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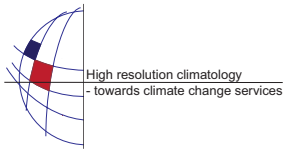


# Effect of Planetary Boundary Layer Feedback on the Diurnal Temperature Range

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Over the last 20 years, the diurnal range of surface temperature (DTR) has decreased over the Northern Hemisphere. Increases in cloud cover are frequently cited as one of the likely causes due to their effectiveness at greatly reducing the surface solar radiation, and hence decreasing the daily maximum temperature. However, the observed decrease in DTR is mainly due to the minimum daily temperature, which has risen faster (0.609 K $dec^{-1}$) than the maximum temperature (0.591 K $dec^{-1}$). Recent work has suggested a relationship between the higher climate sensitivity of the mean daily minimum temperature and the turbulent exchange in the planetary boundary layer.

To investigate the relationship between the DTR and the daily minimum and maximum temperatures over land in the Northern Hemisphere, where the observed decrease in DTR is especially large, this work examined twenty years of data from the ERA-Interim re-analysis. The temperatures were examined when the atmosphere was in a relatively steady-state and after the effects of precipitation were removed. It was found that during the winter, the diurnal temperature range is strongly dependent upon the mean daily minimum temperature, which at high latitudes is well correlated with the boundary layer height ($r \approx 0.6$, $p \leq 0.01$). The detailed results of this analysis will be presented, and their implications discussed.