

Linking the southern annular mode to the diurnal temperature range shifts over southern Africa

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Abstract

The link between the diurnal temperature range (DTR) and the southern annular mode (SAM) over southern Africa for the October to December period during 1960 to 2012 is established using observations. The DTR shifts are consistent with the change of moisture and temperature advection over the subregion which is related to the SAM-induced circulation alterations. As such, we consider these changing circulation patterns as playing the dominant role in different types of the DTR development. In fact, for the long-term influence of changes in the large-scale circulation over southern Africa, the SAM circulation may have substantially contributed to the long-term development of cloud cover/precipitation, which can be used as a proxy for the DTR variability in recent decades. Therefore, cloud cover and precipitation changes acted as a disguise rather than the actual cause for the variations in DTR. At the same time, while the mean temperature trends over southern Africa are similar to the global trends that indicate general warming, this increase is superimposed on the significant DTR decadal variability. Consequently, the DTR can be considered as a possible radiative forced index independent of internal climate variations, which is able to provide additional information for the detection and attribution of climate change over southern Africa.