



Quantification of persistence/predictability barriers in ENSO and its application

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The El Niño-Southern Oscillation (ENSO) is usually subject to a persistence barrier (PB) in boreal spring. This study quantifies the PB and then reveals its distinct features in the two types of ENSO, the eastern Pacific (EP) type with sea surface temperature anomalies (SSTAs) centered in EP and the central Pacific (CP) type with SSTA center in CP. We suggest that the PB of ENSO can be measured by the maximum rate of auto-correlation decline of Niño SSTA indices to represent timing and intensity of the PB where the SSTA loses its persistence fastest. Results show that the PB of ENSO generally occurs in boreal late spring - early summer in terms of Niño3.4 index, and the indices for representing the EP ENSO type have the PBs in late spring while the indices for the CP type have the PBs in summer. Further, by taking a negative summation of the rate of autocorrelation decline during March-August, we define a simple index to quantify the PB intensity of ENSO. The CP ENSO type features a much weaker PB in terms of its two common Niño indices and in this sense may be more predictable, compared to the EP type. Using this index, we can find that the PB intensity of equatorial SSTAs features a longitudinal distribution along the equator, with the stronger PB over the EP than the western Pacific and the far EP. This study may provide a useful tool for understanding potential predictability of the two ENSO types.