**AGU**PUBLICATIONS

*Geophysical Research Letters*

Supporting Information for

**Diversity of Pacific Meridional Mode and its distinct impacts on El Niño-Southern Oscillation**

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**Contents of this file**

**Table S1.** Positive and negative PMM (WPMM and WPMM) events chosen based on the criterion of ±0.7 standard deviation. Red represents El Niño years; blue denotes La Niña years.

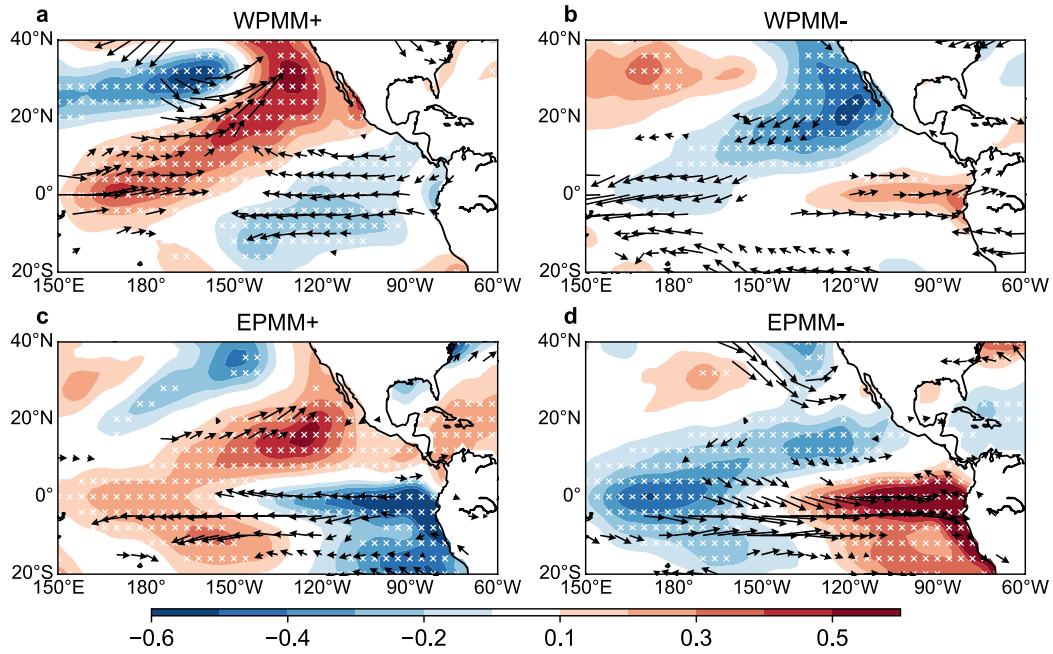|  | Positive | Negative |
|---|---|---|
| WPMM | **1963**, 1980, **1986, 1997**, **2002**, 2010, **2015** | **1955**, 1956, 1971, **1975**, 1979, **1999**, 2008, **2016** |
| EPMM | 1954, 1968, **1973**, 1978, **1982**, **1988**, 1996, 2003, 2018 | **1965**, **1976**, **1983**, 1992, 1993, **1998**, **2006**, 2012, **2017** |

**Figure. S1. Clustering analysis with simultaneous El Niño signal removed.** The cluster 1 (C1) (a) positive and (b) negative western PMM (WPMM) events; and cluster 2 (C2) (c) positive and (d) negative eastern PMM (EPMM) events. The white crosses represent composite of SST (°C) with area above 90% confidence level based on two-tailed t test and the black arrows indicate the composite of 850hPa winds (m/s) above 90% confidence level.
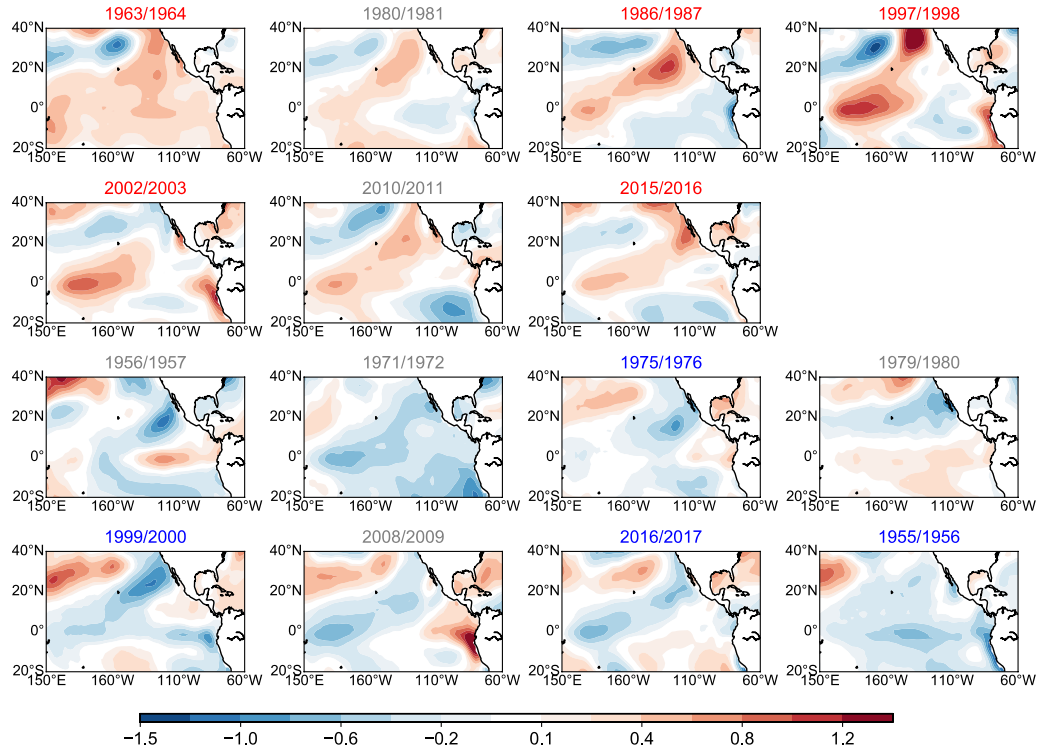
**Figure S2. The spring SST anomalies of 15 individual C1 PMM events**. The year marked by red (blue) color represents the El Niño (La Niña) year, respectively.
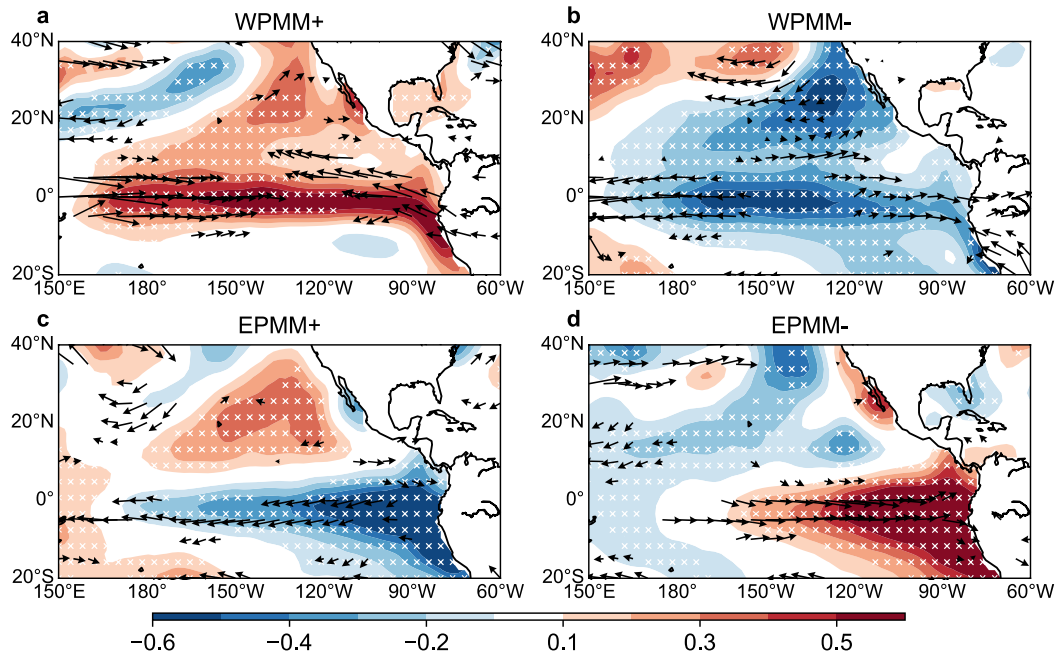
**Figure S3. Composites of May-June-July (MJJ) averaged SST and 850hPa wind anomalies based on different types of PMM years.** (a) The composite MJJ SST anomalies during positive WPMM years; (b) same as (a) but for negative WPMM years; (c) the composite MJJ SST anomalies during positive EPMM years; and (d) same as (c) but for negative EPMM years. The white crosses represent area above 90% confidence level based on Student's and the black arrows indicate the composite of 850hPa winds (m/s) above 90% confidence level.
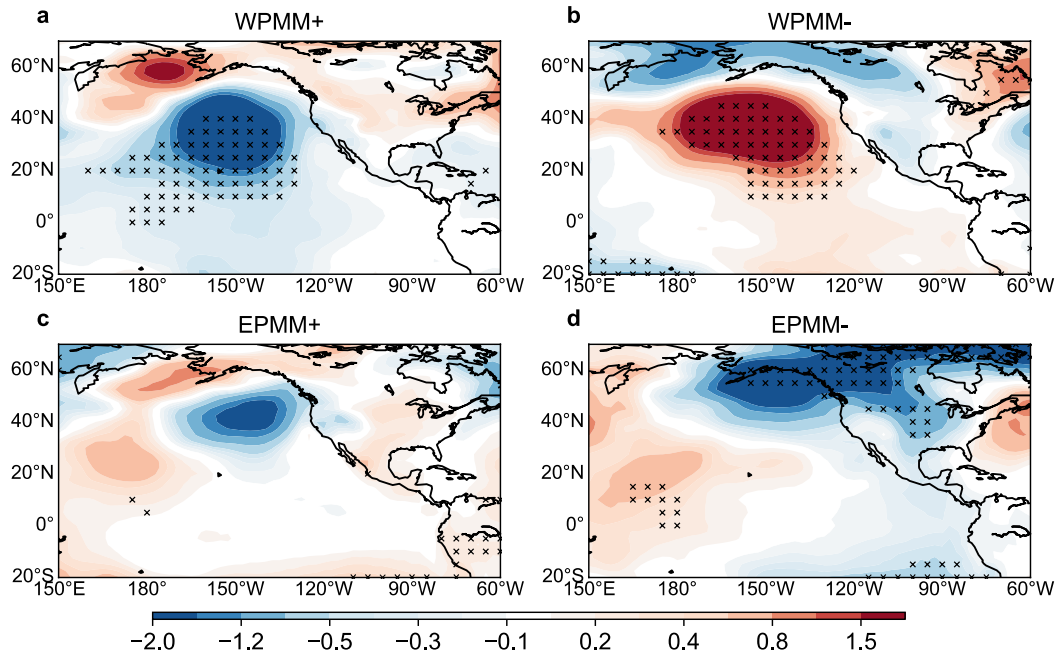
**Figure S4. The composite of previous NDJ SLP anomaly based on FMAM PMM events for the period 1950-2018**. (a) the NDJ SLP anomalies based on C1 positive PMM events; (b) same as (a) but for C1 negative PMM cases; (c) same as (a) but for C2 positive PMM years; (d) same as (b) but for C2 negative PMM years.