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Changes in Nordic climate up to 2100

The greenhouse effect, the trapping of the earth's long wave radiation in the atmosphere, makes it possible to inhabit our small planet. Without it, the mean global temperature would be -18 degrees Celsius. Instead it is +15 degrees. Since the industrial revolution, man has, for the first time, contributed to an enhanced greenhouse effect by the burning of fossil fuels and by changes of land areas, e.g. deforestation. The greenhouse gases which thereby are released are mainly CO₂ and NH₄. There is a strong correlation between the concentration of CO₂ and temperature. Any doubling of CO₂ in the atmosphere gives a temperature increase of about 3 degrees. In addition water vapor also serves as a potent greenhouse gas, thus enhancing the greenhouse effect. The pre industrial CO₂ value was 285 ppm. Now it has increased to 400 ppm. The last 1500 years, the temperature now is higher than ever, even higher than the warm medieval period. But, even if the trend is clear, there is also a natural variability, which means that the global mean temperature varies from year to year. Major volcanic eruptions can cause the global mean temperature to decrease for a year or two. The warming has been greatest in the polar areas. Our planet is not only experiencing a rise in temperature. Other parameters are also effected, thereby using a more proper term "climate change" than "global warming". The last decades the sea ice in the arctic has declined. Especially in summer, the reduction has been large. Measurements also indicate that sea level is rising. This is due to expansion of sea water because of increased temperatures, but also melting of glaciers are contributing.

To describe both past, present and future climate, climate models are run. Only when including man made forcings, the climate models corresponds to the observed temperature increase. Reliable measurements of temperature and precipitation have been done in the Nordic countries since 1850-1875. For all countries both the temperature and the precipitation are now higher than 100-150 years ago. The CO₂ concentration is expected to increase also in the 21st century. How fast depends on how the world develops the next 100 years. A climate "forecast" is called a "scenario". The climate models are mainly global models, how the local climate will change are assessed by downscaling. Climate scenarios for the Nordic countries up to the end of this century show an further increase in both temperature and precipitation. The number of days with zero crossings are expected to increase in cold climates in winter, but to decrease in mild climates. In spring and autumn there will be a reduction. The snow season is expected to be shorter, but in some mountain areas, there could be an increase in the amounts of snow. The area with permafrost is expected to decrease.