

Invited keynote address

75 years evolution in our climate research

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Fram Museum, Bygdøy, Norway

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Dear organizers, ladies and gentlemen,

I am very pleased to be here today to commemorate an outstanding Norwegian scientist, and one of the great events in Norwegian research history. The previous speakers have given us interesting views of the *Maud* expedition, which was concluded 75 years ago, and of Harald Ulrik Sverdrup's scientific influence as one of the founders of modern oceanography.

Fridtjof Nansen pushed strongly for the *Maud* expedition after Amundsen misled him in 1910 and went to the Antarctic instead of the Arctic with *Fram*. Almost 10 years after his departure for the South Pole, Amundsen was able to fulfil his promise to Nansen, and set off with *Maud* to the Polar Basin, with Sverdrup onboard as the leading scientist. In this way, Sverdrup followed directly in Nansen's scientific footsteps

I doubt that Sverdrup ever considered himself a climate scientist. At that time, climate was not considered a research theme of its own. But it is clear that both Nansen and Sverdrup were aware of the Polar Basin's significant influence on global climate. As far back as in 1902, Nansen wrote: "it is evident that the oceanographical conditions of the North Polar Basin have much influence upon the climate, and it is equally evident that changes in the condition of circulation would greatly change the climate conditions". Nansen's words have been proven true: the scientific achievements of the 20th century have allowed us to understand many of the details of this complex cause-and-effect relationships between climate, ocean and atmosphere.

Climate is the average weather over a long time period. We need long-time series of climate parameters in order to document changes in climate and explain their causes. Such time-series can only be achieved by observational methods or by studying historic and prehistoric records. On land and in the atmosphere we have fairly good observational data for more than 100 years. Data are more sparse for the oceans; the seven years of data collected during the *Maud* expedition were an exceptional contribution to the establishment of long time records.

Though our observational data for the oceans are not as good as for the land and atmosphere, scientists have recognized the importance of ocean processes in climate change. We now realize that processes in the Polar Basin and its rim oceans have great influence on the influx of warm water to the North Atlantic, which is *the* factor that

makes western and northern Europe a relatively comfortable place to live for humans. But these processes and how they change with time are not well understood due to lack of long time series.

Determining the human impact on climate is a costly challenge that must be taken up. Research in the northern and southern extremities of our planet will be vital in this endeavour. The polar regions can be described as “early warning” areas. Glaciers and sediments in polar areas provide us with historical and current information that cannot be found elsewhere. Scientists tell us that rapid changes can be expected—within the lifetime of a person! This gives us a whole new perspective, and forces politicians worldwide to take action. Because climate change is an issue that cannot be more international, only by joining forces can we effectively confront this development. Consequently, I heartily welcome the initiative taken by the organizers of the Sverdrup symposium, which is to be held the next couple of days at the Polar Environmental Centre in Tromsø. One important purpose of the symposium is to promote the joining of forces by proposing an international observation programme of the geophysical processes that are so important to the large-scale ocean circulation in the North Atlantic. I can assure you that Norway will support such an initiative.

Scientists conclude with high certainty that the world wide temperature increase we have observed the last 20 years is caused by humans. In the Arctic, the sea ice is disappearing, precipitation is increasing, in some regions the average air temperature has increased by several degrees. We have observed that winter precipitation is increasing along the western coast of Norway and in northern Norway, as predicted by the regional climate model recently developed in Norway. Last year eight people were killed as a direct result of the enormous quantity of snow in the county of Troms in northern Norway. Infrastructure was damaged and transportation systems were closed down for weeks. Scientists predict that such conditions will prevail in the years to come, and there is growing political concern about the situation.

I am a politician, not a scientist. To take informed political action, my colleagues worldwide and I need high quality scientific knowledge about climate change, its causes and consequences in the natural world and on human society.

The changes we have seen in recent years and the increasing impacts on the society are the reasons why governments of the eight Arctic states have taken an initiative to conduct a joint Arctic Climate Impact Assessment (ACIA). At a ministerial meeting in Alaska next month, ministers from all these countries will approve the ACIA implementation plan. After four years, ACIA will deliver a scientific assessment of the societal consequences of climate change in the Arctic, and recommend actions to political leaders. I strongly support this initiative and will assure all of you that the political recommendations for actions will be given serious consideration.