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An OLR-based El Niño index for effects on U.S. seasonal weather anomalies

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The El Niño-Southern oscillation phenomenon has become well known outside of the scientific literature because it has been linked to substantial global seasonal weather anomalies. In affected regions, composites of seasonal weather anomalies compiled from lists of ENSO-extreme years can form the basis for successful seasonal weather prediction efforts, provided the linkages are strong enough. The composites of El Niño-year seasonal U.S. weather anomalies discussed previously (e.g. Harrison and Larkin) have identified various characteristic temperature and precipitation anomalies in some U.S. regions and seasons, but have typically not had very high levels of statistical significance and robustness (event to event similarity; e.g. Harrison and Larkin) even in the regions of largest statistical significance. Composites based on less demanding definitions of El Niño years typically have even less significance and robustness. Here we show that composites of seasonal average mid-tropospheric atmospheric circulation, U.S. temperature and precipitation anomalies over the satellite-era years distinguished by OLR behavior in the eastern equatorial Pacific offer improved levels of statistical significance (e.g. 95% level) and robustness compared to those in the studies previously published. We show also that the seasonal weather composites associated with years classified as El Niño by less demanding criteria have dramatically less statistical significance; most of the useful correlation is the result of the OLR-based events. OLR behavior is more directly connected to atmospheric heating and so it is not surprising that it is better related mid-latitude atmospheric circulation anomalies during an El Niño event than are the more traditionally indexed surface marine variables. We suggest that the OLR perspective on El Niño deserves addition attention than it has so far received. The forecast utility for other years also merits further scrutiny.