The ice winter of 2014/15 on the German North and Baltic Sea coasts and a brief description of ice conditions in the entire Baltic Sea region

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The ice winter of 2014/15 on the German coasts was very weak. The 13 ice climatological stations on the North Sea coast (http://www.bsh.de/de/Meeresdaten/Beobachtungen/Eis/nordsee.jsp) remained free of ice. The value of the accumulated areal ice volume (indicating the severity of the ice winter) thus is zero for the North Sea coast. The value of the accumulated areal ice volume for the Baltic Sea coast is 0.006 m. There were 11 winters with similar ice characteristics in the western Baltic Sea and 15 winters in the German Bight during the last 100 years, Fig. 1.

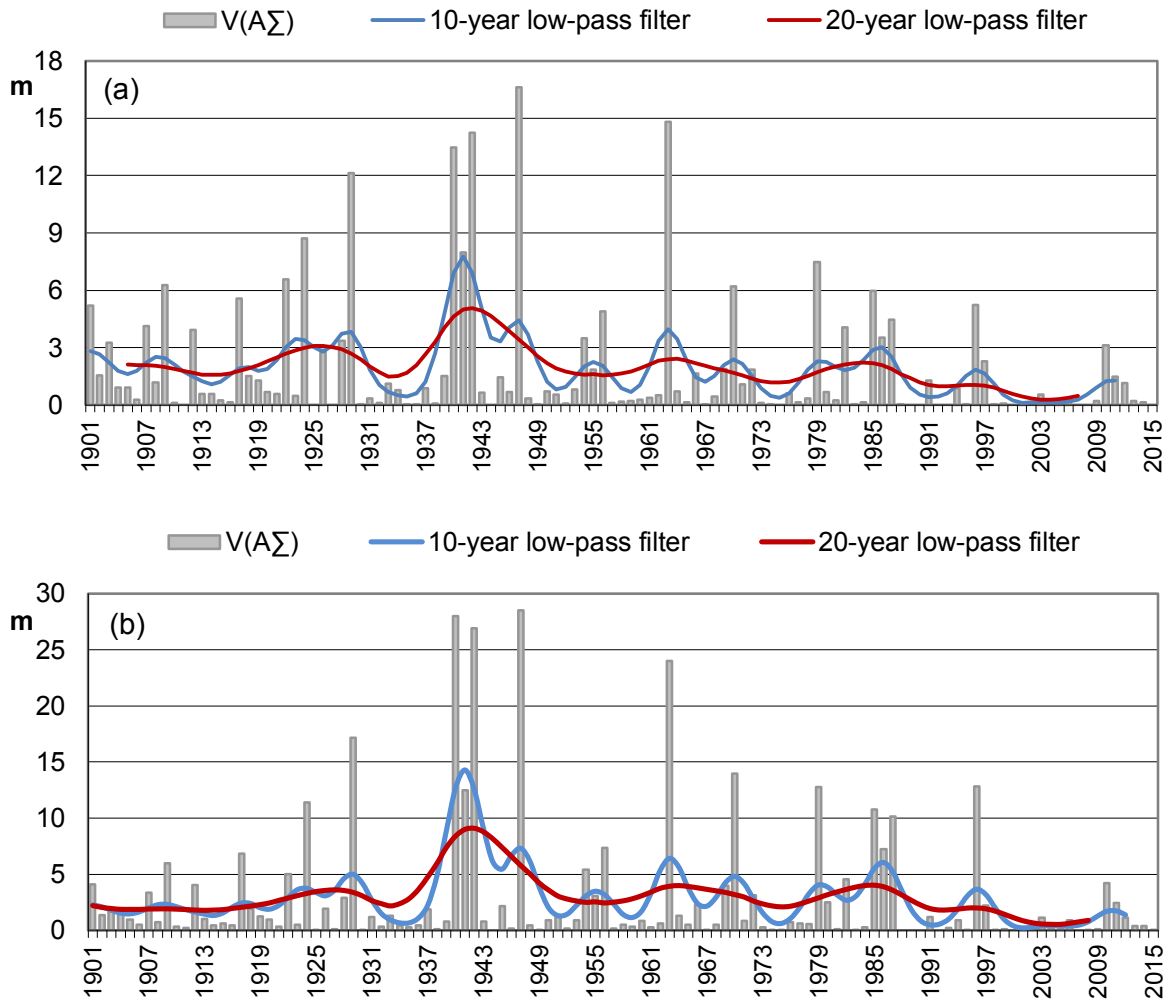

Fig.1: Distribution of accumulated areal ice volume on the German North Sea coast (a) and on the German Baltic Sea coast (b) in the period between 1901 and 2015

Table 1: Monthly mean air temperatures (°C) in the winter of 2014/15 and their deviation from the 1961 – 1990 (K) climate means (courtesy of German Weather Service, www.dwd.de)

Station	November		December		January		February		March	
	°C	K	°C	K	°C	K	°C	K	°C	K
Greifswald	6.9	2.4	2.6	1.5	2.8	3.4	1.6	1.6	5.4	2.7
Schleswig	7.1	2.2	3.2	1.5	2.5	2.2	1.8	1.2	5.1	2.3
Norderney	7.9	1.6	4.6	1.4	4.2	2.6	3.6	1.8	5.8	1.8

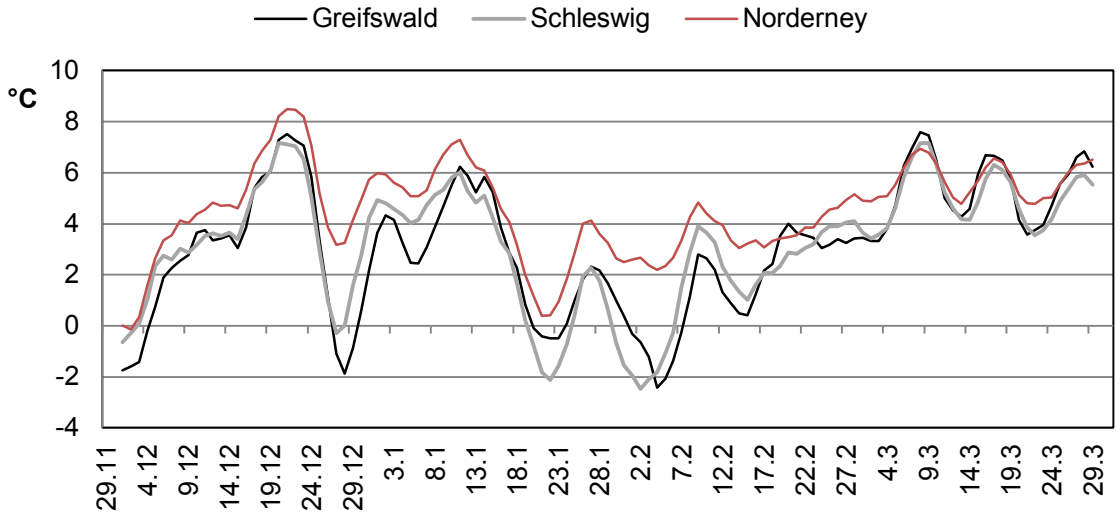

Fig. 2: 5-day running mean of air temperatures in the winter of 2014/15 (courtesy of German Weather Service, www.dwd.de)

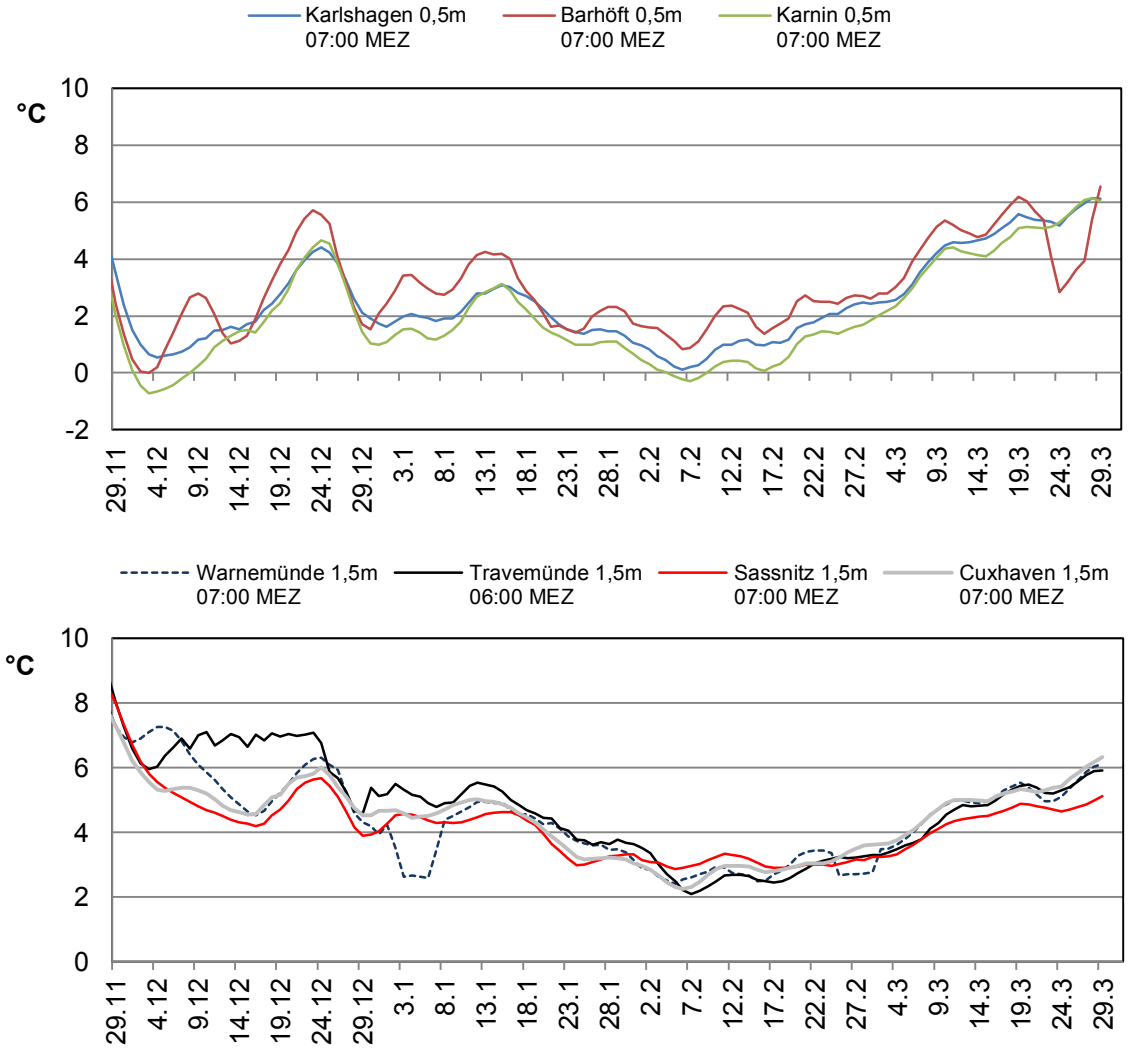

Fig. 3: Water temperatures in the German coastal waters in the winter of 2014/15

Source of measurement data: Karlshagen, Karnin, Barhöft, Sassnitz und Warnemünde – WSA Stralsund; Travemünde – WSA Lübeck; Cuxhaven – Deutscher Wetterdienst

Table 2: Ice conditions on the German coasts in the winter of 2014/15

Monitoring station	Beginning of ice occurrence	End of ice occurrence	Number of days with ice	Max. thickness of level ice, cm
Rankwitz, Peenestrom	05.02.2015	07.02.2015	3	< 5 cm
Warthe, Peenestrom	05.02.2015	07.02.2015	3	< 5 cm
Wolgast – Peenemünde	06.12.2014	08.12.2014	3	< 5 cm
Greifswald-Wieck, harbour	03.12.2014	03.12.2014	1	< 5 cm
Dänische Wiek	01.12.2014	08.02.2015	14	6 cm
Greifswald-Ladebow, harbour	06.02.2015	08.02.2015	3	< 5 cm
Neuendorf, harbour and vicinity	01.12.2014	17.02.2015	14	< 5 cm
Kloster, bodden area	03.12.2014	05.12.2014	3	< 5 cm
Zingst, Zingster Strom	01.12.2014	02.12.2014	2	2 cm
Rostock, city harbour	06.02.2015	06.02.2015	1	< 5 cm
Rostock – Warnemünde	06.02.2015	06.02.2015	1	< 5 cm
Wismar, harbour	29.12.2014	07.02.2015	7	< 5 cm
Neustadt, harbour	01.02.2015	06.02.2015	4	< 5 cm
Schlei, Schleswig – Kappeln	22.01.2015	09.02.2015	17	4 cm
Flensburg – Holnis	04.02.2015	06.02.2015	3	5-10 cm
Büsum, harbour	05.02.2015	06.02.2015	2	2 cm

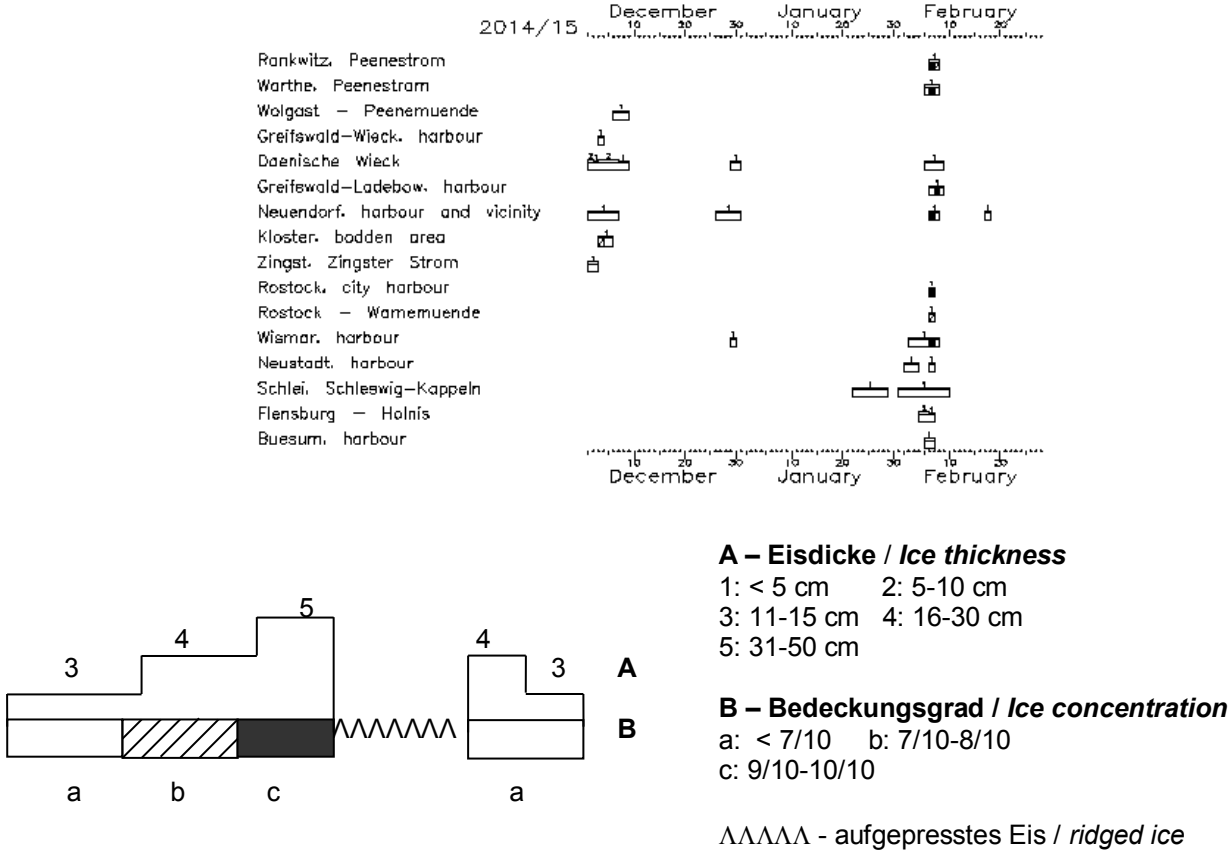

Fig. 4: Daily ice occurrence on the German coasts in the ice winter of 2014/15

The winter of 2014/15 on the German coasts was exceptionally mild. The warm weather continued throughout all winter months (see Table 1 with monthly air temperature mean values and their deviation from long-term means). The cold spells were short and occurred with mostly light frost during the first and the last days of December as well as in late January/early February, Fig. 2. Under these conditions, water temperatures in most sections never dropped low enough for the freezing process to begin, cf. Fig. 3. Some new ice lasting a few days was only reported in the inner Schlei waters, in some harbours, and in sheltered Bodden lagoons of Western Pomerania, close to shore (see Table 2 and Fig. 4). Ice did not cause any obstructions to navigation in the winter of 2014/15.

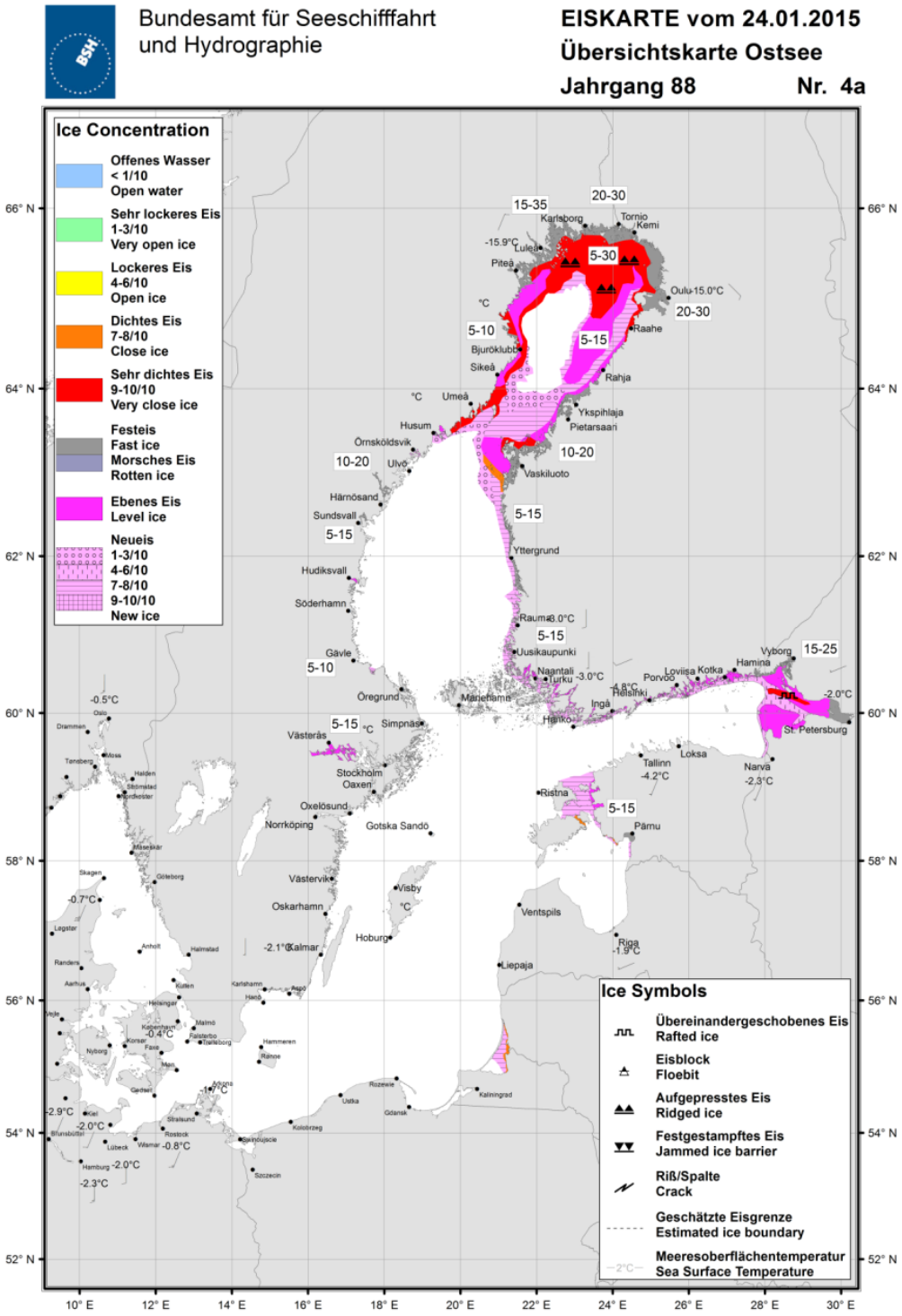

Fig. 5: General ice chart showing maximum ice extent in the Baltic Sea in the winter of 2014/15

In the winter of 2014/15, the weather in the northern region of the Baltic Sea was mostly affected by Atlantic low pressure areas moving from the west to the east over the Baltic Sea. The spells of cold polar air were of short time duration and minor intensity. The extensive ice coverage was limited to the northern part of the Gulf of Bothnia and to the eastern part of the Gulf of Finland. However, the Bay of Bothnia was never totally covered with ice in this winter, the westernmost ice edge in the Gulf of Finland run temporary along the longitude of island Moščnyj (about 28°E). At the normal time of maximum ice formation (late February to mid-March), the thickness of the fast ice in the archipelagos was thinner than usual and reached values of 30-55 cm in the northern Bay of Bothnia (50-80 cm in a moderate and up to 100 cm in a strong ice winter), 10-35 cm in Norra Kvarken (30-60 cm and 50-80 cm), 10-20 cm in the Sea of Bothnia (20-50 cm and 50-70 cm), 15-45 cm in the eastern Gulf of Finland (35-65 cm and 55-65 cm). Maximum ice thicknesses in moderate and strong ice winters are shown in brackets. Usually, the Gulf of Finland becomes completely ice-free by 1 May and the Bay of Bothnia by end of May. The last ice of the 2014/15 winter was observed in the Gulf of Finland in the middle of April and in the Bay of Bothnia in the middle of May.

Also in the whole Baltic Sea region, the maximum extent of ice – about 51,000 km^2, observed on 24 January, Fig. 5 – indicated a very weak ice winter. The long-term series of recorded maximum ice extents in the Baltic Sea dates back to the year 1720 and covers 296 winter seasons. During this time, the seasonal maximum ice extent varied between 49,000 km^2 and 420,000 km^2. The winter of 2014/15 belongs among the winters of 1929/30, 1938/39, 1943/44, 1948/49, 1960/61, 1988/89, and 2007/08 to the mildest ice winters in the last 100 years, cf. Fig.6.

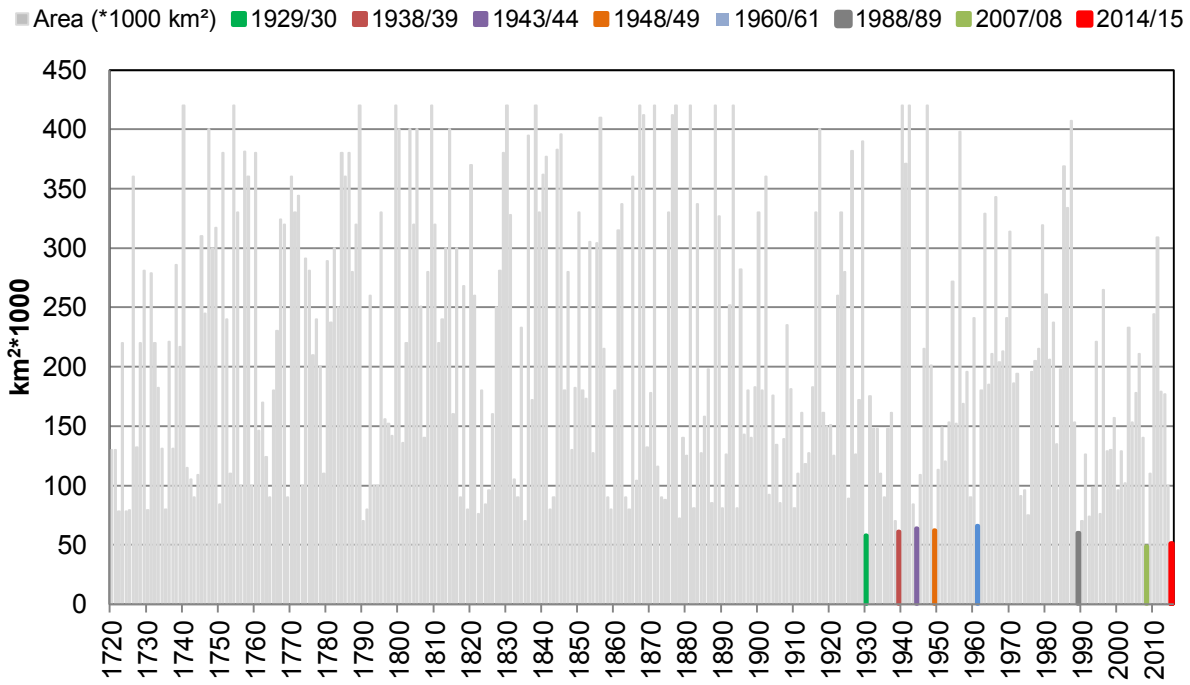

Fig.6. Seasonal maximum ice extent in the Baltic Sea since 1720
(Seinä, A., E. Palosuo, 1996: The classification of the maximum annual extent of ice cover in the Baltic Sea 1720–1995, Meri – Report Series of the Finnish Institute of Marine Research, No. 27, 79-91 and J. Vaindlo, 2014: FMI_max_areas_1961–2014, private information).

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