An accurate estimation of long-term temperature trends is vital for a realistic assessment of the climate change. Radiosonde temperature observations provide the only atmospheric measurements that have both a high-vertical resolution and long enough period for quantifying the vertical profile of long-term atmospheric temperature trends. In this study, long-term atmospheric temperature trends have been derived from radiosonde data obtained at nine stations located in Antarctica. It is concluded that over the past five decades significant lower-stratospheric cooling and tropospheric warming trends have occurred over the Antarctic. While the attributions of the observed significant atmospheric temperature trends are beyond the scope of this study, it has been noted that the observed pattern of the tropospheric warming and stratospheric cooling is one of the expected consequences of the increase in concentration of greenhouse gases and stratospheric ozone depletion. It has also been demonstrated that significant warming in the Antarctic at the surface is attributed to anthropogenic influence.

Our study has also demonstrated clear seasonality of the observed stratospheric temperature trends. In both spring and summer, cooling trends in the lower stratosphere were highly significant, while autumn and winter temperature trends were rather weak and statistically insignificant. This seasonality of the atmospheric trends is likely linked to the dramatic seasonal reduction in the lower-stratospheric ozone concentration over the Antarctic in the austral spring-summer seasons.