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The Role of Sensible Heat Transport by the Stationary Waves in Climate Variability in the Northern Hemisphere.

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Previous studies (van Loon, 1979 and van Loon and Williams, 1980) have shown that during the northern hemisphere winter, increase of the total sensible heat transport in middle latitudes is associated with increased zonally averaged temperature gradient in the subtropics and decreased temperature gradient at middle and northern latitudes. The strong negative correlation between the total sensible heat flux divergence and zonally averaged temperature in middle latitudes suggests that this effect is mainly owed to the flux of the stationary (mean) waves. In addition, temperature gradients in subtropical latitudes tend to be negatively correlated with those in higher latitudes, implying a connection with changes in the transport of sensible heat by stationary waves and furthermore with the storm tracks at different latitudes. The present work aims to update the earlier studies and to explore the association between total eddy transport and temperature gradients as well as the relationships between gradients at lower and higher latitudes. NCEP Reanalysis data, over the period 1958-2005, were used to calculate total, mean and transient heat transport and to estimate their correlations with meridional temperature gradient at the 850 hPa. Our findings support those of the earlier studies. Moreover, the mean annual series of lower-troposphere temperature in the middle latitudes were found in agreement with those for the sensible heat flux in the stationary waves. It is assumed that the increase of temperature during the last two decades in the subtropics is associated with a shift of atmospheric baroclinicity and low system tracks northwards along with intensification of the Icelandic low.