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Attribution of the role of global warming in the forest fires in Sweden 2018

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The summer of 2018 in Sweden was characterized by a persistent blocking high-pressure system situated over northern and central Europe, resulting in numerous large forest fires spread over large parts of the country. The total burned area was more than 25.000 hectares, which is unprecedented for modern times in Sweden. Here, we study the role of global warming from the meteorological perspective. This is done by studying the Canadian Fire weather index (FWI) based on sub-daily data, both in ERA-Interim and 2 (large ensemble) climate models simulations (EC-Earth, CESM1-LENS).

For ERA-Interim, we find that the maximum forest fire risk in July 2018 had return times of $\sim$15 to $\sim$20 years in Southern Sweden, but $\sim$40 years in Northern Sweden. Further, we find a negative trend of the FWI for Southern Sweden over the 1979 to 2017 time period, yielding a decreased risk (with high uncertainty) of such an event solely based on reanalysis data.

The 2 large-ensemble climate models point to 2 to 3 times increased risk for such an event in all three regions for a 2 degrees warmer climate, relative to pre-industrial climate. For the current climate we find no clear change in risk for such an event, relative to pre-industrial climate, as CESM1 points to a slight decreased risk but EC-Earth to a slight increased risk. Changes to extremes in fire weather risk are mainly related to changes in precipitation and temperature. Over the whole of Sweden temperatures are projected to increase yielding an increase in fire risk. For precipitation, Northern Sweden is projected to have an increase in precipitation during summer, whilst Southern Sweden is projected to have an decrease of precipitation. This is however not reflected in the projected fire risk, as both Northern and Southern Sweden have a similar increase of risk for such an event.

Hence, we find no clear influence of global warming in the 2018 forest fires in sweden, but do find an increased risk of such an event for future climate.