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Seasonal prediction of North Pacific SSTs and PDO in the NCEP CFS Hindcasts

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This study assessed the seasonal prediction skill of North Pacific SST anomalies as well as the Pacific Decadal Oscillation (PDO) index using the NCEP Climate Forecast System (CFS) hindcast data set for 1982-2006. The SST forecasts exhibit significant skills over much of the North Pacific for two to three seasons in advance and outperform the anomaly persistence forecasts over much of the North Pacific except areas near the Kuroshio Extension around 35N. There is a strong seasonality in the PDO prediction: predictability is highest for forecasts initialized in the boreal spring and lowest for those initialized in the boreal fall. Similar to Nino 3.4 prediction, the PDO forecast in the CFS represents a constant phase shift with respect to lead month. The influence of ENSO predictions on the PDO and North Pacific SST predictions were investigated. ENSO composite analysis showed that seasonal prediction skills in the central North Pacific mainly result from the prediction skill of ENSO via atmospheric bridge. As a result, the CFS PDO skill is significant higher than the persistence skill at all leads during ENSO years. However, the CFS PDO skill is significantly lower than the persistence skill during normal years, and therefore, the overall PDO skill in CFS only beats persistence skill at 1-2 lead months. The poor skill during the normal year is attributed to large forecast errors near the Kuroshio Extension. Our study suggests that to improve PDO prediction skill we need to continue to improve ENSO forecast skill as well as to reduce model biases in the western North Pacific.