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Seasonal predictability of sea surface temperature anomalies over the Kuroshio–Oyashio Extension: low in summer and high in winter

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The seasonal predictability of sea surface temperature anomalies in the Kuroshio–Oyashio Extension (KOE–SSTA) is explored by performing perfect model predictability experiments from the point of view of initial error growth in a global coupled model. It is found that prediction errors of KOE–SSTA always increase in boreal summer and decrease in boreal winter, which leads to larger (smaller) prediction errors and lower (higher) prediction skills in boreal summer (winter). This seasonal characteristic of KOE–SSTA error growth implies a season–dependent predictability with lower in summer and higher in winter. The mechanism responsible for error growth associated with the seasonal predictability is also explored. The error increase in summer and error decrease in winter of KOE–SSTA are largely attributed to the seasonal evolution of latent heat flux error and mean temperature advection by vertical current error, both of which are forced by the prediction error of one–month leading zonal wind stress per unit mass for the mixed layer in KOE region. The shallowest (deepest) mixed layer in summer (winter) amplifies (reduces) the forcing of zonal wind stress errors on the error growth of KOE–SSTA, causing the seasonal evolution of prediction errors of KOE–SSTA and ultimately resulting in the season–dependent predictability of KOE–SSTA: low in summer and high in winter.