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The Impact of Kuroshio Extension Fronts Variation on the Pacific Storm Tracks and the relationship with Temperature over North America

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The intensity index of Kuroshio Extension and northern front zones (KEF) is defined as the area average of SST meridional gradient by using Hadley Center's surface sea temperature dataset (1949-2014), and the Kuroshio Extension frontal intensity index (KEFI) has seasonal to interdecadal variations. In winter, the KEFI has significant positive correlation with transient variances in the North Pacific storm tracks area, and the positive relationship appears when KEFI lead storm tracks one month which indicates the intensity of KEF could influence storm tracks in winter. To investigate the possible mechanism, we found: when the winter SST front is stronger, the more significant difference between ocean-air heat flux in both sides of KEF could strengthen the near-surface temperature gradient, which maintains the near-surface baroclinicity and benefits the transient heat transport, promote the develop of transient eddies at last. Additional, the large-scale circulation also be response to KEF in winter: when the KEF is stronger, the Aleutian is deepen, the subtropical high is strengthen, the 500 hPa potential high is increased (decreased) in south (north), the subtropical jet is weaker and wider. It is found that the oceanic fronts promote storm tracks by transporting heat upward and maintaining the air temperature gradient in winter. In further, the significant correlation was found between the Kuroshio Extension Oceanic Front intensity and the temperature over North America in autumn and winter.