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Observed effects of integrated water vapor on long-term diurnal temperature range changes over China

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Diurnal temperature range (DTR) is one of important index used to describe the climate change and variability. The decline in DTR has been observed over most global land areas in recent decades due to a faster increasing in daily minimum temperature (Tmin) than daily maximum temperature (Tmax). The changes of the DTR in different region generally are determined by many different factors. In this study, we will quantitatively assesses the strong damping effects of column-integrated water vapor on the long-term DTR over China using more homogenized datasets of observed daily extreme 2-meter temperature and the daily precipitable water (PW) derived from the radiosonde dataset. The result shows that the DTR derived from daily homogenized extreme temperature shows downward trends decreasing by about 0.2-0.5oC decade-1 over most of China during 1960-2010 and by more than 0.5o/decade over northern China in winter. The long-term DTR change is also significantly correlated with the tropospheric column-integrated water vapor (r?0.60), with a dPW/dDTR slope of ˜-9.7% K-1, which is particularly higher in summer and autumn.

Keywords: Diurnal temperature range, Water vapor, Observed effects, China