

Impact of the astronomical lunar 18.6-yr tidal cycle on El-Niño and Southern Oscillation

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Even though El-Niño and Southern Oscillation (ENSO) has a tremendous impact on global climate and society, its long-term forecast remains difficult. In this study, we discovered a statistically significant relationship between ENSO timing and the 18.6-year period lunar tidal cycle in the mature-phase (December –February) ENSO time-series during 1867–2015 and extending back to 1706 with proxy data. It was found that El-Niño tended to occur in the 1st, 10th, and 13th years after the maximum diurnal tide in the 18.6-yr cycle, and La-Niña tended to occur in the 3rd, 12th, and 16th years. These tendencies were also confirmed by corresponding sea-surface temperature (SST) and sea-level pressure (SLP) distributions; particularly Pacific SST and SLP spatial patterns in the third La-Niña and the tenth El-Niño year well resemble those of Pacific Decadal Oscillation (PDO). These findings contribute to understanding and forecasting long-term ENSO variability.

Keywords: El-Niño and Southern Oscillation, air-sea interaction, tide, mixing, climate