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# Anticyclonic atmospheric circulation as an analogue for the warm and dry mid-Holocene summer climate in central Scandinavia

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Abstract. Climate reconstructions from central Scandinavia suggest that annual and summer temperatures were rising during the early Holocene and reached their maximum after 8000 cal yr BP. The period with highest temperatures was characterized by increasingly low lake-levels and dry climate, with driest and warmest conditions at about 7000 to 5000 cal yr BP. We compare the reconstructed climate pattern with simulations of a climate model for the last 9000 years and show that the model, which is predominantly driven by solar insolation patterns, suggests less prominent mid-Holocene dry and warm period in Scandinavia than the reconstructions. As an additional explanation for the reconstructed climate, we argue that the trend from the moist early Holocene towards dry and warm mid-Holocene was caused by a changing atmospheric circulation pattern with a mid-Holocene dominance of summer-time anticyclonic circulation. An extreme case of the anticyclonic conditions is the persistent blocking high, an atmospheric pressure pattern that at present often causes long spells of particularly dry and warm summer weather, or "Indian summers". The argument is tested with daily instrumental temperature and precipitation records in central Sweden and an objective circulation classification based on surface air pressure over the period 1900–2002. We conclude that the differences between the precipitation and temperature climates under anticyclonic and non-anticyclonic conditions are significant. Further, warm and dry combination, as indicated by mid-Holocene reconstructions, is a typical pattern under anticyclonic conditions. These results indicate that the presented hypothesis for the mid-Holocene climate is likely valid.

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