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An OLR perspective on ENSO impacts on seasonal weather anomalies

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El Niño-Southern Oscillation (ENSO) impacts on seasonal weather anomalies form a basis for skillful statistical seasonal weather prediction in the regions around the globe where the statistical links between ENSO and seasonal weather anomalies are strong. Tropical Pacific sea surface temperature (SST), sea level pressure (SLP) and outgoing longwave radiation (OLR) all provide measures of the coupled ENSO anomaly state, but of these OLR is most closely connected to the tropical Pacific atmospheric heating anomalies that allow ENSO to influence seasonal atmospheric circulation and weather anomalies elsewhere. OLR shows a different sort of behavior over the tropical Pacific than SST or SLP (Chiodi and Harrison, 2010). A unique warm-ENSO (El Niño) index based on outgoing longwave radiation (OLR) conditions in the tropical Pacific has been shown to have an especially close statistical linkage to seasonal weather anomalies over North America (Chiodi and Harrison, 2013). A complimentary OLR-based cool-ENSO (La Niña) index has also been proposed and this pair of OLR-based ENSO indices is evaluated for their respective connections to interannual seasonal weather and atmospheric circulation anomalies around the globe using composite analysis. We find that since 1974, when satellite-based OLR observation became available, most of the useful (statistically significant and consistent from event to event) ENSO impacts on seasonal precipitation are due to the years distinguished by the OLR-based ENSO indices. The 4 “OLR El Niño” and 6 “OLR La Niña” events identified in the 1974-2012 period are a subset of those identified by the commonly used Niño 3.4-based ENSO definitions (roughly half). The other “non-OLR ENSO years” yield global seasonal weather anomaly composites that, in terms of amounts of locally statistically significant anomaly, are not much different than should be expected from the effects of chance alone. The OLR El Niño and OLR La Niña years are typically (9 out of 10) distinguished from others by the respective OLR indices prior to the start of the strongly affected boreal winter season. Thus, to the extent this observed behavior holds in the coming decades, OLR diagnostics can serve as indicators of times in which greater confidence can be placed in seasonal forecasts. Understanding better the factors that link tropical Pacific SST and OLR anomalies merits attention.