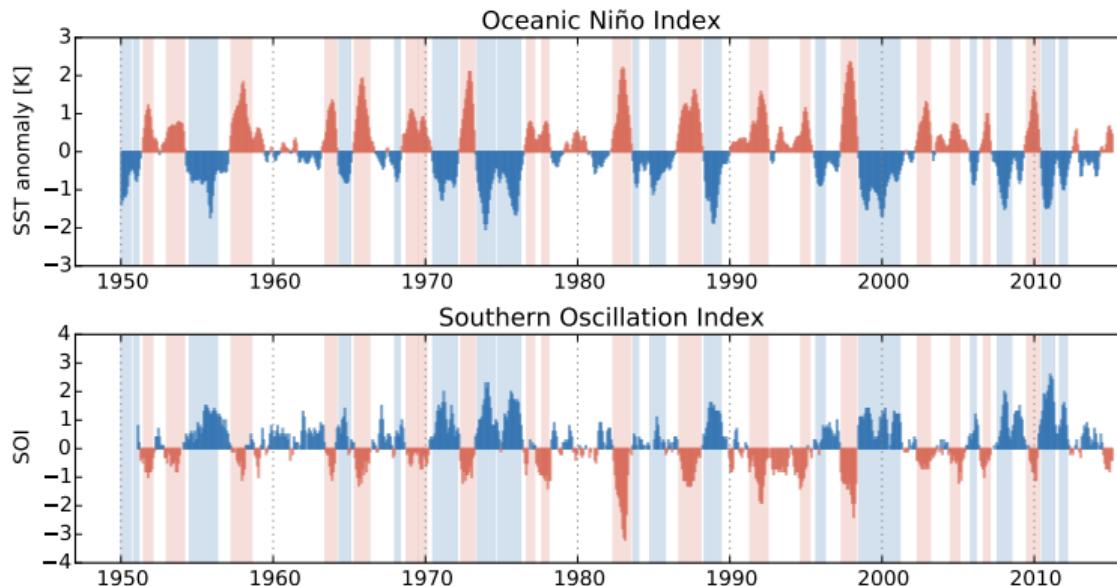


ENSO is coupled atmosphere–ocean variability

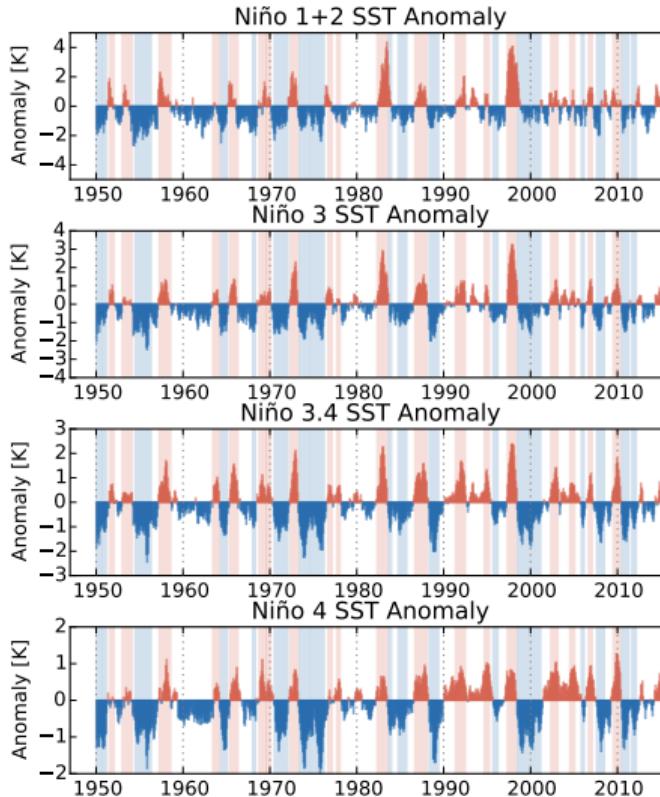
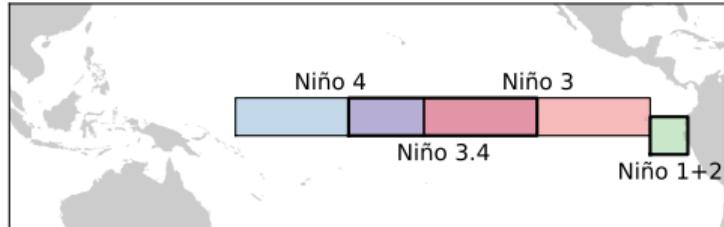
## El Niño: an oscillation in sea surface temperature in the equatorial Pacific



Southern Oscillation: an oscillation in sea level pressure in the equatorial Pacific

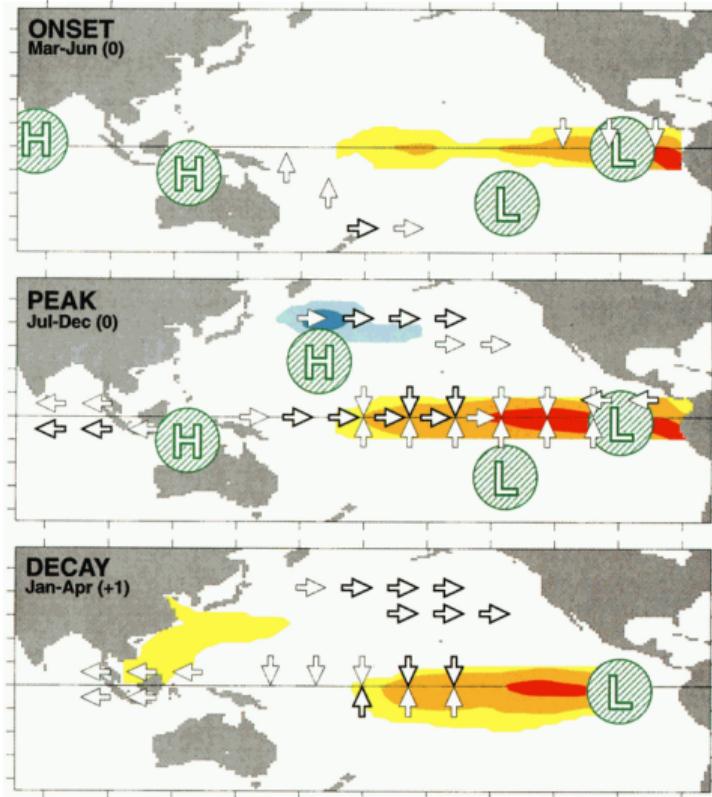
## Describing ENSO variability

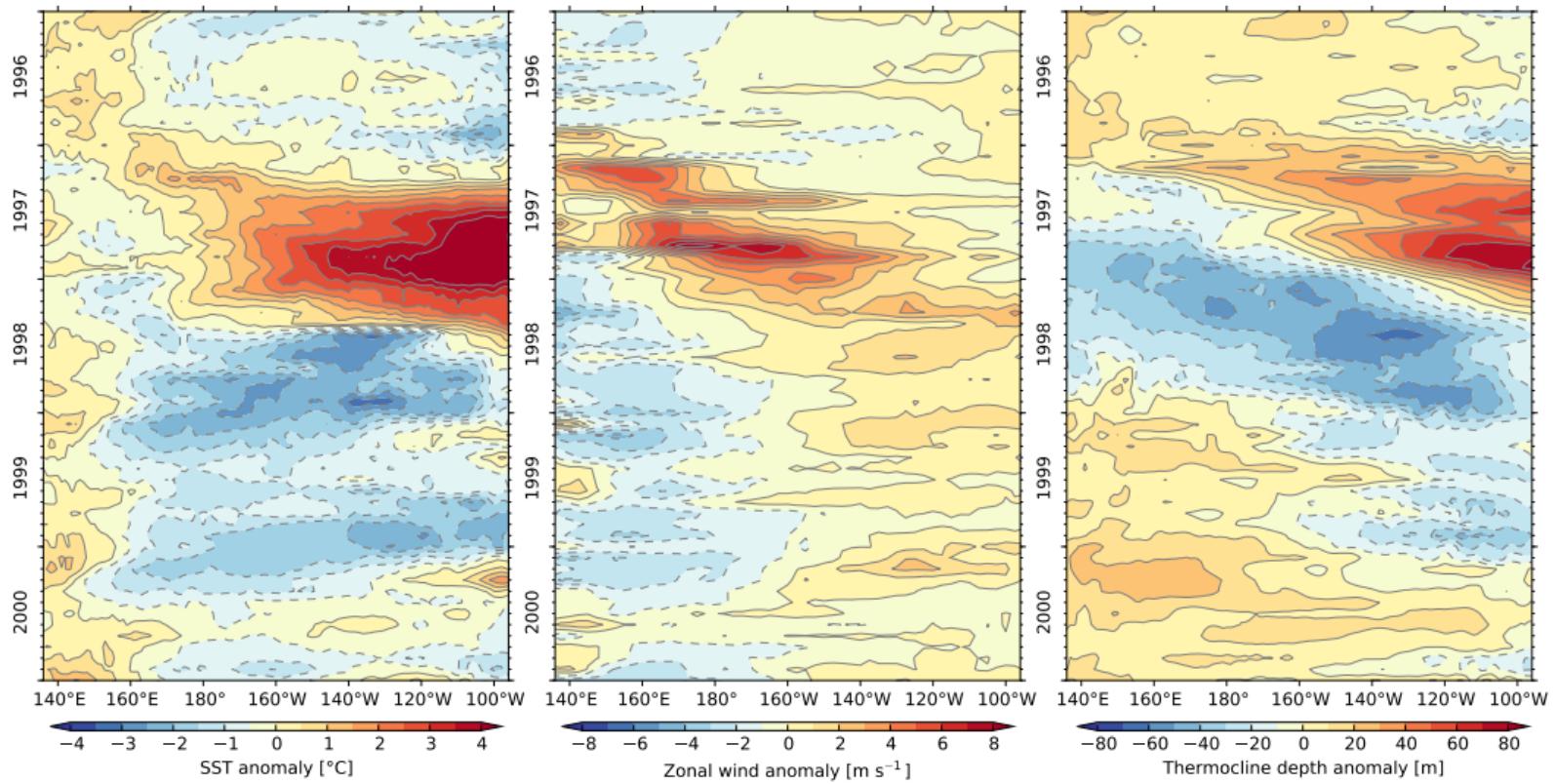
- ▶ SST anomalies in various regions of the tropical Pacific are used to index the strength of ENSO variability
- ▶ Major phases are generally consistent among indices
- ▶ ENSO varies on interannual time scales
- ▶ The typical period is 3–5 years ( $\sim 3.24$  over this time period), but there are times when ENSO is very quiet



## El Niño development and decay

- ▶ El Niño development is locked to the seasonal cycle
- ▶ A warm anomaly develops in the eastern tropical Pacific during boreal spring, with low sea level pressure above
- ▶ Low SLP drives convergence and increased precipitation as the SST anomaly in the tropical eastern Pacific strengthens during late summer, fall, and early winter
- ▶ The anomalous warming and convergence dissipate and retreat toward the west during the following winter and spring

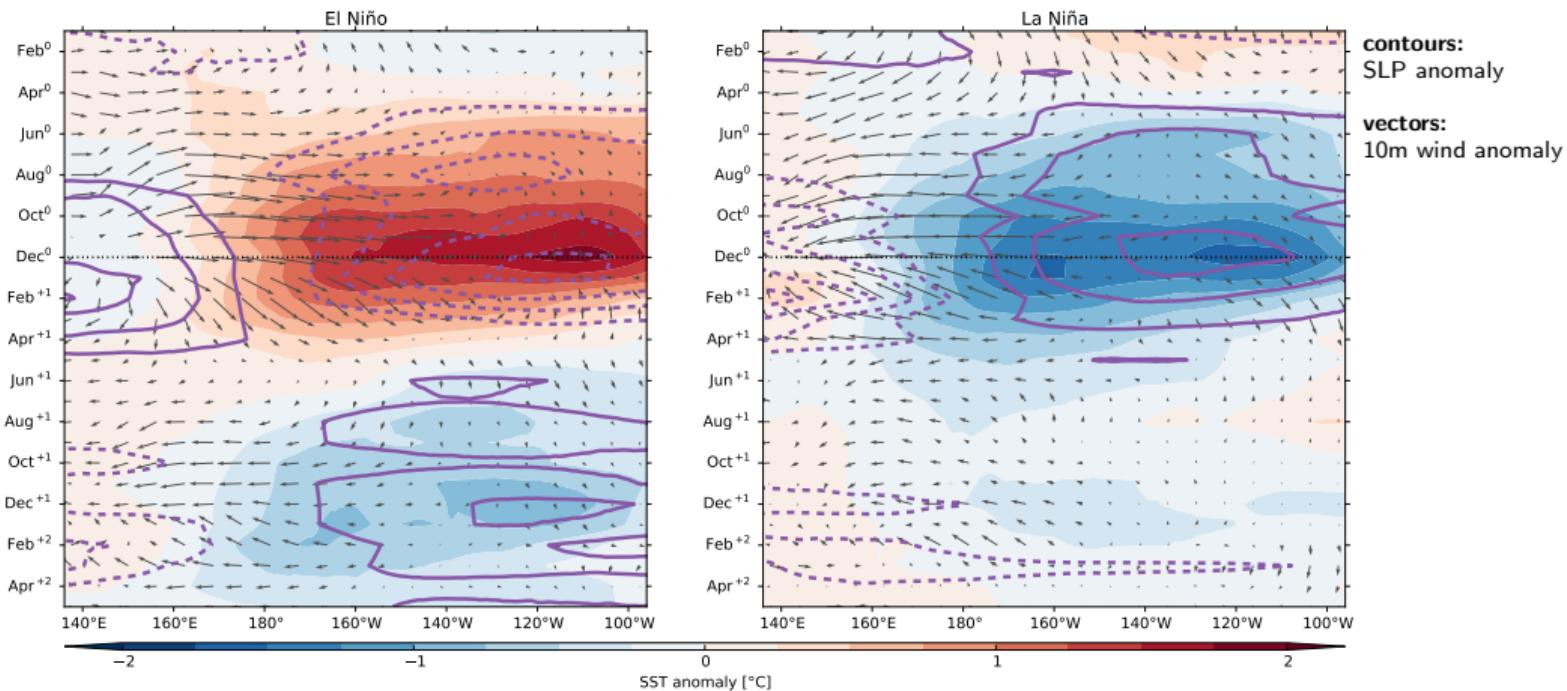




## Development of 1997–98 El Niño and 1998–99 La Niña

**contours:** precipitation anomaly

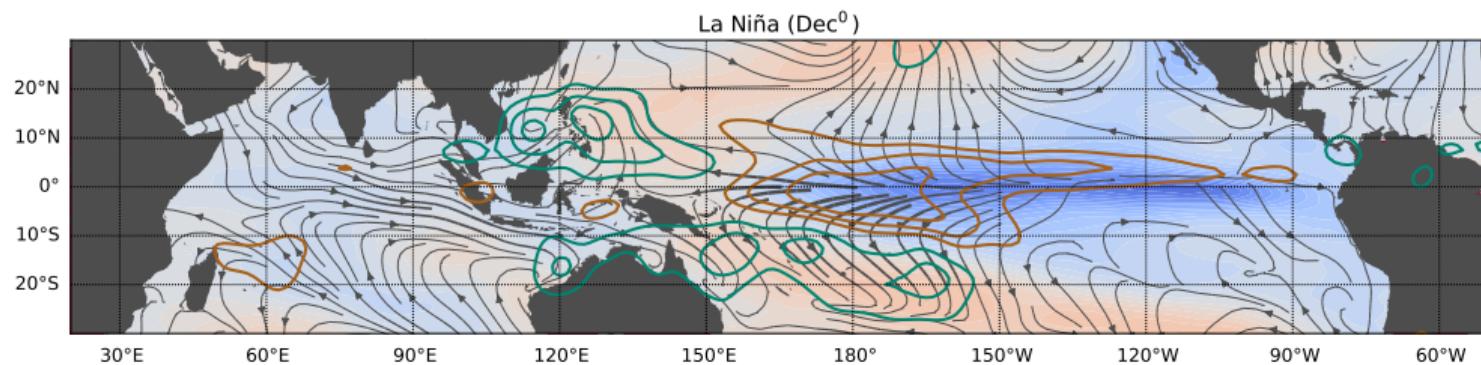
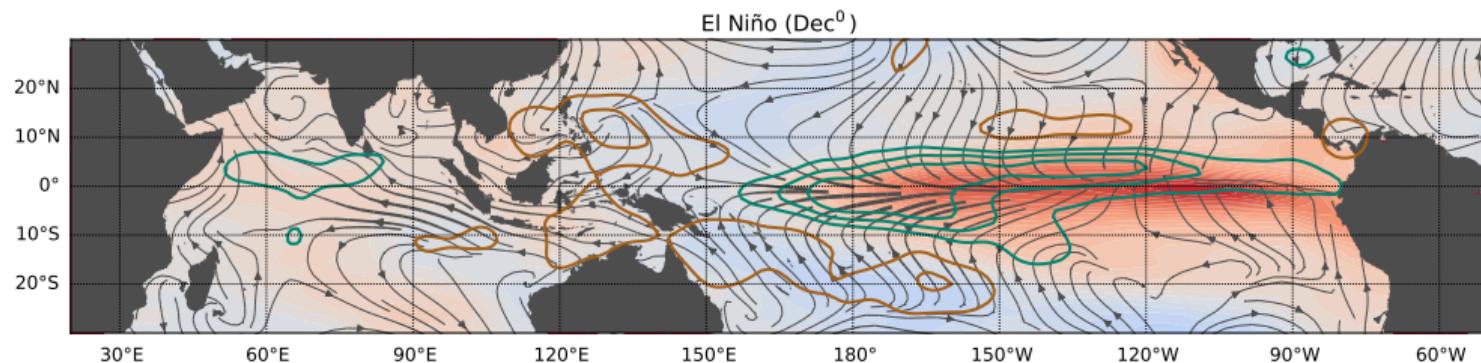
## Composite development of El Niño and La Niña



data from COBE & JRA-55

## Composite anomalies during peak El Niño and La Niña

contours: precipitation anomaly



data from COBE & JRA-55