



Sensitivity of future severe Western Europe autumn storms to North Atlantic SST warming

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Recent simulations with a very high resolution ($\sim 25\text{km}$) global climate model indicate that severe storms with a tropical origin might reach western Europe in a warmer climate more often. Here we have investigated the sensitivity of this increase to the structure and amplitude of the warming in the North Atlantic. Warming of the eastern tropical Atlantic appears to be crucial for the possibility that tropical cyclones will reach western Europe. However, even without eastern tropical Atlantic warming Europe will be susceptible to severe storms in autumn that originate in the western tropical Atlantic. These are immature tropical cyclones that in present climate will vanish due to unfavourable conditions before reaching western Europe. Simulations for the near future (2030-2034) suggest that these weak tropical systems might already induce a significant increase of severe western European autumn storms for the coming decades due to baroclinic re-intensification that is enhanced by moist processes. This is sensitive to the structure of the mid-latitude warming. Further warming beyond the near future will not increase the number of severe autumn storms that originate from weak tropical systems, due to enhanced tropical atmospheric stability that suppresses these weak systems. The number of severe storms originating from major hurricanes still increases further toward the end of this century.