# Influence of the Kuroshio Extension and Oyashio fronts on the atmosphere as revealed in the JRA-55 family

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Impact of midlatitude frontal SST gradients on the overlying atmosphere are assessed through comparison between two products of a new Japanese reanalysis (JRA55). One of them is a product called JRA55C in which in-situ observational data have been assimilated in a forecast system with horizontal resolution of ~60km and the COBE SST data with 1-degree resolution is prescribed. The other is an additional product (JRA55CHS) with MGDSST data with a quarter-degree resolution, which can resolve the frontal-scale SST structures. The comparison reveals substantial differences in midlatitude atmospheric processes around the western boundary currents and associated SST fronts. As a typical example, wintertime atmospheric response to variability of the Kuroshio Extension (KE) is examined. The Kuroshio Extension fluctuates between its stable and unstable regimes on (quasi) decadal time scale. In its unstable regime, eastward transport of the KE decreases, and its path tends to be more meandering compared to its stable regime. As in satellite observations, enhancement of cloudiness and precipitation in the mixed-water region east of Japan during the unstable regime of KE relative to its stable regime is represented well in JRA55CHS but not in JRA55C product. The enhancement results from augmented heat/moisture release from the warmer ocean with more active warm-core eddies in unstable KE regimes. This oceanic thermal forcing onto the atmosphere is manifested as positive correlation in anomalies between SST and heat/moisture release, which is represented only in the high-resolution MGDSST but not in the COBE SST. Distinct differences in upward motion and diabatic heating ratio represented in these products are not limited within the atmospheric boundary layer, suggesting the significant impact of the oceanic forcing on the atmospheric circulation in free atmosphere.

 