

# Was the summer of 2018 a glimpse of the Swedish future?

After the summer of 2018 there has been an increased interest in extreme weather. When climate change is discussed it is usually concerning the average conditions however, there could also be a change in the behavior of extreme events.

The summer of 2018 in Sweden had unusually high temperatures over a long time period (heatwave) with little rain (precipitation). Although it would be convenient to assume this a part of how global climate change and increasing temperatures affect Sweden – is it necessarily so? The climate is usually described as the average weather over longer time periods (about 30 years) and thus a perceived change in weather cannot be directly attributed to a change in climate. It could also be an extreme occurrence in the present climate that simply happens rarely. These extreme events are also part of what describes the climate and can be described as events that have a probability of happening with for example 10-, 100- or 1000-year intervals, or return periods.

The climate models used when studying climate change are commonly run once for a time period to discern the change over time. However, since extreme events are so rare, a change would be hard to distinguished using so short time periods. Instead a model can be run multiple times over the same time period and in that way give enough data points. The Japanese d4PDF database consists of such simulations, that have been run 100 times in the present climate and 90 times for a future climate that is about 4 degrees warmer globally at the end of the century.

The work consisted in extracting the temperature and precipitation data for Sweden from the database, compiling the average climate now and in the future (also seasonally), comparing them to the official data from the SMHI and lastly calculating the extreme weather conditions now and in the future climate.

The primary results concern the extreme weather conditions in the future compared to the present climate. The maximum daily temperature, of the warmest day of the year, increases on average about the same as the average temperature. However, for the rare extraordinary warm days (return period >100 years) the temperature increases more and especially so in the south-east of Sweden.

Precipitation basically show the same pattern where there is an average increase of about 20 percent, but the severity of the short most extreme events, with long return periods, increase 50-75 percent. Notably, the precipitation does not increase in south-east Sweden during the summer which would, especially when combined with higher temperatures, cause years with water shortages to become more prevalent.

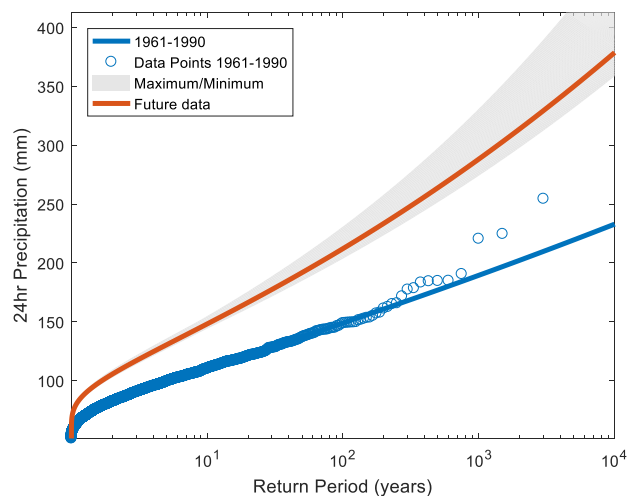


Figure 1: The present and future severity of 24hr precipitation events with increasing return periods (increasing rarity).