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Assessing projected changes in heat waves over Northern Europe using two regional climate models at 8-km resolution.

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As temperatures in Northern Europe increase due to climate change the occurrence of extreme events such as heat waves is likely to change. A higher occurrence rate of heat waves can have serious health consequences, in particular for the elderly, but also for very young children and the infirm. Not only the occurrence rate of heat waves, but also changes in the duration of individual heat waves, is of importance. It is therefore of relevance to investigate how the occurrence of heat waves is likely to increase in the future, to allow for adaptation. We have looked at the projected changes in the occurrence rate of heat waves in a part of northern Europe including southern Scandinavia, the Baltic Sea and the North Sea, according to two different greenhouse gas emission scenarios: RCP4.5 and RCP8.5. In this study we have chosen to use the Danish Meteorological Institutes definition, in which a high temperature event is classified as a heat wave if the average of the maximum temperature of a period of at least 3 consecutive days exceeds 28°C. To estimate the change in the occurrence rate of heat waves we have used two different GCM-RCM combinations, NorESM-WRF (BCCR) and EC-EARTH-HIRHAM5 (DMI). Both regional models have down-scaled the global models to a resolution of about 8 km, and hourly values of several parameters including temperature, precipitation and wind have been stored. We compare the climate model data from three different time slices, 1981-2010 run with historical greenhouse gas concentrations, 2021-2050 (RPC4.5 and RCP 8.5) and 2071-2100 (RPC4.5 and RCP 8.5), to see the time evolution in the occurrence rate of heat waves for the two RCP scenarios. Our results indicate that the occurrence rate of heat waves in this region will increase as a consequence of global warming, and that individual heat waves will tend to last longer.