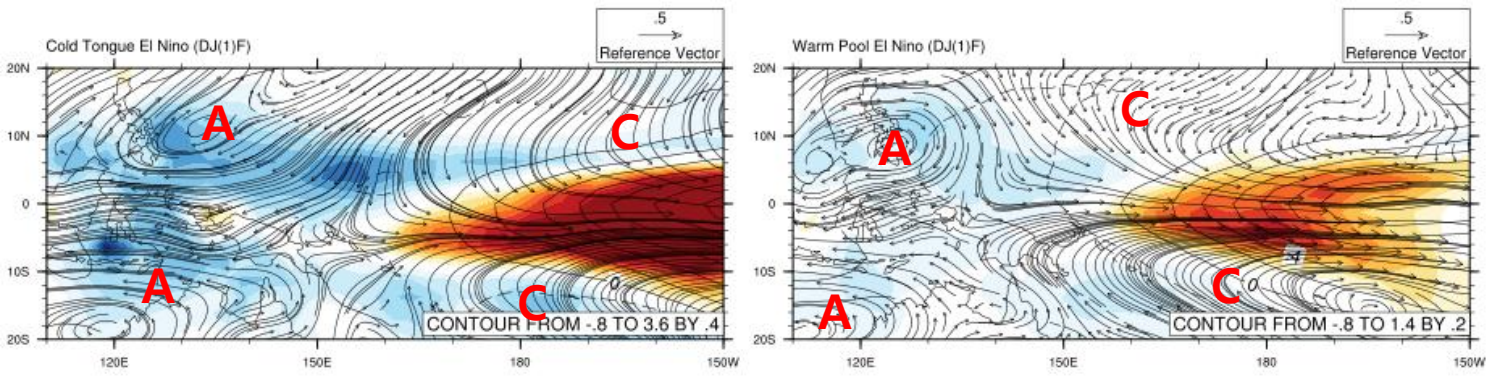
Two-types of El Nino: Pacific Islands

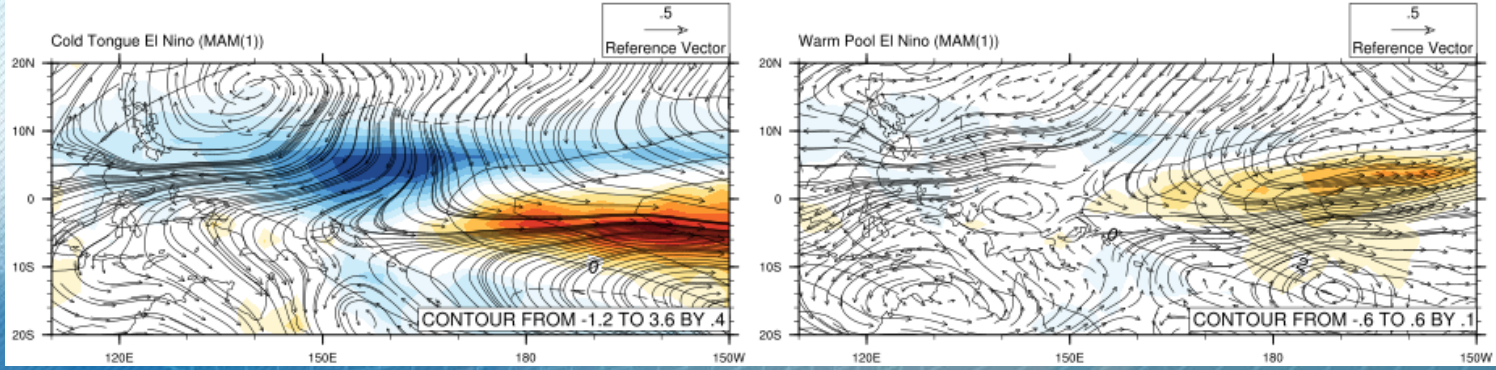
Developing JJA(0)

Mature D(0)JF(1)

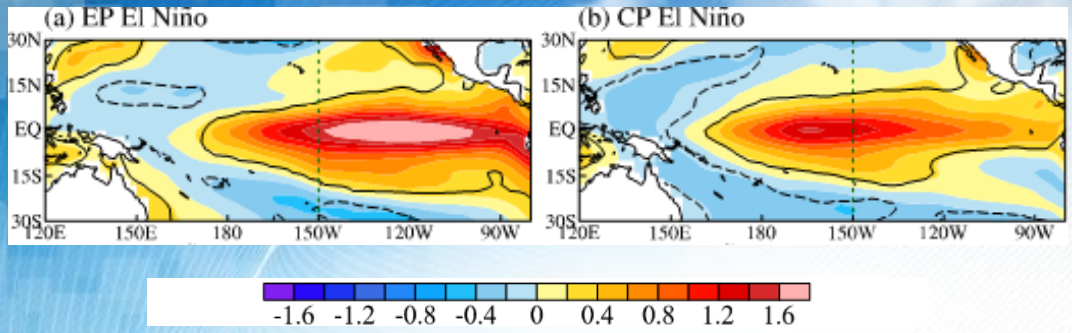
Decaying MAM(1)







Two types of El Nino



Zhang, et. al., (2019) ENSO regime changes responsible for decadal phase relationship variation between ENSO sst and warm water volume, Geophysical Research Letters, 46, 7546-7553.

Available PIC station data : 1983 JFM ~ 2019 DJF

(1983 JFM ~ 2019 DJF)	EP type (4)	CP type (6)
El Nino years	1982/1983	1991/1992
	1986/1987	1994/1995
	1997/1998	2002/2003
	2015/2016	2004/2005
		2006/2007
		2009/2010

Zhang, et. al., (2019)

Impacts of El Nino Diversity On Pacific Islands

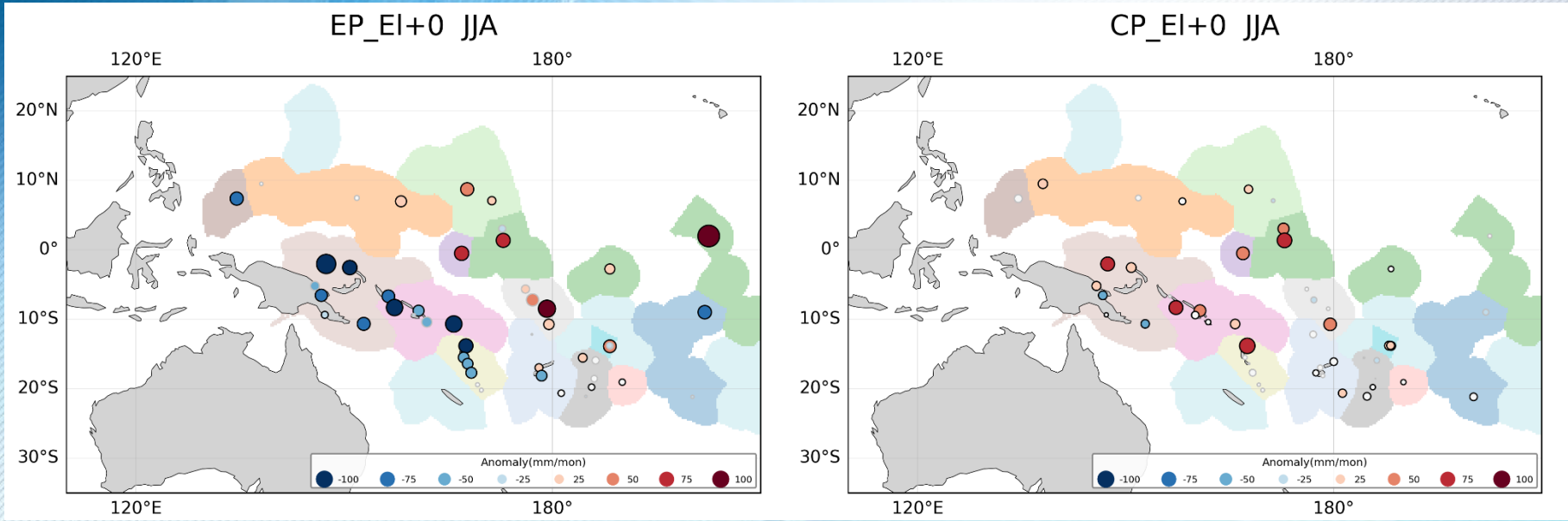
Two-types of El Nino: Pacific Islands

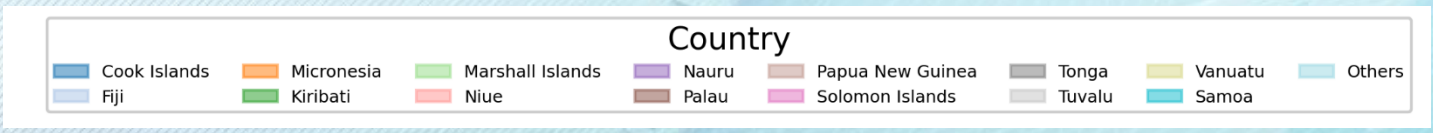
JJA season

El Nino Developing

EP (3): 1982/1983, 1986/1987, 1997/1998, 2015/2016

CP (6): 1991/1992, 1994/1995, 2002/2003, 2004/2005,





Closed circle : 90% significant level

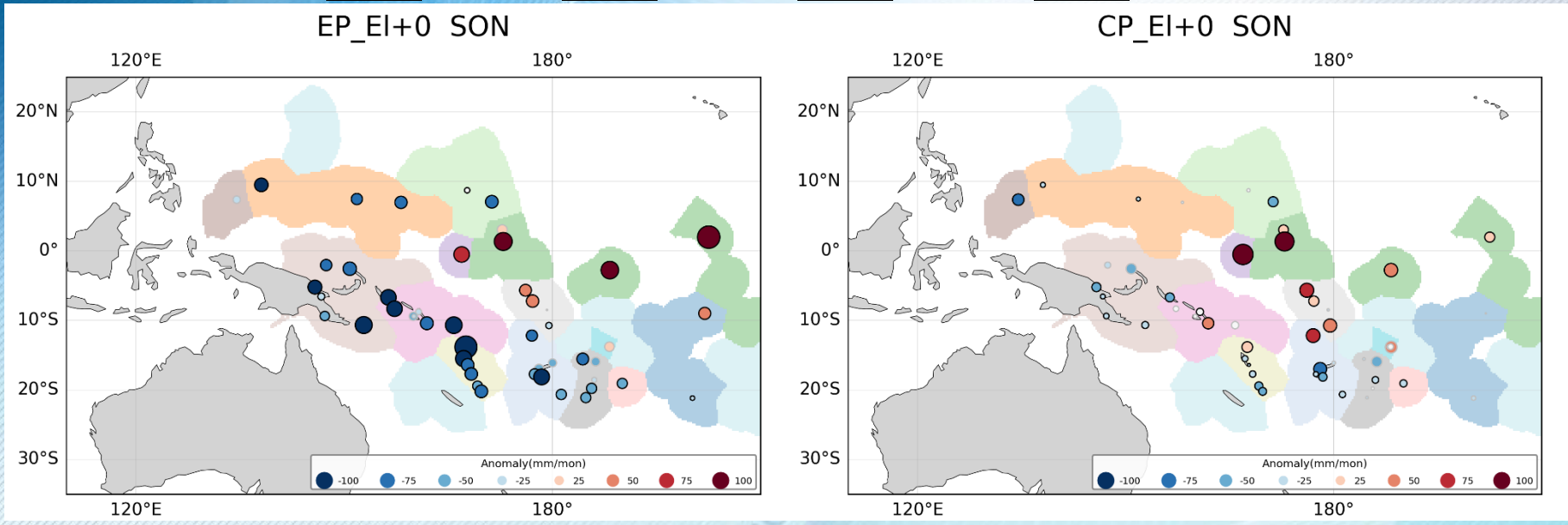
Two-types of El Nino: Pacific Islands

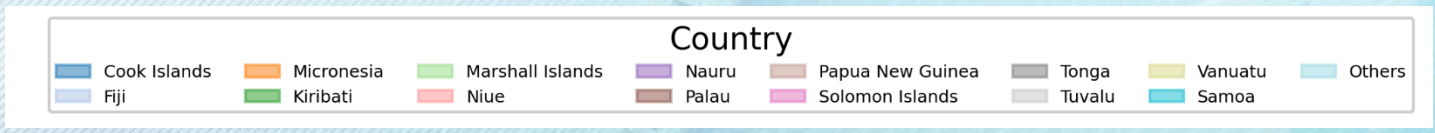
SON season

El Nino Developing

EP (3): 1982/1983, 1986/1987, 1997/1998, 2015/2016

CP (6): 1991/1992, 1994/1995, 2002/2003, 2004/2005,





Closed circle : 90% significant level

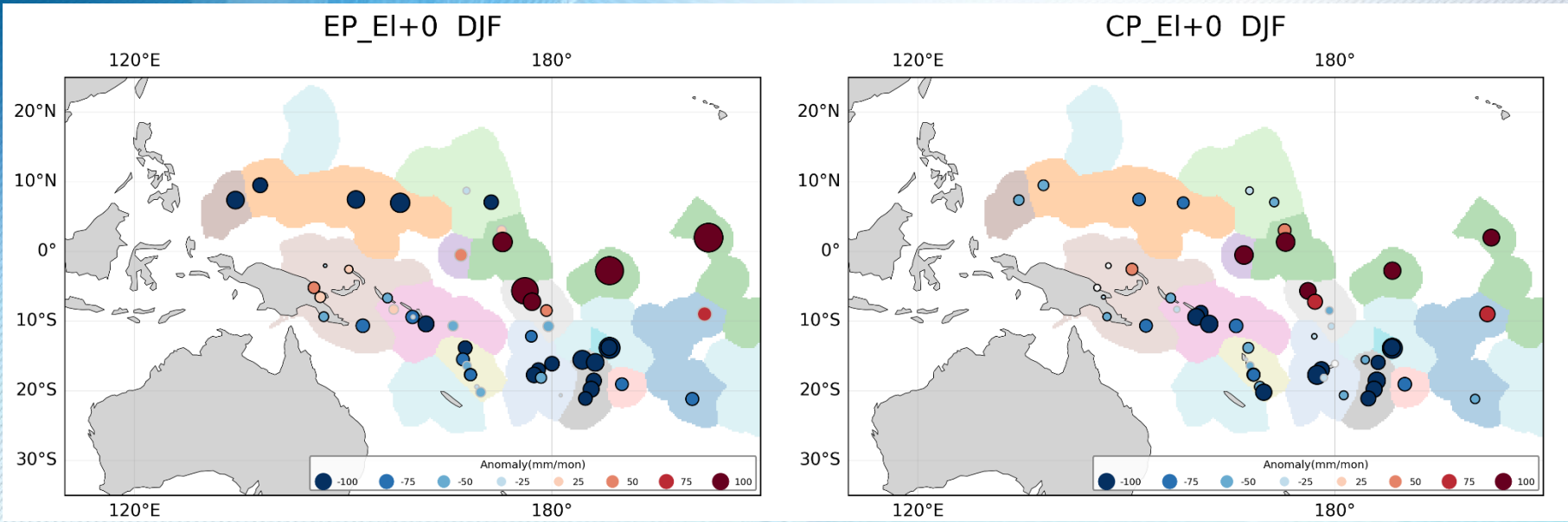
Two-types of El Nino: Pacific Islands

DJF season

El Nino PEAK

EP (4): 1982/1983, 1986/1987, 1997/1998, 2015/2016

CP (6): 1991/1992, 1994/1995, 2002/2003, 2004/2005,



Closed circle : 90% significant level

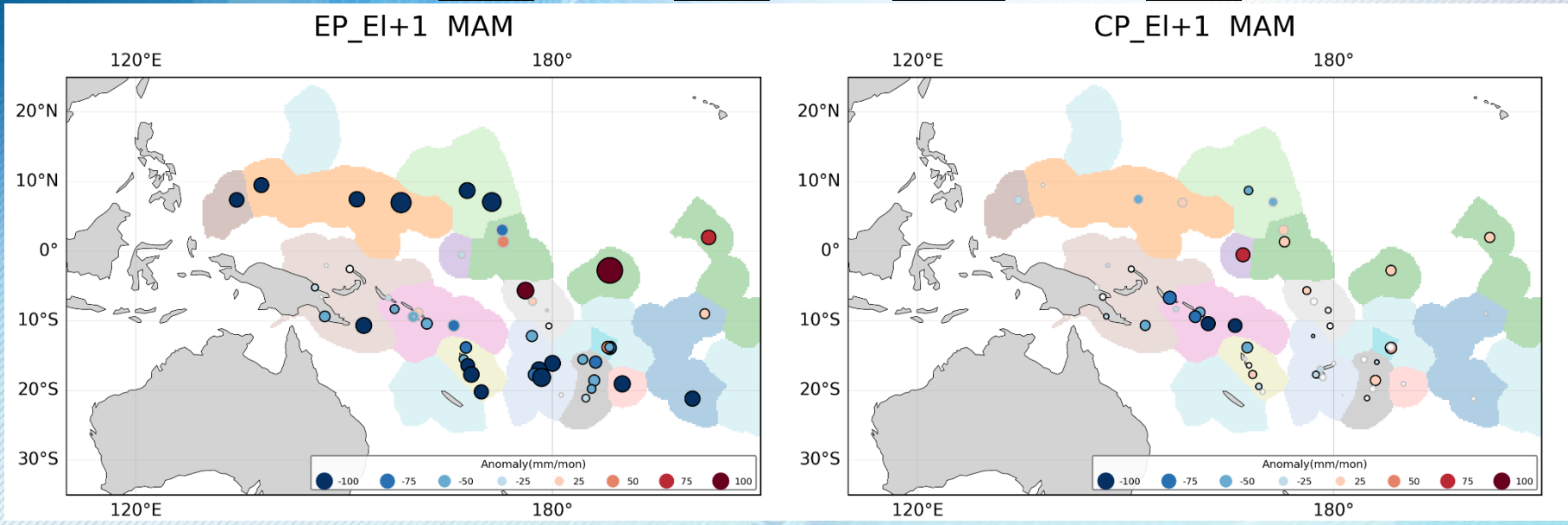
Two-types of El Nino: Pacific Islands

MAM season

El Nino Decaying

EP (4): 1982/1983, 1986/1987, 1997/1998, 2015/2016

CP (6): 1991/1992, 1994/1995, 2002/2003, 2004/2005,



Closed circle : 90% significant level

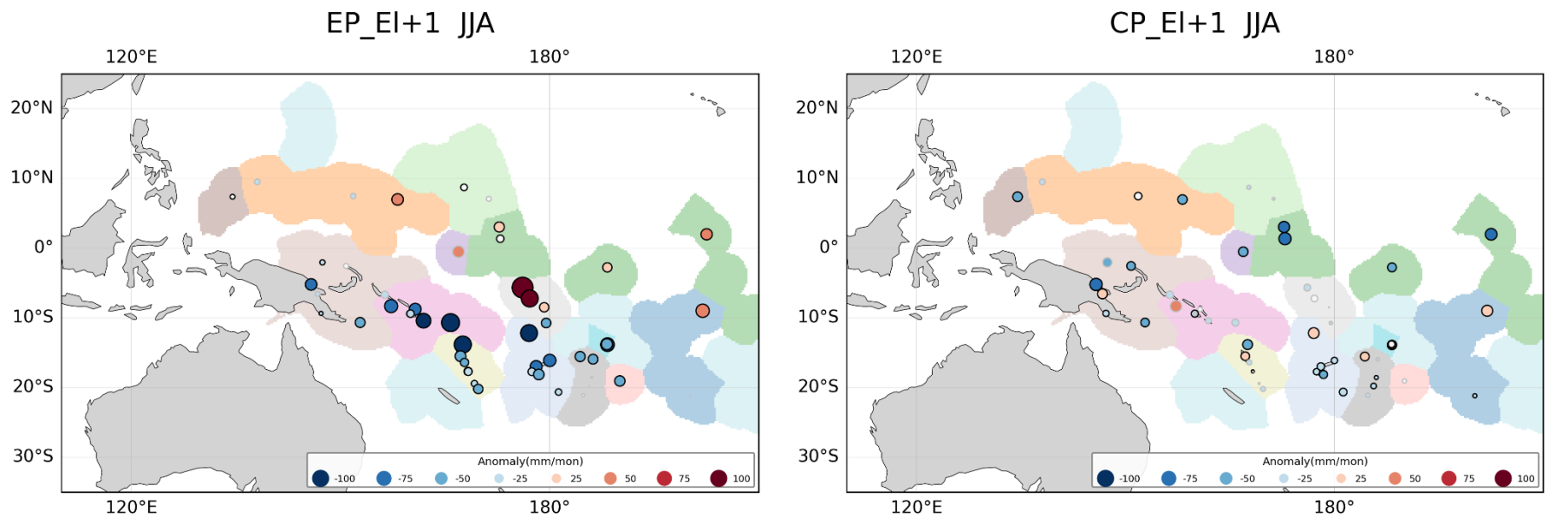
Two-types of El Nino: Pacific Islands

JJA season

El Nino Decaying

EP (4): 1982/1983, 1986/1987, 1997/1998, 2015/2016

CP (6): 1991/1992, 1994/1995, 2002/2003, 2004/2005,



Closed circle : 90% significant level

Thank You!

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http://climate.snu.ac.kr