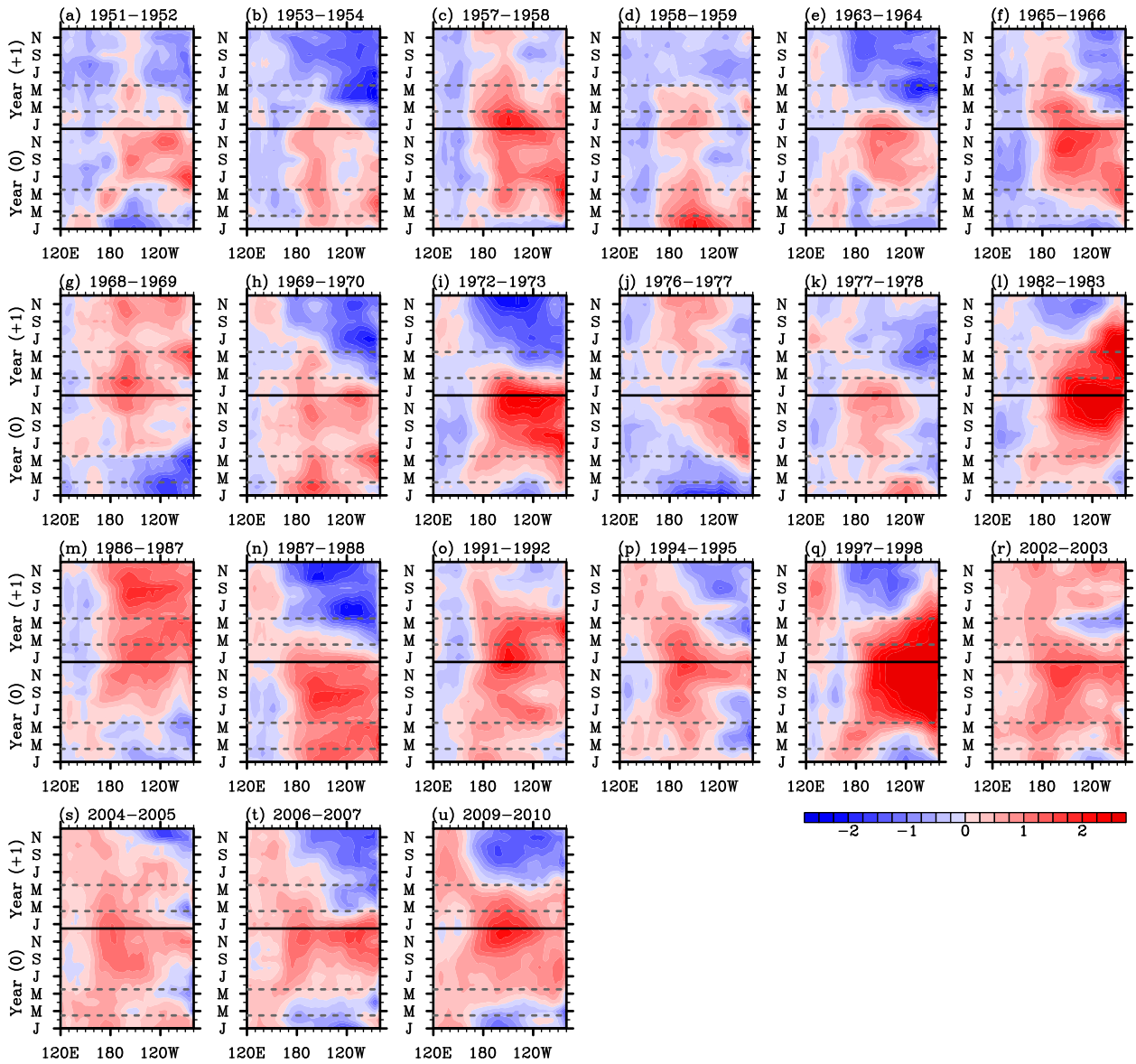


**Table S1.** 21 El Niños and 22 La Niñas identified during 1949 – 2012 based on the threshold that SST anomalies in Niño 3.4 should exceed 0.5°C for a minimum of five consecutive overlapping seasons. ERSST3 is used to compute the SST anomalies in Niño 3.4. Those ENSO events accompanied by the onset of another ENSO event of the opposite and same sign are indicated as “Transition” and “Resurgence”, respectively.

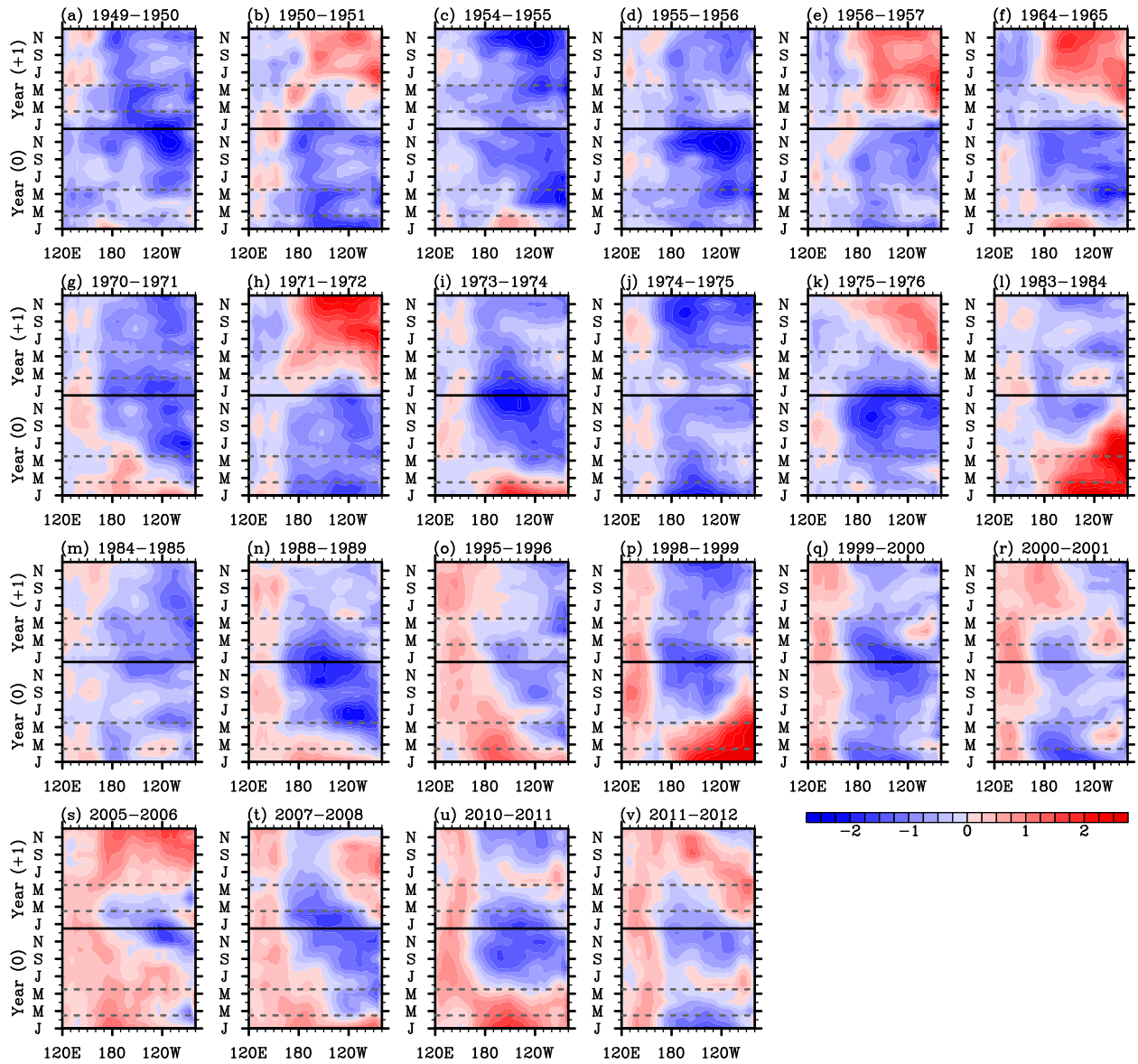
21 El Niños (0)		22 La Niñas (0)	
1951 - 1952		1949 - 1950	Resurgence
1953 - 1954	Transition	1950 - 1951	Transition
1957 - 1958	Resurgence	1954 - 1955	Resurgence
1958 - 1959		1955 - 1956	Resurgence
1963 - 1964	Transition	1956 - 1957	Transition
1965 - 1966		1964 - 1965	Transition
1968 - 1969	Resurgence	1970 - 1971	Resurgence
1969 - 1970	Transition	1971 - 1972	Transition
1972 - 1973	Transition	1973 - 1974	Resurgence
1976 - 1977	Resurgence	1974 - 1975	Resurgence
1977 - 1978		1975 - 1976	Transition
1982 - 1983	Transition	1983 - 1984	Resurgence
1986 - 1987	Resurgence	1984 - 1985	
1987 - 1988	Transition	1988 - 1989	
1991 - 1992		1995 - 1996	
1994 - 1995	Transition	1998 - 1999	Resurgence
1997 - 1998	Transition	1999 - 2000	Resurgence
2002 - 2003		2000 - 2001	
2004 - 2005	Transition	2005 - 2006	Transition
2006 - 2007	Transition	2007 - 2008	
2009 - 2010	Transition	2010 - 2011	Resurgence
		2011 - 2012	

## Equatorial Pacific SST Anomalies – El Nino (0)



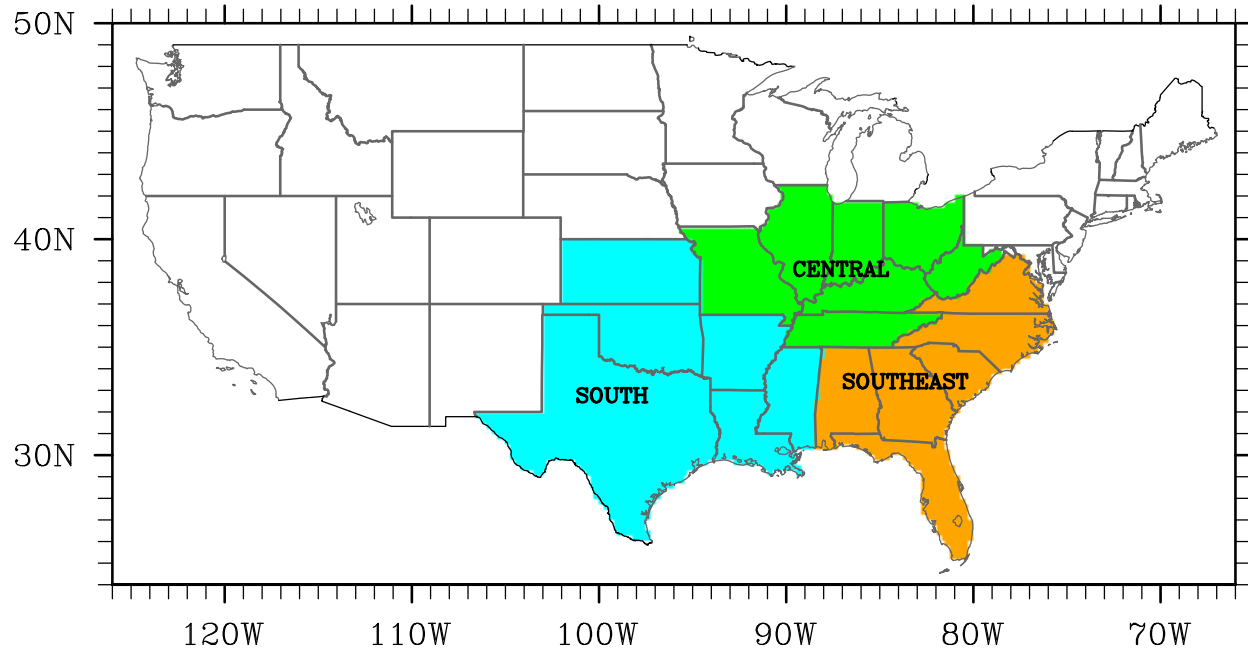
**Figure S1.** Time-longitude plots of the tropical Pacific SST anomalies averaged between 5°S and 5°N for 21 El Niños that occurred during 1949-2012, derived from ERSST3. The unit is °C.

## Equatorial Pacific SST Anomalies – La Nina (0)



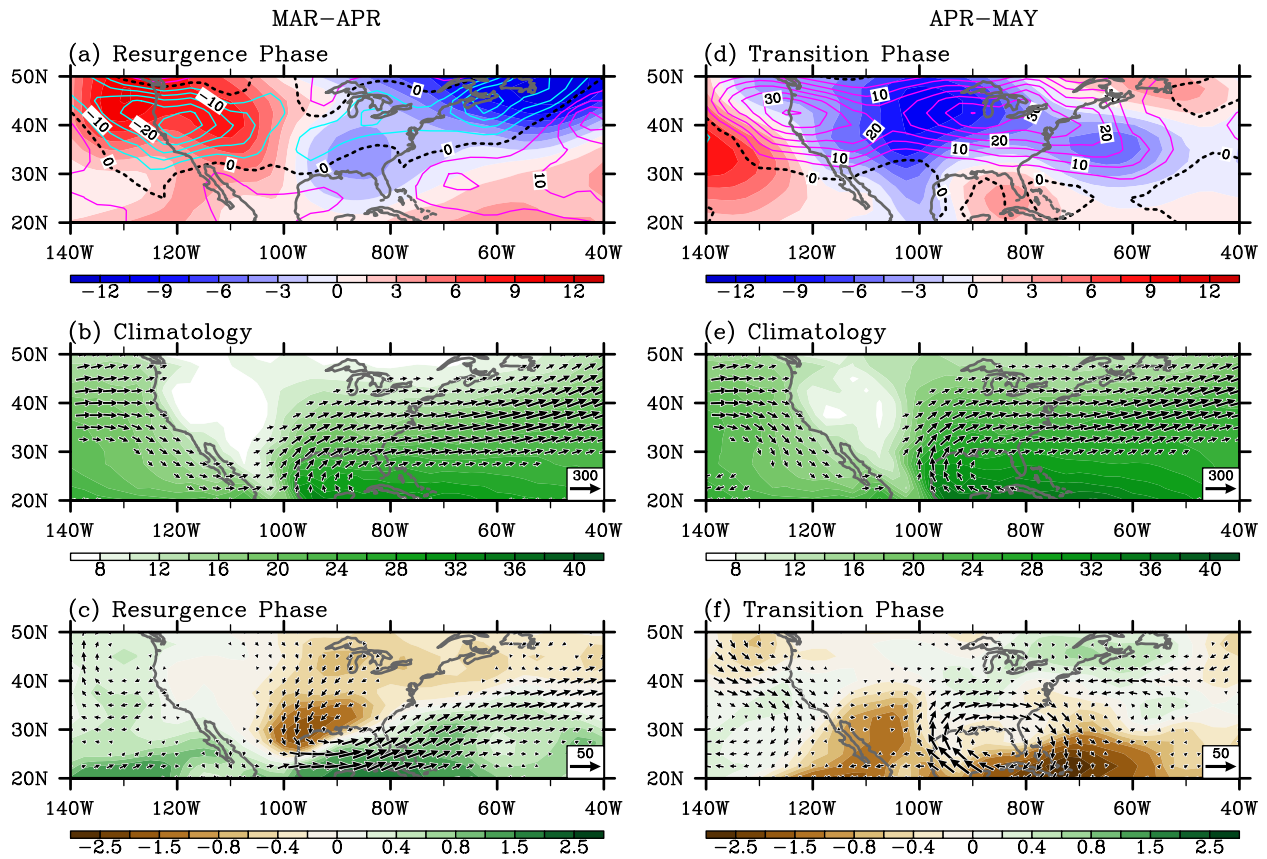
**Figure S2.** Time-longitude plots of the tropical Pacific SST anomalies averaged between 5°S and 5°N for 22 La Niñas that occurred during 1949–2012, derived from ERSST3. The unit is °C.

### Three U.S. Regions defined by NCDC



**Figure S3.** Three U.S. regions, namely the South, Central and Southeast, defined by National Climate Data Center. These regions are frequently referred in the main text to describe regional rainfall anomalies in the U.S.

ENSO Composite: Springtime Atmospheric Anomalies over the U.S.



**Figure S4.** Upper-panel: anomalous geopotential height at 850 hPa (color shades) and variance of 5-day high-pass filtered meridional winds at 300 hPa (contours) for (a) early spring of ENSO resurgence phase and (d) late spring of ENSO transition phase. Mid-panel: climatological moisture transport (vectors) and precipitable water (color shades) in (b) early and (e) late spring. Bottom-panel: anomalous moisture transport (vectors) and precipitable water (color shades) for (c) early spring of ENSO resurgence phase ( $0.5 \times [\text{El Niño resurgence} - \text{La Niña resurgence}]$ ) and (f) late spring of ENSO transition phase ( $0.5 \times [\text{El Niño-to-La Niña transition} - \text{La Niña-to-El Niño transition}]$ ). The units are  $\text{kg}\cdot\text{m}^{-1}\cdot\text{s}^{-1}$  for moisture transport,  $\text{kg}\cdot\text{m}^{-2}$  for precipitable water, gpm for geopotential height and  $\text{m}^2\cdot\text{s}^{-2}$  for variance of meridional winds.