

The ice season 2004-2005

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Key Message

The ice season 2004/2005 was late, intensively freezing, short and normal in terms of ice extent.

The ice season started as normal in the middle of November but continued mild and easy during the beginning of the season. Short cold periods were interrupted by mild and windy weather until mid – February, in December –January number of intensive storm events passed over the Baltic which well mixed water masses. Then a cold period about one month long followed with rapid ice formation. The largest ice extent – 177,000 km² – was reached on the 16th of March. The ice winter was, by the extent of the ice cover, classified as normal. The ice breaking up was in most waters earlier than normal and the 23rd May the Baltic Sea was ice free.

Ice formation

In all maritime areas, with the exception of the Bay of Bothnia, winter began noticeably earlier than average, in the end of November, but most of the thin ice layer melted due to the mild and windy weather in December - January. A more extensive ice cover did not begin forming until the middle of February.

The first ice on the Swedish side was formed in sheltered bays in northernmost Bay of Bothnia in the middle of November, fairly normal as well this is normal in Estonian waters of the Gulf of Riga in the Pärnu bay, first ice appeared at the end of November.

First freezing in the southern part of the Bay of Bothnia started as normally, toward the end of the month. At the same time, ice also began forming on the Bothnian Sea, the Archipelago Sea and the western Gulf of Finland, about a month earlier than average, and in the eastern Gulf of Finland, about 2 weeks earlier than average.

The easy ice situation continued also in January. Temporarily some ice formed close the coast but it was rapidly drifted towards the northern coast. At the end of January also some ice formed off the coast.

Beginning of the ice season in Latvian waters was shifted to later dates. The first ice appearance in Latvian area of the Gulf of Riga (eastern coast of the gulf) has been observed in the late January 2005. That means about month later than average. The first ice appearance was observed with four weeks time delay at Liepaja station on January 27.

In the Lithuanian coast and Lagoon the first ice formed 26-27 January. The Curonian lagoon freeze (ice cover in whole lagoon) in February 6th.

The easy ice situation continued also in the beginning of February. Then the ice formation and ice extension were rapid. The 17th Bay of Bothnia and the Quark were almost covered by ice, only a minor open area occurred in central parts.

The Bay of Bothnia was totally covered with ice on the 24th of February, over a month later than average. At the end of February, the ice edge in the Gulf of Bothnia ran from out of Sundsvall to about 30 nautical miles south of Sydostbrotten and further to Storkallegrund, and from there about 15 nautical miles west of the Rauma lighthouse, and to Åland. The Archipelago Sea was frozen, and the ice layer in the Gulf of Finland reached the Bengtskär – Pakri line.

The ice edge in the northern Baltic Sea was situated along the line Söderarm – Bogskär – Tahkuna. The Gulf of Riga being frozen, but the open Gulf of Riga was still completely free of ice by the end of February.

At the end of February the coldness increased and the ice extent continued further south along the Swedish coast in Sea of Bothnia. Ice was also formed in archipelagos further south in the Baltic southwards to Karlskrona.

In the beginning of March the ice formation at sea continued in Sea of Bothnia southwards to Sea of Åland as well as in the archipelagos in the Baltic. In the Gulf of Riga the intensive ice formation started and by 12th of March entire Gulf was covered with thin, up to 15cm thick new ice, which then easily was drifting in varying wind conditions. NW and W winds, as well general circulation transported ice towards Southern coast of the Gulf of Finland, especially in second decade of the March. On Estonian coast, in Kunda area and in the Narva bay ridging occurred if wind speed exceeded 12m/s in mid-March, which caused problems for navigation there.

The 16th of March the ice extent was maximum. The largest ice extent was 177 000 km² (see Figure 1: simplified ice chart of 16 March and Figure 2). The Sea of Bothnia was almost covered by ice and the southern ice edge run from Söderarm at the Swedish coast south-eastwards via Svenska Björn to Ristna at the Estonian coast. Entire Gulf of Finland was covered with compact drift and fast ice eastern Helsinki-Tallinn line and with more open ice westward towards the entrance to the Gulf. Prevailing Northerly winds caused heavier ice conditions on Estonian coast than those on Finnish coast. The most part of the Gulf of Riga was covered by close to compact partly ridged drift ice, heavy ridges, some even bottom grounded and up to 7m thick, were observed in the entrance to the Pärnu Bay. Lake Mälaren was totally covered by ice and major parts of the lake Vänern. Some ice had also temporarily occurred in harbour areas in the Sound as well as inner sheltered Swedish fjords in Skagerrak.



Figure 1. The largest ice cover – 177 000 km² – was reached on the 16th of March.

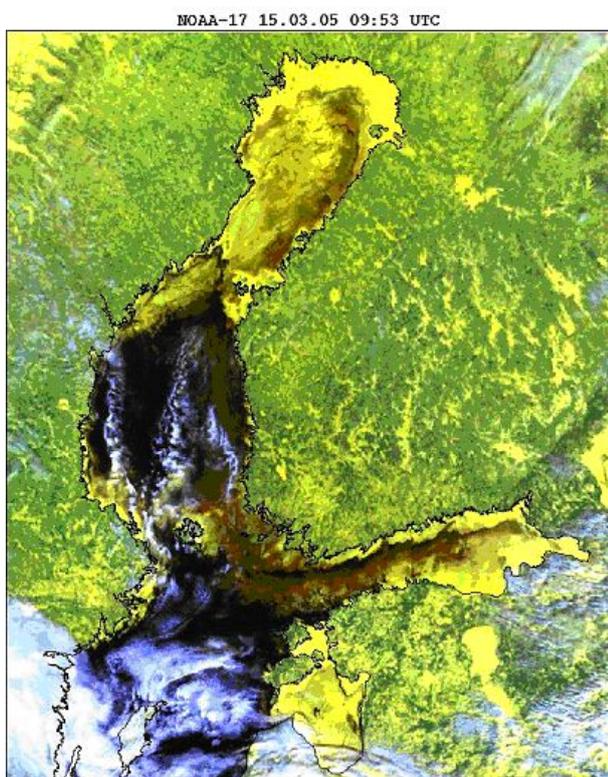


Figure 2. Satellite image of 15th of March 2005.

<http://www.bsh.de/de/Meeresdaten/Beobachtungen/Eis/Satbild15-03-05.jpg>

The southern Baltic Sea

Meteorological conditions in the winter of 2004/2005 led to two periods of ice formation in the western and southern Baltic. The first ice formed in some small harbours and shallow inner fairways in late January/early February, but melted away completely by mid-February. The second ice period of about four weeks began on the last days of February. On the coasts of Schleswig-Holstein and Mecklenburg, some thin ice was observed in the Inner Schlei (20 days), the harbours of Flensburg (6 days), Neustadt (4 days), Wismar (18 days), and Rostock (8 days) as well as on the Unterwarnow (4 days), but this type of new ice hardly hindered navigation. The coastal lagoons south of the Darss-Zingst peninsula and the shallow, sheltered coastal waters of Vorpommern were covered with ice for about 30 days, the fairways to Stralsund and Wolgast for 10 to 15 days. At the time of maximum ice development in the first decade of March, the thickness of level ice reached 5 to 15 cm.

Ice breaking up

The ice conditions began declining shortly after mid-March. In the Northern Baltic Sea the ice broke up toward the end of March, about a week earlier than average. On the open Latvian coast at Liepaja the ice disappeared by March 21, ten days later than normal. In the Lithuania, the Curonian lagoon was free for ice from 8 April.

The beginning of April the mild south-westerly winds penetrated over the Scandinavia. A lead opened along the Swedish coast from Piteå southwards while the ice at sea in Bay of Bothnia was compressed at the Finnish coast where new heavy ridges were formed and ice pressure occurred. During first days of April in the Gulf of Finland SW winds transported ice from Estonian coast West of Kunda towards the open sea in centre Gulf, where ice intensively melted during first decade of April. Eastern part of the Gulf of Finland still stayed icebound, Narva bay until 12th April, Primorsk and St.Petersburg area even until 22nd April.

In the Gulf of Riga the ice cover destruction starts from northern part of the gulf in the beginning of April. The rest of rotten drift ice was concentrated in the eastern part of the gulf by April 10. The last ice was observed at Salacgriva station (north-eastern coast of the gulf) by April 22. That is ten days later than normal. Pärnu Bay was covered with stable fast ice until 15th April, then some wind events, first from SW which causes water level rise in the bay and then from NE, transported ice out from the bay. Pärnu bay became ice free on 17th of April, which is quite close to normal.

In the Bothnian Sea, the Archipelago Sea and the Gulf of Finland, the ice broke up at the end of April, in normal time. The 22-23rd Bay of Bothnia was ice free, one week earlier than average. The duration of the ice winter was slightly under to a month shorter than average in all maritime areas.

Ice thicknesses

In the northern Bay of Bothnia was 45 to 70 cm, Quark 20 to 40 cm, Sea of Bothnia 10 to 40 cm and in the Archipelago Sea 25 to 30 cm. The maximum thickness of fast ice in the Western Gulf of Finland was 40 cm, in the Eastern Gulf of Finland 45 to 55 cm. Major navigational difficulties in the Gulf of Finland occurred East of Kunda, where ridging occurred under pressure of NW and W winds. Ice thicknesses in the Gulf of Riga varied in wide range, in open part 15-25 cm, in the Moonsund area and in the Pärnu Bay 25 to 45cm. In the Gulf of Riga major difficulties for ship traffic were located into the Pärnu bay and specially entrance to this as SW winds caused heavy ridging on the border areas between fast and drift ice. In the Southern part of the Gulf of Riga ice concentration remained lower and navigation problems were met temporarily only in case of N or NE winds.

In open sea areas the ice was 20 to 45 cm thick in the Bay of Bothnia and 5 to 20 cm in the Bothnian Sea. The mostly 20 to 45 cm thick drift ice in the open sea area of the Bay of Bothnia was locally compacted and ridged, causing major difficulties to navigation. In mid-March, the sea area in the eastern part of the Gulf of Finland was covered with 20 to 40 cm thick very close and ridged ice, in the western part with 5 to 15 cm thick very close, partly rafted and ridged drift ice.

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For reference purposes, please cite this Baltic Sea environment fact sheet as follows:

[Author's name(s)], [Year]. [Baltic Sea environment fact sheet title]. HELCOM Baltic Sea Environment Fact Sheets. Online. [Date Viewed], <http://www.helcom.fi/baltic-sea-trends/environment-fact-sheets/>.