



## Expected future changes in the Arctic-Norwegian island of Svalbard.

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Located about midway between continental Norway and the North Pole is a group of Norwegian-Arctic islands called Svalbard. Longyearbyen is the administrative center of Svalbard, with about 2000 inhabitants, and the islands are the home of the polar bear, the Svalbard reindeer, the arctic fox, amongst other exotic creatures.

A cold and dry climate dominates Svalbard, with an estimated mean annual temperature of about -8.7°C and total precipitation varies between 200-600 mm/year.

Due to the “Arctic amplification”, temperatures in Svalbard have increased by about 3 times as much as the global mean, and has involuntarily become a laboratory for climate change. March 2019 was the 100'th month in a row with mean temperature exceeding the 1961-90 normal, which has resulted in e.g. several episodes of rainfall during winter in Longyearbyen.

In the report “Climate in Svalbard 2100” (Hanssen-Bauer et al., 2019), the Norwegian Centre for Climate Services (NCCS) in collaboration with several research institutions, presents a description of past, as well as projected future climate development towards the end of the century. It covers changes in atmospheric variables, along with hydrology, cryosphere and ocean, and includes effects on the physical nature, e.g. risk associated with landslides and avalanches. The report was commissioned by the Norwegian Environment Agency in order to provide basic information for climate change effect studies and climate change adaptation in Svalbard.

We will here present the main findings from this report, which includes changes from 1971-2000 to 2071-2100 under the high (RCP8.5) and the medium (RCP4.5) emission scenarios based on available Arctic CORDEX projections:

- Annual temperature is expected to increase by about 10 (7)°C, under RCP8.5 (RCP4.5)
- Annual precipitation is expected to increase by about 65 (45)%
- Heavy precipitation events will occur more frequently and become more intense
- River flow is expected to increase, but the magnitude depends on the contributions from increasing temperature, precipitation and glacier meltwater
- Increased precipitation, and increasing fraction as rain, is expected to lead to more rain-floods and combined snowmelt-, glacier melt- and rain-floods
- Snow season is expected to shrink
- Erosion and sediment transport is expected to increase
- Near-surface permafrost is projected to thaw in coastal and low altitude areas for the high emission scenario
- Many types of avalanches and landslides are expected to become more frequent
- The loss of glacier mass and area is expected to change the landscape and contribute to global sea-level rise

### References:

I.Hanssen-Bauer, E.J.Førland, H.Hisdal, S.Mayer, A.B.Sandø, and A.Sorteberg., 2019: Climate in Svalbard 2100. NCCS report 1/2019.