



## *Climate change in the polar regions*

*Both Antarctica and the Arctic have a decisive impact on development of the climate at global level. Because of their role in the global climate system, a close watch needs to be kept on the polar regions so that we can respond adequately to the challenge of climate change at global level.*

In the context of climate change, the Arctic is playing the role of the canary in the coalmine. Over the past few decades, the annual average temperature in the Arctic has increased at almost twice the rate in the rest of the world. Without changes in global emission patterns, climate change is expected to accelerate in the Arctic in this century, contributing to major physical, ecological, social and economic changes, many of which have already begun.

Over the last few decades we have seen a substantial retreat in sea ice cover – multi-year sea ice has been significantly reduced, and the ice has become thinner. The observed minimum sea ice cover in the Arctic in the last few years corresponds to a warming that was not expected to occur for another 20-30 years.

Climate change is also being observed in Antarctica. In the last 50 years, the air temperature over the Antarctic Peninsula has risen by 2.5° C. The temperature of the ocean has increased by 1-2° C. Some of the ice shelves surrounding the Peninsula have disappeared and the ice masses onshore are increasing their speed on the way to the ocean.

### **Feedback processes in the Arctic can accelerate climate change**

The melting of sea ice is one of the key feedback processes that threaten to accelerate climate change. A reduction in ice and snow cover will increase the absorption of incoming radiation because a reflective white surface – snow and ice – is replaced by dark surfaces – open sea and bare ground. These absorb

more heat, which will lead to increased warming. Higher terrestrial temperatures may lead to thawing of the permafrost and subsequent releases of large quantities of methane to the atmosphere. This is another crucial feedback mechanism that may enhance warming and make efforts to combat climate change more difficult.

### **Effects on sea level rise**

The polar regions store large freshwater reservoirs in the form of ice. The Antarctic ice cap contains 90% of the freshwater ice of the world. Accelerated melting of the Greenland ice sheet and several Arctic glaciers is being observed. There are also signs of increased warming in the Antarctic. Melting of the ice caps will result in a considerable rise in sea level. Melting of the Greenland ice sheet, although only a long-term threat, would raise the sea level by about 6-7 metres. If only 1 per cent of the Antarctic ice melts, sea level will rise by 65 cm. The Greenland ice sheet is already shrinking. Ice melt in Antarctica is the most unpredictable variable in the prognoses of future sea levels, according to the IPCC. A rise in sea level will have devastating consequences for people's livelihoods in coastal areas.

### **Understanding more**

Polar climate research is a priority issue for the Norwegian government. We must understand polar processes better to make more precise climate predictions and gain a better foundation for understanding the consequences of climate change. A better understanding of climate processes will help us to identify how much emissions need to be cut so that we do not trigger irreversible physical processes that could make it impossible to control future climate trends.