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Dominant modes of Diurnal Temperature Range variability over Europe and their relationships with large-scale atmospheric circulation and sea surface temperature anomaly patterns

Monica Ionita-Scholz (1), Gerrit Lohmann (), Norel Rimbu (1,2,3), and Patrick Scholz ()

(1) Alfred Wegener Institute, Paleoclimate Dynamics, Bremerhaven, Germany (monica.ionita@awi.de), (2) University of Bucharest, Faculty of Physics, Bucharest, Romania, (3) Climed Norad, Bucharest, Romania

The relationships between the dominant modes of interannual variability of Diurnal Temperature Range (DTR) over Europe and large-scale atmospheric circulation and sea surface temperature anomaly fields are investigated through statistical analysis of observed and reanalysis data. It is shown that the dominant DTR modes as well as their relationship with large-scale atmospheric circulation and sea surface temperature anomaly fields are specific for each season.

During winter the first and second modes of interannual DTR variability are strongly related with the North Atlantic Oscillation and the Scandinavian pattern, while the third mode is related with the Atlantic Multidecadal Oscillation. Strong influence of the Atlantic Multidecadal Oscillation and the Arctic Oscillation on spring DTR modes of variability was also detected. During summer the DTR variability is influenced mostly by a blocking-like pattern over Europe, while the autumn DTR variability is associated with a wave-train like pattern, which develops over the Atlantic Ocean and extends up to Siberia. It is also found that the response of DTR to global sea surface temperature is much weaker in spring and summer comparing to winter and autumn. A correlation analysis reveals a strong relationship between DTR modes of variability and the Cloud Cover anomalies during all seasons. The influence of the potential evapotranspiration and precipitation anomalies on DTR modes of variability is strongest during summer, but it is significant also in spring and autumn. It is suggested that a large part of interannual to decadal DTR variability over Europe is induced by the large-scale climate anomaly patterns via modulation of cloud cover, precipitation and potential evapotranspiration anomaly fields.