The persistence characteristics of sea surface temperature anomalies (SSTA) in the North Pacific are investigated and compared with the ENSO spring persistence barrier (PB). The results show that SSTA in the Northwest Pacific Basin (NWPB) has a PB in summer. Similar to the ENSO spring PB, the persistence of SSTA in the NWPB shows a significant decline in summer regardless of the starting month. Although the phase locking of SSTA to the annual cycle generates the ENSO spring PB, it does not explain the NWPB summer PB.

Local oceanic process and atmospheric forcing may be responsible for the NWPB summer PB; the relative influences of these factors on SSTA persistence differ between the cold and warm seasons. Local oceanic process and atmospheric forcing both influence SSTA persistence starting in wintertime, whereas SSTA persistence starting in summertime may be more strongly influenced by air–sea interaction, such as coupling between atmospheric circulation and SSTA and the positive cloud feedback on SSTA at the initial stage of the summertime SSTA persistence, because the shallow summertime mixed layer is decoupled from thermal anomalies at depth in the ocean. In contrast, remote ENSO forcing may have no significant influence on the NWPB summer PB.