



INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET

INSTITUTE OF MARINE RESEARCH
Nordnesgaten 50
P.O. Box 1870 Nordnes
NO-5817 Bergen – Norway
Tel.: +47 55 23 85 00
Fax: +47 55 23 85 31

www.imr.no

TROMSØ DEPARTMENT
Sykehusveien 23
P.O. Box 6404
NO-9294 Tromsø – Norway
Tel.: +47 55 23 85 00
Fax: +47 77 60 97 01

FLØDEVIGEN RESEARCH STATION
NO-4817 His – Norway
Tel.: +47 55 23 85 00
Fax: +47 37 05 90 01

AUSTEVOLL RESEARCH STATION
NO-5392 Storebø – Norway
Tel.: +47 55 23 85 00
Fax: +47 56 18 22 22

MATRE RESEARCH STATION
NO-5984 Matredal – Norway
Tel.: +47 55 23 85 00
Fax: +47 56 36 75 85

PUBLIC RELATIONS AND COMMUNICATION
Tel.: +47 55 23 85 38
Fax: +47 55 23 85 55
E-mail: informasjonen@imr.no

CONTACTS
Randi Ingvaldsen
Tel: 55 23 85 96
E-mail: randi.ingvaldsen@imr.no

Svein Sundby
Tel: 55 23 84 68
E-mail: svein.sundby@imr.no

Bjørn Ådlandsvik
Tel: 55 23 84 52
E-mail: bjorn.adlandsvik@imr.no

RESEARCH GROUP:
Oceanography

MARINE RESEARCH NEWS

Havklimaet i Arktis og den aktuelle situasjonen sommeren 2008

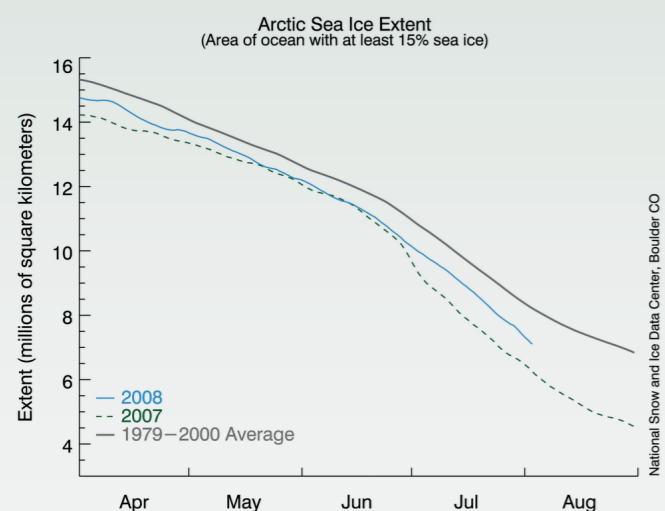


Figure 4. Time series of ice extent in the Arctic through the summer. The grey line is the long-term average, the blue line shows the situation in 2008 while the green dashed line shows 2007. Source: NSIDC.

▶▶ than normal, with particularly little ice north of Alaska. However, compared to the record low in 2007, there is more ice both in the Canadian Archipelago and in the regions north of eastern Siberia. In 2007 the Arctic ice cover was displaced towards the Atlantic sector, while this

year it is shifted towards the Pacific sector of the Arctic Ocean. It remains to be seen whether the ice cover this autumn will fall below the minimum of last year, but at the moment it seems likely that 2008 will not produce a new record.

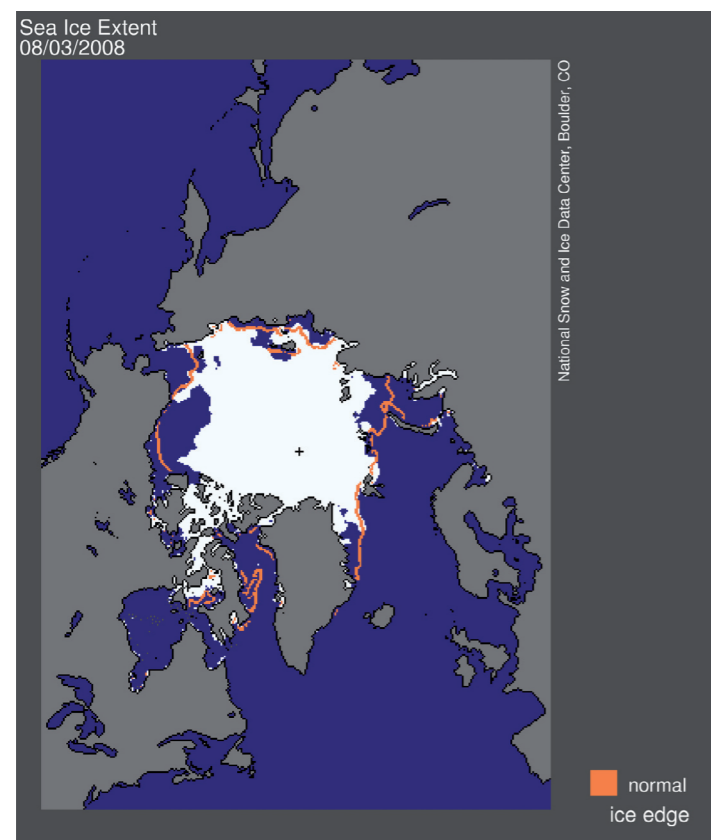


Figure 5. Ice cover in the Arctic on August 3, 2008. Source: NSIDC.

Photo: Merete Fonn



Arctic Ocean Climate and present situation in summer 2008

In late winter 2008 record-high temperatures were observed in the Barents Sea, but the spring and summer temperatures fell below those observed in 2007. There is slightly more ice in the Arctic Ocean than in 2007, but a large proportion of the ice is thin first-year ice, and can melt quickly.

BY RANDI INGVALDSEN, SVEIN SUNDBY AND BJØRN ÅDLANDSVIK

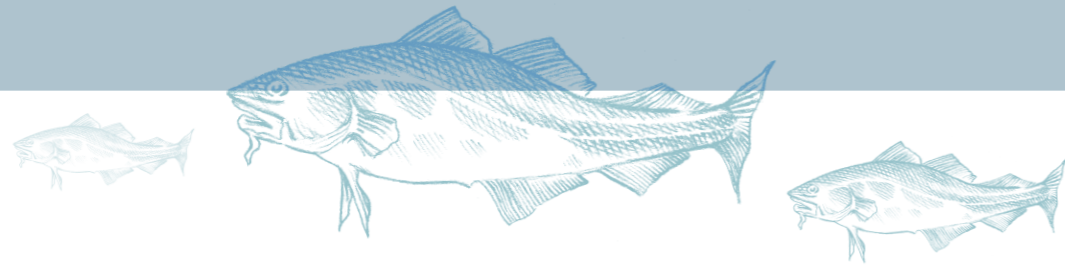
THE BARENTS SEA CLIMATE AND THE BIG PICTURE

A source of confusion in the climate debate is a lack of understanding of the difference between global and local climate. The global temperature is geographically averaged as a mean over the entire globe, and is often presented as a mean air surface temperature. Natural climate variations on short time-scales, such as interannual fluctuations and fluctuations from one decade to the next, usually disappear in the averaging process, leaving only the long-term climate variability (Figure 1, upper panel). In addition to a 60-70-year climate cycle caused by natural forcing, the figure shows an increasing temperature over the last 150 years. This

trend is attributed to human-induced climate change caused by greenhouse gas emissions. Temperatures on a regional scale, for example in the Barents Sea or in the Arctic, show greater variability than the global temperature (Figure 1, lower panel), and has a strong climate period of about 10 years. The long-term climate signal is therefore harder to identify in the figure, but it is still present.

The summer temperature in the Barents Sea fluctuates on an even shorter time-scale (Figure 2). We do not know all the mechanisms that control these fluctuations, but one of the most important ones is changes in the transport of warm Atlantic





Arctic Ocean Climate and present situation in summer 2008

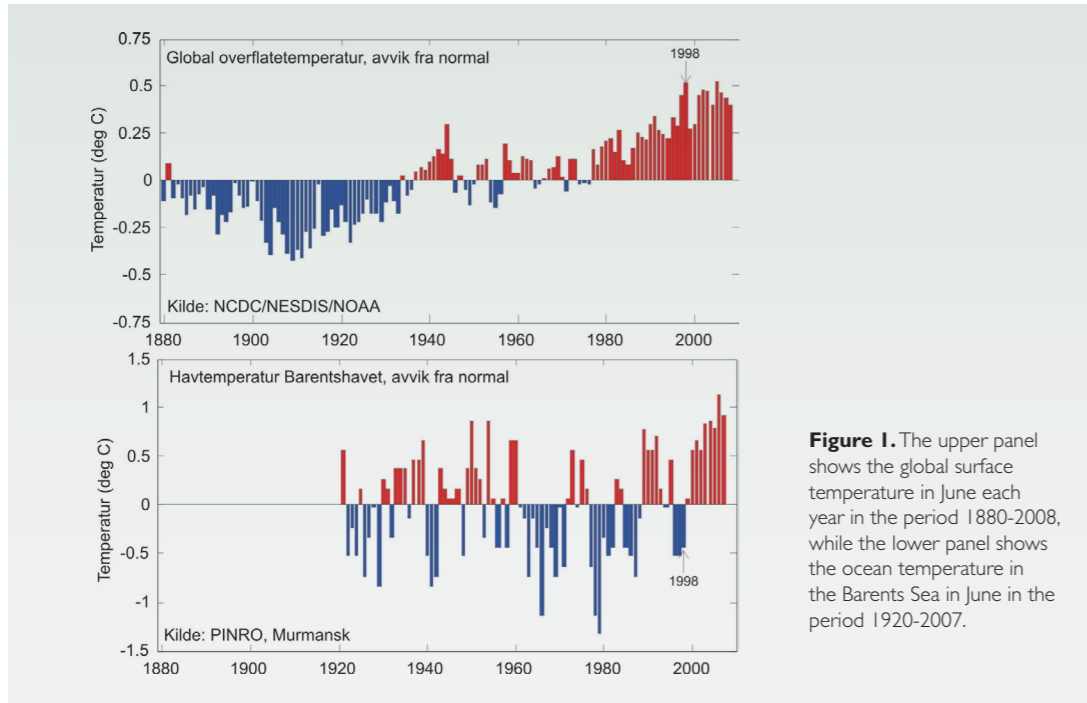


Figure 1. The upper panel shows the global surface temperature in June each year in the period 1880-2008, while the lower panel shows the ocean temperature in the Barents Sea in June in the period 1920-2007.

water coming from south. Another important factor is the local heating/cooling from the air, but in summer this influence is limited to the upper 50 meters. In recent years the temperatures in this ocean region have been high, but although it is still warm, the summer of 2008 was colder than the summer of 2007 (Figure 2). Colder waters in both the upper and lower water layers indicate both a weaker and colder Atlantic current, and less heating from the air due to lower air temperatures in spring 2008 than in spring 2007.

The global air temperature can therefore not be used directly in our region because it does not capture the local conditions, as is illustrated by the difference between the upper and lower panel of Figure 1. For example, the warmest year globally, 1998, was a relatively cold year in the Barents Sea. Another issue is that the global surface temperature is just the temperature at the surface, and its interannual variations do not represent year-to-year variability in the deeper water layers. This is evident from the time series from the Barents Sea showing that the surface temperature has been experiencing a decreasing

trend since 1998, while the temperature in the Atlantic inflow has increased (Figure 2). It is the temperature in the deeper water layers that has most impact on the marine ecosystem and fish stocks.

Another interesting point is that natural climate variations, for example large changes in the surface temperature in the Pacific Ocean (El Niño) one year, can be seen in the global surface temperature. Such conditions occurred in 1998, leading to a high global temperature that year (Figure 1). This means that we cannot expect a continuous temperature increase, but it does not mean that human-induced global warming is not occurring.

ICE CONDITIONS IN THE ARCTIC

The sea ice in the Arctic Ocean has been decreasing for as long as satellite measurements have been available, and in autumn 2007 the ice cover was at a record low (Figure 3). There was little ice in the Arctic Archipelago north of Canada, in the ocean regions north of Alaska and off eastern Siberia. This was caused by unusual

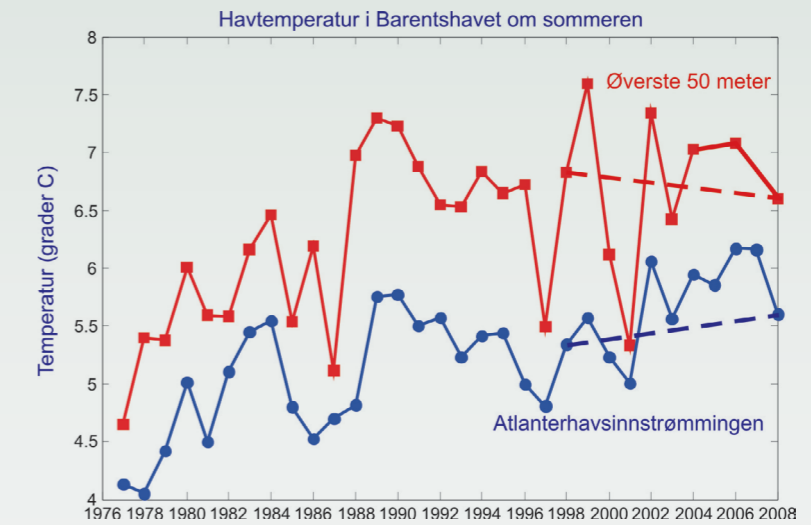


Figure 2. Observed ocean temperature in June as recorded by the Institute of Marine Research, Bergen, in its regular cross-section of the Barents Sea since 1977. The red line is the temperature in the upper waters, while the blue line is the temperature in the Atlantic inflow deeper in the ocean. The dashed lines illustrate the changes between the years 1998 and 2008.

wind conditions and high air and ocean temperatures. Due to the situation last year, the ice in the Arctic Ocean now consists mostly of new ice (i.e. first-year ice). The new ice is thinner than multi-year ice and melts faster.

The late winter 2008 was very warm in the Barents Sea, and the ocean monitoring performed by Institute of Marine Research, Bergen, showed higher temperatures than ever. In warmer water less ice forms during winter, and the thin first-year old ice melts faster. In spring 2008

US scientists warned that the North Pole might already be ice-free this summer. However, as already mentioned, the spring and summer of 2008 were colder than in 2007, and this is reflected in both the ocean temperatures and ice cover. Currently (late summer 2008) there is less ice than normal in the Arctic, but more than in 2007 (Figure 4). In addition, the geographical distribution of the ice is different. The current situation (August 2008) is shown in Figure 5. There is more ice than normal to the east of Svalbard, while the rest of the Arctic has less ice

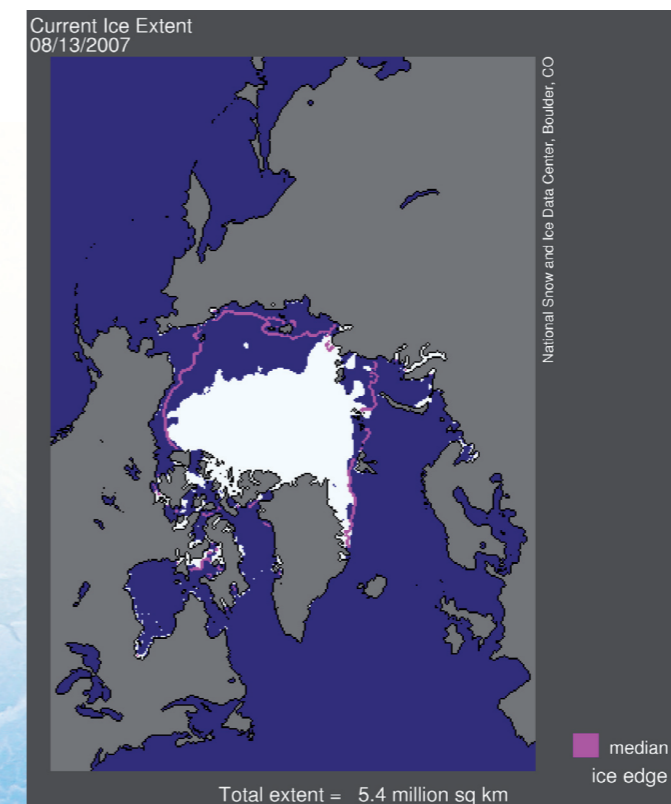


Figure 3. Ice cover in the Arctic on August 13, 2007. The orange line show normal ice cover at this time of year. Source: US National Snow and Ice Data Centre (NSIDC).