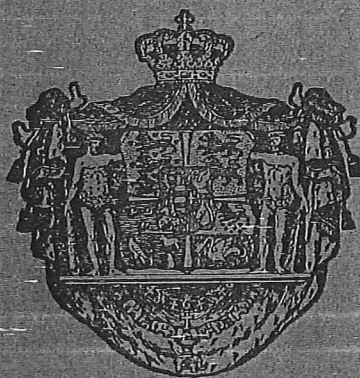


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Isforholdene i de danske Farvande i Vinteren 1918—1919.

Bearbejdet af Kaptajn C. I. H. SPEERSCHNEIDER.

Oplysningerne om Isforholdene i den forløbne Vinter er indsamlede og bearbejdede paa lignende Maade som tidligere.

Tabel I viser Middelftemperaturen og Afvigelserne fra Normalen paa 7 Steder i Landet. Det fremgaar af Tabellen, at Afvigelserne var positive i December og Januar og negative i Februar og Marts, idet dog Afvigelsen for Fanø var positiv i Marts.

December 1918. Middellufttrykket *) var ved Skagen 754.3 mm, i Kjøbenhavn 756.1 mm, eller henholdsvis 4.1 og 3.7 mm lavere end normalt. Vindretningen var overvejende omkring Sydvest. Frostdagenes Antal var gennemsnitlig 13, medens det normale Antal er 18. Paa Fyrskibene, hvor Thermometret aflæses 6 Gange i Døgnet, var den laveste Temperatur $\div 2.5$ (Anholt Knob).

Januar 1919. Middellufttrykket var ved Skagen 759.8 mm, i Kjøbenhavn 761.0 mm, eller henholdsvis 0.8 og 1.1 mm lavere end normalt. Vindretningen var overvejende omkring Syd eller Sydøst. Frostdagenes Antal var gennemsnitlig 18, medens det normale Antal er 22. Paa Fyrskibene var den laveste Temperatur $\div 4.5$ (Skagens Rev).

Februar. Middellufttrykket var ved Skagen 758.2 mm, i Kjøbenhavn 758.3 mm, eller henholdsvis 1.9 og

*) reduceret til 0° C., Havets Overflade og Tyngden ved 45° Br.

The State of the Ice in the Danish Waters during the Winter 1918—1919.

Edited by Capt. C. I. H. SPEERSCHNEIDER.

The ice-reports during the past winter have been collected and edited in the same way as heretofore.

Table I. shows the mean temperature and the deviations from the normal in seven places in the Kingdom. It appears from the table that the deviations were positive in December and January and negative in March, although the deviation for Fanø was positive in March.

December 1918. The mean atmospheric pressure *) was at the Skaw 754.3 mm. and at Copenhagen 756.1 mm., or 4.1 and 3.7 mm., respectively, below the normal. The direction of the wind was principally about south-west. The number of frosty days was, on the average 13, while the normal number is 18. On the light-ships, where the thermometer is read off six times every twenty-four hours, the lowest temperature was $\div 2.5^{\circ}$ (Anholt Knob).

January 1919. The mean atmospheric pressure was at the Skaw 759.8 mm., and at Copenhagen 761.0 mm., or 0.8 and 1.1 mm., respectively, below the normal. The direction of the wind was principally about south or south-east. The number of frosty days was, on the average, 18, while the normal number is 22. On the light-ships the lowest temperature was $- 4.5$ (The Skaw Reef).

February. The mean atmospheric pressure was at the Skaw 758.2 mm., and at Copenhagen 758.3 mm.,

*) Reduced to 0° C. at the surface of the sea, and gravity at 45° N. Lat.

2.8 mm lavere end normalt. Vindretningen var overvejende omkring Øst. Frostdagenes Antal var gennemsnitlig 23, medens det normale Antal er 21. Paa Fyrskibene var den laveste Temperatur $\div 10.6$ (Lappegrunden).

Marts. Middellufttrykket var ved Skagen 756.3 mm, i Kjøbenhavn 757.9 mm eller henholdsvis 1.9 og 1.2 mm lavere end normalt. Vindretningen var skiftende. Frostdagenes Antal var gennemsnitlig 25, medens det normale Antal er 18.

Paa Fyrskibene var den laveste Temperatur $\div 6.7$ (Læsø-Trindel).

Tabel 2 viser de Frostperioder og Frostdage som indtraf i Løbet af Vinteren. Efter enkelte Frostdage i December faldt Vinterens første Frostperiode fra c. 20. Januar til c. 10. Februar hvilket fremkaldte Isdannelse i de indre Farvande fra c. 1. til 25. Februar.

I sidste Halvdel af Februar fandtes atter enkelte Frostdage, og Vinterens anden Frostperiode faldt fra 14.—19. Marts og varede til c. 26. Marts.

I denne Frostperiode dannedes der ikke Is i de aabne Farvande og i meget faa indelukkede Farvande, skønt det flere Steder frøs ret haardt.

Af Stationerne havde Randers den største Kuldesum (108.6), Kjøbenhavn den mindste (52.6).

Tabel 3 viser Vandets Overfladetemperatur og Saltholdighed i Løbet af Vinteren; Middeltal er anført for hvert Tidøgn. Vandets Temperatur faldt jævnt i December og Januar og naaede paa Grund af Frostperioden fra c. 20. Januar til 10. Februar sit laveste midt i Februar, for det nordlige Kattegats vedkommende lidt før, Vandet i Limfjorden holdt sig ved Frysepunktet i hele Februar Maaned. Senere steg Overfladens Temperatur atter noget, og faldt kun ganske lidt for Kuldeperioden i Slutningen af Marts. Ved Bornholm faldt Vandets Temperatur jævnt hele Vinteren og naaede sit laveste i sidste Tidøgn af Marts.

Saltholdigheden var lavest i Kattegat og Lille Bælt i Begyndelsen af Februar; i Storebælt og Sundet i Slutningen af Januar og i Limfjorden midt i Marts.

or 1.9 and 2.8 mm., respectively, below the normal. The direction of the wind was principally about east. The number of frosty days was, on the average, 23, while the normal number is 21. On the light-ships, the lowest temperature was -10.6 (Lappegrunden).

March. The mean atmospheric pressure was at the Skaw 756.3 mm., and at Copenhagen 757.9 mm., or 1.9 and 1.2 mm., respectively, below the normal. The direction of the wind was varying. The number of frosty days was, on the average, 25, while the normal is 18.

On the light-ships, the lowest temperature was -6.7 (Læsø-Trindel).

Table II. shows the periods of frost and frosty days that occurred in the course of the winter. After a few frosty days in December, came the first period of frost, which lasted from about 20th January to about 10th February, which caused formation of ice in the inner waters from about 1st to 25th February.

In the last half of February, there were again a few frosty days, and the second period of frost of the winter occurred between 14th and 19th March, lasting till about 26th March.

During this period of frost, ice was not formed in the open waters, and in but very few enclosed waters, although there was rather severe frost in several places.

Of all the stations, Randers had the largest amount of cold (108.6), and Copenhagen had the smallest (52.6).

Table III. shows the surface temperature and salinity of water in the course of the winter, an average being given for every ten-day period. The temperature of the water fell steadily during the months of December and January, and, owing to the period of frost from about 20th January to 10th February, it reached its lowest point in the middle of February,—even a little earlier, with respect to the northern most Kattegat. The water in Limfjorden remained just at the freezing-point during the whole of February. Later on, the surface temperature again rose a little, and only fell very little before the cold period at the end of March. At Bornholm the temperature of the water fell steadily all winter, and reached its lowest point during the last ten days of March.

The salinity was lowest in the Kattegat and the Little Belt in the beginning of February; in the Great Belt and the Sound, at the end of January; and in

Ved Bornholm var Saltholdigheden som altid konstant hele Vinteren.

Limfjorden, in the middle of March. At Bornholm, the salinity was, as always, constant all winter.

I Tabel 4 er opført Resultaterne af de rundt om ved Kysterne o. fl. Steder anstillede daglige Iagttagelser over Isforholdene og disses Indflydelse paa Besejlingsforholdene. Naar en i Tabel 5 anført Lokaltitet er udeladt i Tabel 4 i en eller flere Maaneder, har der ingen Is været paa det paagældende Sted. I Tabel 5 er alle de Steder anført, hvorfra der anstilles Observationer.

For at hjælpe til en ensartet Bedømmelse er Isforholdene udtrykt ved Bogstaver, som har følgende Betydning:

Isfrit..... A	Svær Driv-Is..... F
Løs Sjap- og Kvadder-Is B	Pak-Is..... I
Sammenpakket Sjap- og Kvadder-Is..... E	Skrue-Is..... H
Spredt Driv-Is..... C	Tynd Fast-Is..... D
Driv-Is..... K	Svær Fast-Is..... G

Til nærmere Forklaring paa disse Benævnelser tjener følgende Beskrivelse:

- B. *Sjap-Is* kaldes den Masse, der dannes af Sne og Vand eller af smaa Ispartikler, saalænge den ikke er frosset sammen endnu. *Kvadder-Is* kaldes de smaa, i Reglen afrundede Isflader eller Isklumper, som kan optræde for sig, førte sammen af Vind og Sø, men som hyppig træffes i Forbindelse med *Sjap-Is*.
- E. *Sammenpakket Sjap- og Kvadder-Is* er *Sjap-Is* eller *Kvadder-Is* eller begge Dele i Forening, som paa Grund af Kuling eller Strøm, eller mulig Hindring for Isens Bevægelse, er pakket sammen i en grødlignende Masse af antagelig Tykkelse.
- C. *Spredt Driv-Is*. Isflager eller Iskodser, som med større Mellemrum er spredte over Farvandet, og som er i Drift.
- K. *Driv-Is*. Isflager eller Iskodser i mere samlede Masser, som er i Drift.
- F. *Svær Driv-Is*. Svære Isflager eller Iskodser i samlede Masser, som er i Drift.

Table 4 contains the results of the daily observations at the various stations concerning the state of the ice and its influence on the navigation. The non-appearance in table 4 for one month or more at one of the stations mentioned in table 5 means, that no ice has been observed at that station during the time in question. Table 5 gives the names of all the stations, at which observations are taken.

In order to further uniformity of judgement, the state of the ice is indicated by letters having the following signification.

Free of ice..... A	Heavy drift ice..... F
Brash and pancake ice B	Pack..... I
Packed brash and pancake ice..... E	Screw ice..... H
Open ice..... C	Thin fixed ice..... D
Drift ice..... K	Heavy fixed ice..... G

The following description gives a more precise explanation of the above designations:

- B. *Brash ice* is a mass consisting of snow and water or of very small pieces of ice not yet frozen together. *Pancake ice* consists of small, generally round, ice flakes or ice lumps. It may appear alone, brought together by the wind or the sea, but it often appears in connection with *brash ice*.
- E. *Packed brash and pancake ice* is brash ice or pancake ice or both at the same time, which has been packed together in a turbid mass of considerable thickness either by the wind or the current or by some obstruction to the free drift of the ice.
- C. *Open ice* is drifting ice flakes or hummock ice scattered over the water at greater intervals.
- K. *Drift ice* is drifting ice flakes or hummock ice in more collected masses.
- F. *Heavy drift ice* is drifting heavy ice floes or hummock ice in close masses.

- I. *Pak-Is*. Svære Iskoder, som af Kuling eller Strøm, eller, hvad oftest er Tilfældet, paa Grund af Indsnævring af Farvandet, er pakkede sammen til en svær tæt Masse.
- H. *Skrue-Is*. Is, som skruer.
- D. *Tynd Fast-Is*. En sammenfrosset, landfast Isflade af mindre Styrke.
- G. *Svær Fast-Is*. En sammenfrosset, landfast Isflade af betydelig Styrke.

Besejlingsforholdene er udtrykt ved Bogstaver, som har følgende Betydning:

Skibsfarten uhindret.....	N
» vanskelig for Sejlskibe.....	O
» vanskelig; for Sejlskibe kun mulig med Bugserhjælp.....	P
Skibsfarten lukket for Sejlskibe.....	Q
» kun mulig for kraftige Dampere	R
» kun mulig med Isbryderhjælp	S
» helt lukket	T
Rende holdes aaben med Isbryder.....	U

Tabel 5 er Sammendrag af Tabel 4, men er tillige Fortegnelse over alle Observationsstederne. For hvert Sted er anført, hvormange Dage der har været Is af de forskellige Arter, og hvormange Dage Skibsfarten har været paavirket deraf. Endvidere findes Rubrikker for det samlede Dageantal med Is samt for Tiderne for første og sidste Ismelding. Det maa dog erindres, at Stedet i Mellemtiden godt kan have været isfrit selv i længere Tid.

I sidste Rubrik er der for enkelte Pladser anført den største Tykkelse i cm, som Isen har naaet.

Oversigt over Isforholdene i de forskellige Farvande.

Jyllands Vestkyst var isfri hele Vinteren. I Graadyb var der lidt Drivis i Februar, medens Ringkjøbing Fjord havde Is i 6 Uger.

- I. *Pack* means heavy ice floes, which have been packed together in heavy, dense masses, either by the wind or the current or — as is generally the case — by a narrowing of the waters.
- H. *Screw ice* means ice that is screwing or nipping.
- D. *Thin fixed ice* means thin land ice.
- G. *Heavy fixed ice* means heavy land ice.

The conditions for navigation are indicated by letters having the following signification.

Navigation unimpeded.....	N
» difficult for sailing vessels	O
» difficult, impossible for sailing vessels without tug-boat.....	P
Navigation closed for sailing vessels.....	Q
» only possible for powerful steamers.....	R
» impossible without the assistance of icebreaker	S
» quite closed.....	T
Channel kept open by means of ice breaker	U

Table 5 is a summary of Table 4 but also a list of all the stations. For each station is put down the number of days with ice of the various descriptions and the number of days on which navigation has been affected by the ice. Further rubrics will be found giving the total number of days with ice, and the dates of the first and the last report of ice. However, it must be noted, that in the interval the station may very well have been free of ice, even for a longer period.

In the last column is given — for some of the stations — the greatest thickness in cm, which the ice has attained.

Summary of Ice Conditions in the different Waters.

The west coast of Jutland was free from ice all winter. In Graadyb there was a little drift ice in February, while Ringkjøbing Fjord had ice for six weeks.

I **Limfjorden** begyndte Isen i Bugterne i Slutningen af Januar og paa Bredningerne i Begyndelsen af Februar. Isen laa til Begyndelsen af Marts, undtagen i Skive Havn og Fjord, hvor den blev liggende til Slutningen af Marts, her var Skibsfarten helt lukket i c. 7 Uger. Oddesund og Nisum Bredning havde Is i 3 Uger, Sallingsund, Løgstør- og Thisted Bredninger i 4 Uger; nogle Havne havde Is fra 6 til 9 Uger.

I **Kattegat** begyndte Isen at dannes ved Kysterne den 8. Februar; men da Frosten samme Dag ophørte, standsede Isdannelsen i de aabne Farvande. I Mariager Fjord optraadte Isen allerede fra Slutningen af December, i de øvrige Fjorde i de første Dage af Februar; den ophørte her i Begyndelsen af Marts, medens den i Mariager Fjord blev liggende til den 27. Marts. Havnene havde meget lidt Is, medens Fjordene havde Is fra 4—10 Uger.

I **Sundet** havde kun Københavns Havn Is, og det kun i 5 Dage; lidt Is viste sig i Flinterenden.

Store Bælt var ganske isfrit. I Nakskov Fjord laa Isen i 3 Uger.

Ogsaa **Lille Bælt** var isfrit, medens Fjordene her havde Is i 6 Uger og Bogense Havn i 1 Uge.

Femer Bælt og den vestlige **Østersø** var isfri, kun udfor Gjedser var der lidt Sjapis i Farvandet i 1 Uge. Nysted Bredning og Præstø Havn og Fjord havde Is i 4 Uger.

Ved **Bornholm** var Østersøen isfri, medens Rønne og Nexø Havne havde Is i faa Dage.

De indre Farvande. I Isefjorden laa Isen i Havne og Fjorde i hele Februar og første Trediedel af Marts.

I Smaalandsfarvandet begyndte Isen nogle Steder i Slutningen af Januar. I Februar laa Isen i alle indelukkede Farvande — dog ogsaa i Storstrømmen i nogle Dage — men der blev atter isfrit overalt i Slutningen af Maanedens. Skjelskør Havn og Karrebæksminde Havn havde Is i et Par Uger; Guldborgsund og Bandholm Havn i 3 Uger, medens Vordingborg Havn, hvor Isen ellers ligger forholdsvis længe, kun havde Is i 4 Uger i denne Vinter.

In **Limfjorden** the ice began in the bays and bights at the end of January, and on the broad expanses in the beginning of February. The ice lay till the beginning of March, except in Skive harbour and fjord, where it lay till the end of March. Here navigation was entirely closed for about seven weeks. Oddesund and Nisum Bredning (Bredning=broad expanse of water) had ice for three weeks; Sallingsund, Løgstør Bredning, and Thisted Bredning, for four weeks.

In the **Kattegat** the ice began to form along the coast on the 8th February, but as the frost ceased the same day, the formation of ice was stopped in the open waters. In Mariager Fjord, ice appeared already in the end of December; in the other fjords, in the first days of February. It disappeared here in the beginning of March, while, in Mariager Fjord, it lay till 27th March. The harbours had very little ice, while the fjords had ice from 4—10 weeks.

In the **Sound**, only the harbour of Copenhagen had ice, and that only five days. A little ice appeared in Flinterenden.

The **Great Belt** was entirely free from ice. In Nakskov Fjord, the ice lay three weeks.

Also the **Little Belt** was free from ice, while the fjords here had ice for six weeks, and Bogense Harbour one week.

The **Femer Belt** and the western **Baltic** were free from ice with the exception of the waters just outside of Gjedser, where there was a little brash ice for one week. Nysted Bredning (Bredning = broad expanse, »broads«) and Præstø Harbour and Fjord had ice for four weeks.

At **Bornholm** the Baltic was free from ice, while Rønne and Nexø harbours had ice for a few days.

The inner waters. In Isefjord the ice lay in harbours and fjords during the whole of February and the first of March.

In the Smaaland waters, the ice began to form in some places at the end of January. In February the ice lay on all enclosed waters, — even on Storstrømmen for a few days, — but the ice disappeared again everywhere at the end of the month. Skjelskør Harbour and Karrebæksminde Harbour had ice for a couple of weeks, and Guldborgsund and Bandholm for three weeks, while Vordingborg Harbour, where the ice otherwise lies comparatively long, only had ice four weeks this winter.

I Farvandet mellem Øerne Syd for Fyn var der ogsaa meget lidt Is, kun et Par Uger midt i Februar; dog havde Marstal Havn Is i 3 Uger.

Helt isfri var 52 Stationer; 17 Stationer havde Is i mere end 1 Maaned, 2 Stationer i mere end 2 Maaned. Det højeste Antal Dage med Is, 75, havde Mariager Fjord. Den første Is viste sig den 1. December (Mariager Fjord), den sidste Is saas den 27. Marts (Skive Fjord og Mariager Fjord).

Isens Tykkelse blev maalt fra 33 Stationer. Største Tykkelse af Isen blev maalt til 20 cm (Skive Fjord); Pakis blev maalt til 30 cm.

Tabel 6 viser, hvor længe Fyrskibene gennemsnitlig har været inddraget for Is; det fremgaar af Tabellen, at Fyrskibene indenfor Skagen som Regel inddrages i 1 af 3 Vintre. Naar Fyrskibene inddrages, bliver de gennemsnitlig inde i 5 à 6 Uger.

Ismeldingstjenesten, som træder i Virksomhed, naar Isen begynder at optræde i Hovedfarvandene, var etableret fra 8. til 28. Februar. Af 26 Vintre har Ismeldingstjenesten været etableret i 9, hvilket svarer til Is i Hovedfarvandene i 1 af 3 Vintre. I ingen af Vintrene er Ismeldingstjenesten begyndt før 25. Januar.

Til Sammenligning mellem de forskellige Vintre tjener Tabel 7, hvor Tallene angiver det gennemsnitlige Antal Dage med Is for de forskellige Slags Farvande og Havne. Det ses heraf, at Vinteren 1918—1919 ikke havde meget Is, idet Gennemsnittallet af Antal Isdage for »Alle Stationer« var 11.6, medens Gennemsnittet for 13 Aar er 16.7 Dage med Is.

De sidste 13 Vintre grupperer sig med Hensyn til Isdagens Antal i 2 skarpt adskilte Grupper. For de fire isrige Vintre er Gennemsnittet 36.4 Dage med Is med Grænserne 30.3 og 44.9. Af disse fire Vintre havde Vinteren 1916—1917 en Del mere Is, 44.9 Dage, end de andre 3 isrige Vintre og maa derfor betragtes som en særlig langvarig Isvinter. Gennemsnittet for de 9 isfattige Vintre er 8.0 Dage med Is og med Grænserne 2.4 og 15.3 Dage. Gennemsnitlig er altsaa 1 af 3 Vintre en Isvinter.

In the waters between the islands south of Funen, there was also very little ice, — only a couple of weeks in the middle of February. But Marstal Harbour had ice for three weeks.

52 stations were quite free from ice; 17 stations had ice for more than a month; 2 stations more than two months. Mariager Fjord had the largest number of ice days — 75. The first ice appeared 1st Dec. (Mariager Fjord), and the last ice was seen on the 27th March (Skive Fjord and Mariager Fjord).

The thickness of the ice was measured at 33 stations. The greatest thickness of ice was 20 cm. (Skive Fjord); pack ice was measured up to 30 cm.

Table VI. shows how long, on the average, the light-ships have been taken in on account of ice. It appears from the table that the light-ships east of the Skaw are, as a rule, taken in one winter out of three. When the light-ships are taken in, they generally stay in for five or six weeks.

Ice report service, which begins when the ice commences to appear in the main waters, was established from 8th to 28th February. Out of 26 winters, the ice report service has been established during only nine, which corresponds to ice in the main waters one winter out of three. The ice report service has in no winter commenced before 25th January.

A comparison between the different winters is given in Table VII., in which the figures give the average number of ice days for the different kinds of waters and harbours. It appears from this table that the winter 1918—1919 did not have much ice, as the average of the number of ice-days for »all stations« was 11.6, while the average for 13 years is 16.7 ice days.

The last 13 winters form, with respect to the number of ice-days, two distinct groups. For the four icy winters, the average is 36.4 ice-days, with the extremes 30.3 and 44.9. Of these four winters, the winter 1916—1917 had considerably more ice (44.9 days) than the other three icy winters, and must therefore be considered a specially long ice winter. The average for the nine winters with but little ice is 8 ice-days; the extremes being 2.4 and 15.3 days. Thus the average is one icy winter out of three.

Meteorologisk Institut bringer sin Tak til alle de Observatorer, hvis iagttagelser har gjort det muligt at fremkomme med de foreliggende Oplysninger om Isforholdene i de danske Farvande i Vinteren 1918—1919.

Maj 1919.

The Meteorological Institute wishes to express gratitude to all the observers whose observations have made it possible to publish the present information in regard to ice conditions in the Danish waters during the winter of 1918—1919.

May, 1919.

Tab. 1.

Luftens Middeltemperatur samt Afvigelserne fra Normalen i Vinteren 1918—1919.

The mean-temperature of the air and the variations from the normal temperature during the winter 1918—1919.

		Fanø (Nordby)	Skagen (Fyret)	Randers (Strømmen)	Samsø (Tranebjerg)	Bogø (Navig. Skolen)	Kjøbenhavn (Met. Inst.)	Hammershus (Sandvig)
December	Middeltemp..	3.8	3.1	2.5	3.4	3.1	3.1	3.3
	Afvigelsen ..	+ 2.9	+ 1.3	+ 2.2	+ 1.6	+ 1.9	+ 1.7	+ 1.4
Januar	Middeltemp..	1.5	1.7	1.0	1.7	1.6	2.0	2.0
	Afvigelsen ..	+ 1.6	+ 1.0	+ 1.5	+ 1.3	+ 1.9	+ 1.9	+ 1.7
Februar	Middeltemp..	- 0.1	0.0	- 0.6	0.2	- 0.1	- 0.1	0.1
	Afvigelsen ..	- 0.1	- 1.2	- 1.6	- 1.0	- 0.3	- 0.2	0.0
Marts	Middeltemp..	1.6	0.7	0.4	1.2	1.2	0.9	0.8
	Afvigelsen ..	+ 0.1	- 0.6	- 0.9	- 0.5	- 0.5	- 0.5	- 0.4

Tab. 2.

Frostperioderne og Frostdagene i Vinteren 1918—1919.

The frosty periods and frosty days during the winter 1918—1919.

		Frostdage	1ste Frostperiode	Frostdage	2den Frostperiode	Samlet Kuldesum. <i>Total amount of cold</i>
Fanø (Nordby)	a b c	$\frac{21}{12}$ - $\frac{22}{12}$, $\frac{31}{12}$ 2 — 0.4 — 0.2	$\frac{21}{1}$ - $\frac{8}{2}$ 16 m. Afb. — 39.0	$\frac{18}{2}$ - $\frac{19}{2}$, $\frac{29}{2}$ 2 — 2.4 — 0.9	$\frac{19}{3}$ - $\frac{25}{3}$ 6 m. Afb. — 10.4	— 53.3
Skagen (Fyret)	a b c	$\frac{21}{12}$ 1 — 1.3	$\frac{21}{1}$ - $\frac{8}{2}$ 13 m. Afb. — 43.9	$\frac{16}{2}$ - $\frac{19}{2}$, $\frac{25}{2}$ - $\frac{1}{3}$ 4 7 — 4.7 — 10.0	$\frac{14}{3}$ - $\frac{25}{3}$ 9 m. Afb. — 13.5	— 73.4
Randers (Strømmen)	a b c	$\frac{13}{12}$, $\frac{22}{12}$, $\frac{31}{12}$ - $\frac{1}{1}$ 4 — 6.7	$\frac{20}{1}$ - $\frac{12}{2}$ 20 m. Afb. — 70.9	$\frac{16}{2}$ - $\frac{19}{2}$, $\frac{26}{2}$ - $\frac{1}{3}$, $\frac{5}{3}$ 4 4 1 — 6.7 — 5.5 — 0.2	$\frac{16}{3}$ - $\frac{26}{3}$ 9 m. Afb. — 18.6	— 108.6
Samsø (Tranebjerg)	a b c	$\frac{31}{12}$ 1 — 0.7	$\frac{22}{1}$ - $\frac{14}{2}$ 19 m. Afb. — 34.1	$\frac{16}{2}$ - $\frac{19}{2}$, $\frac{26}{2}$ - $\frac{1}{3}$ 3 m. Afb. 4 — 5.8 — 3.4	$\frac{19}{3}$ - $\frac{26}{3}$ 7 m. Afb. — 11.1	— 55.1
Bogø Navig. Skolen)	a b c		$\frac{22}{1}$ - $\frac{9}{2}$ 17 m. Afb. — 37.2	$\frac{12}{2}$ - $\frac{16}{2}$, $\frac{21}{2}$ - $\frac{1}{3}$ 3 m. Afb. 3 — 2.5 — 3.0	$\frac{19}{3}$ - $\frac{26}{3}$ 7 m. Afb. — 13.7	— 56.4
Kjøbenhavn (Met. Inst.)	a b c	$\frac{12}{12}$, $\frac{22}{12}$ 1 — 0.8	$\frac{22}{1}$ - $\frac{8}{2}$ 15 m. Afb. — 32.4	$\frac{19}{2}$, $\frac{26}{2}$ - $\frac{1}{3}$ 1 4 — 1.1 — 2.7	$\frac{19}{3}$ - $\frac{26}{3}$ 7 m. Afb. — 15.6	— 52.6
Hammershus (Sandvig)	a b c	$\frac{12}{12}$, $\frac{22}{12}$ 2 — 1.3	$\frac{22}{1}$ - $\frac{9}{2}$ 16 m. Afb. — 32.3	$\frac{19}{2}$, $\frac{26}{2}$ - $\frac{2}{3}$ 1 5 — 0.1 — 4.9	$\frac{18}{3}$ - $\frac{26}{3}$ 8 m. Afb. — 18.2	— 56.8

Anm. 1: a er Frostperiodens Varighed (*the duration of the frosty period*).b er Antal af Dage, hvis Middeltemperatur var under 0° (*number of days with a mean-temperature below 0°*).c er Kuldesummen (Produktet af Frostperiodens Middeltemperatur og Dageantallet) (*the amount of cold (the product of the mean-temperature of the frosty period and the number of days of the period)*).m. Afb. betyder med Afbrydelse (*with interruption*).

Tab. 3.

Middeltal af Vandets Overfladetemperatur og Saltholdighed Kl. 8 Fm. i Vinteren 1918—1919

The mean temperature and salinity of the surface water at 8 a. m. during the winter 1918—1919.

(Det øverste Tal i hver Rubrik angiver Temperaturen, det underste Saltholdigheden i ‰)

(The upper number in each rubric indicates the temperature, the lower the salinity).

1918—1919	Skagens-Rev	Læsø-Rende	Anholt-Knob	Lappe-Grund	Odde-Sund	Aalborg	Middelfart	Svendborg-Sund	Kolby-Kaas	Sprogø	Kjels-Nor	Middelgrundsfortet	Masnedø	Christiansø
$1/12—10/12$	7.1 32.4	7.0 23.4	6.0 20.0	5.8 12.4	4.4 30.0	3.8 22.7	6.6 19.4	4.8 17.9	6.6 19.6	5.9 14.6	5.6 14.9	6.5 10.2	5.0 9.2	7.4 7.7
$11/12—20/12$	6.1 30.0	6.1 25.1	5.2 20.3	5.1 15.5	3.9 29.4	2.6 21.2	6.1 19.6	4.9 20.4	5.9 18.9	5.3 14.5	5.4 14.1	5.6 12.7	4.7 8.8	6.6 7.7
$21/12—31/12$	4.6 30.7	4.2 27.3	4.2 22.8	4.2 19.4	2.2 28.8	0.1 18.6	5.0 20.4	4.3 20.2	3.8 21.9	4.7 21.0	4.8 20.2	4.8 17.0	3.2 11.2	5.8 7.6
$1/1—10/1$	5.1 32.6	3.8 26.4	4.1 24.8	3.8 13.4	2.1 28.7	0.6 18.1	4.0 20.8	3.5 19.5	3.9 22.0	3.9 19.2	4.1 19.0	4.5 11.1	3.5 11.1	4.5 7.2
$11/1—20/1$	4.6 31.5	4.2 26.9	3.6 23.8	3.6 11.7	2.3 28.5	1.6 18.0	3.6 17.7	3.1 18.8	3.6 16.8	3.4 14.1	3.5 15.0	3.9 10.7	3.1 10.8	4.4 7.3
$21/1—31/1$	2.9 27.6	2.8 23.1	2.0 19.9	2.6 9.1	0.2 27.5	0.0 17.6	2.5 16.1	2.5 18.4	2.2 15.5	2.2 11.3	2.1 12.1	3.0 8.7	2.1 8.4	3.4 7.2
$1/2—10/2$	0.8 23.4	0.5 19.5	0.4 17.2	0.5 15.3	—0.9 26.9	—1.2 23.3	0.8 16.0	0.5 17.4	0.3 15.8	0.6 11.8	0.6 13.3	1.2 12.3	0.6 10.4	2.5 7.3
$11/2—20/2$	1.5 26.4	0.2 20.3	0.0 20.0	0.2 18.4	—0.6 28.0	—1.1 22.2	0.6 17.9	0.4 18.4	0.0 17.2	0.5 17.2	1.0 18.1	0.6 16.7	0.4 11.1	2.2 7.3
$21/2—28/2$	0.7 24.3	0.8 20.7	0.7 21.3	1.4 9.6	—0.8 26.7	—0.7 21.3	1.1 16.4	1.6 18.4	1.1 17.7	1.0 12.7	1.5 13.6	2.1 9.6	1.9 8.3	2.3 7.3
$1/3—10/3$	2.7 32.6	1.4 23.0	1.1 20.9	1.3 15.7	0.2 27.0	0.1 19.7	1.7 16.5	1.9 18.1	1.4 15.3	1.5 11.4	1.6 13.1	1.6 11.6	1.4 10.1	2.1 7.2
$11/3—20/3$	2.5 27.7	2.3 23.6	2.1 20.4	2.3 11.9	1.4 26.0	0.5 15.7	2.9 18.5	3.1 18.1	2.6 18.7	2.5 14.3	2.5 15.2	2.7 12.2	2.2 9.9	2.3 7.2
$21/3—31/3$	2.1 27.2	1.8 24.5	1.6 19.9	1.4 14.2	0.5 26.1	0.8 21.7	1.8 16.2	1.5 18.4	1.5 15.3	1.3 12.7	1.1 13.8	2.2 11.1	1.6 9.7	1.9 7.3

Daily observations concerning the ice and the navigation in the danish waters during the winter 1918—1919.

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Daily observations concerning the ice and the navigation in the danish waters during the winter 1918—1919.

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AN V IIII

i de danske Farvande for Vinteren 1918—1919.

Daily observations concerning the ice and the navigation in the danish waters during the winter 1918—1919.

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Daglige lagttagelser over Is- og Besejlingsforholdene

XIX

Tab. 4.

i de danske Farvande for Vinteren 1918—1919.

Daily observations concerning the ice and the navigation in the danish waters during the winter 1918—1919.

		Februar																															Bemærkninger		
																																	Remarks		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Smaalandsfarvandet.																																			
Vordingborg Havn	{Isforh. Besejlfh.	d p	d p	d p	d p	d p	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	d p	d p	d p	d p	d p	d p	.	.	.	.	.	.	14. cm. d. 12.	
Kallehave—Stege	{Isforh. Besejlfh.	d n	d o	d p	d p	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	h s	h s	h s	f r	f r	.	.	.	.	.	.	.	16. cm. d. 5. 2. Rende.		
Bøgestrømmen	{Isforh. Besejlfh.	.	.	.	.	d q	d q	d q	g t	g t	g t	g t	g t	g t	g t	g t	g t	g t	g t	g t	g t	k q	k q	k q	.	.	.	.	.	.	.	.	9. cm. d. 11.		
Farvandet S. for Fyen.																																			
Faaborg Havn og Fjord...	{Isforh. Besejlfh.	.	.	.	.	.	.	.	d p	d p	d p	b o	b o	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Svendborg Havn.....	{Isforh. Besejlfh.	.	.	.	.	.	d p	d p	e o	b o	b o	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5. cm. d. 7.	
Svendborgsund østre Del..	{Isforh. Besejlfh.	.	.	.	.	.	c n	c n	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Rudkjøbing Havn.....	{Isforh. Besejlfh.	.	.	.	.	d o	d o	g r	g r	g r	g r	g r	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	d o	.	
Rudkjøbingløb nordre Del.	{Isforh. Besejlfh.	.	.	.	.	b o	i r	i r	i r	i r	i r	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	.	
Marstal Havn.....	{Isforh. Besejlfh.	b n	b n	b n	.	b o	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	10. cm. d. 9.	
Farvandet ved Marstal....	{Isforh. Besejlfh.	.	.	.	.	b o	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	g q	13 cm. d. 12. 8—16 Rende.	
Marts																																			
Vestkysten.																																			
Ringk. Fjord (nordl. Del) .	{Isforh. Besejlfh.	.	k q	k q	k q	k q	k q	k q	k q	k q	k q	k q	.	.	.	.	.	.	.	.	.	.	b o	d o	d o	d q	.	.	.	.	.	.	.	.	
Limfjorden.																																			
Lemvig Havn og Lem-Vig.	{Isforh. Besejlfh.	k o	k o	c o	c o	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Struer Havn og Bugt.....	{Isforh. Besejlfh.	g r	g r	k r	k r	d q	f r	f r	f r	f r	f r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Thisted Bredning.....	{Isforh. Besejlfh.	g r	k p	k p	k p	k p	k p	k p	k p	k p	k p	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Sallingsund.....	{Isforh. Besejlfh.	c q	c o	c o	c o	c o	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13 cm d. 1.	
Skive Havn og Fjord.....	{Isforh. Besejlfh.	g t	g t	g t	g t	g t	g t	g t	g t	g t	g t	h o	h o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	b o	20 cm d. 1.		
Løgstør Bredning.....	{Isforh. Besejlfh.	.	.	.	k p	k p	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Aggersund.....	{Isforh. Besejlfh.	.	.	.	d p	c p	c p	c p	c p	c p	c p	.	.	.	.	.	.	.	.	.	.	d o	d o	b o	b o	b o	.	.	.	.	.	.	.		
Limfjorden Aalborg—Hals.	{Isforh. Besejlfh.	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o	c o		
Kattegat.																																			
Mariager Fjord.....	{Isforh. Besejlfh.	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	g r	.	d o	d o	d o	d o	d o	d o	d o	d o	.	.	d o	d o	d o	.	.	.	.		
Indløb til Mariager Fjord..	{Isforh. Besejlfh.	d p	d p	d p	d p	d p	d p	d p	d p	d p	d p	d p	d p	d p	d p	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Randers Fjord.....	{Isforh. Besejlfh.	b n	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Indløb til Randers Fjord..	{Isforh. Besejlfh.	e p	e p	e p	e p	e p	c n	c n	c n	c n	c n	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
Horsens Havn og Fjord...	{Isforh. Besejlfh.	d p	d p	d p	d p	c o	c o	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
Lille Bælt.																																			
Vejle Havn og Fjord.....	{Isforh. Besejlfh.	d q	d q	d p	d p	d p	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	d o	d o	.	.	.	.	.	Rende aaben.	
Kolding Havn og Fjord...	{Isforh. Besejlfh.	d o	d o	d o	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Østersøen.																																			
Nysted Bredning.....	{Isforh. Besejlfh.	k p	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Præstø Havn og Fjord....	{Isforh. Besejlfh.	.	d o	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	d o	d o	.	.	.	.	.	.	

Daglige iagttagelser over is- og besejlingsforholdene

Tab 4.

i de danske Farvande for Vinteren 1918—1919.

Daily observations concerning the ice and the navigation in the danish waters during the winter 1918—1919.

		Marts																															Bemærkninger		
																																	Remarks		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Bornholm.																																			
Rønne Havn	{ Isforh. Besejlfh.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	d n	d n	d n											
Isefjorden.																																			
Nykjøbing Havn og Fjord .	{ Isforh. Besejlfh.	d q	d q	d q	d q	d q	d q	d q	d q	d q																									
Roskilde Havn	{ Isforh. Besejlfh.	g r	g r	g r	d q	d q	d q	d q	d q	d q	d q																								
Roskilde Fjord	{ Isforh. Besejlfh.	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o	k o																						
Smaalandsfarvandet.																																			
Kallehave—Stege	{ Isforh. Besejlfh.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	d n	d n						

(Sammendrag af Tabel 4.)
(Summary of Tab. 4.)

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Tab. 6.

Oversigt over Inddragningen af danske Fyrskibe under Isforhold.

Oplysningerne begynder 1879*)

*Withdrawal of Danish light-ships during ice.**The reports commence 1879*).*

	Vinteren 1918—1919		Antal Dage fra Station paa Grund af Is <i>Number of days of the station on account of ice</i>	Har siden 1879 været inddraget <i>Withdrawn since 1879</i>			Bemærkninger <i>Remarks</i>
	Inddraget <i>withdrawn</i>	Udlagt <i>replaced</i>		i Antal Vintre <i>Number of winters</i>	ialt Dage <i>Total number of days</i>	Antal Dage pr. Vinter med Is <i>Number of days pr. winter with ice</i>	
Horns-Rev	} Var inddraget af andre Aarsager end Is i Foraaret 1919. <i>Withdrawn during the spring 1919 from other causes than ice.</i>		—	I	3	3	*) {Udlagt i 1906. <i>Established in 1906.</i>
Vyl			—	I	12	12	
Graadyb			—	I	8	8	
Skagens-Rev	—	—	—	11	394	36	*) {Udlagt i Juli 1908. <i>Established in July 1908.</i>
Læsø-Trindel	—	—	—	12	431	36	
Læsø-Rende	—	—	—	13	463	36	
Østre-Flak	—	—	—	3	89	30	
Anholt-Knob	—	—	—	14	509	36	
Schultz-Grund	—	—	—	13	524	40	*) {Oplysningerne begynder 1883. <i>The reports commence 1883.</i>
Lappe-Grund	—	—	—	14	364	26	
Drogden	—	—	—	14	561	40	
Gjedser-Rev	Som Horns-Rev	—	—	12	521	43	

Tab. 7.

Sammenligning mellem de forskellige Vintre.

Comparison between the various winters.

Antal Dage med Is for: <i>Number of days with ice in:</i>	1906 —07	1907 —08	1908 —09	1909 —10	1910 —11	1911 —12	1912 —13	1913 —14	1914 —15	1915 —16	1916 —17	1917 —18	1918 —19
Aabne Farvande... <i>(The fairways)</i>	6.6	0.2	18.6	0.1	0	17.7	0.3	0.1	0.0	0.1	21.4	1.2	0.7
Havne ved aabent Farvand... <i>(Harbours situated at the fairways)</i>	17.4	2.9	28.4	2.2	0.5	20.4	3.2	2.1	0.5	2.7	33.5	6.1	4.4
Tildels lukkede Farvande... <i>(Partly closed waters)</i>	24.2	6.7	41.0	2.1	0.2	35.1	6.2	4.6	2.7	3.7	50.7	9.1	8.5
Havne ved indelukkede Farvande... <i>(Harbours situated in closed waters)</i>	52.8	25.5	69.2	14.2	9.6	49.1	18.4	15.0	16.9	18.1	71.6	34.3	28.6
Indelukkede Farvande... <i>(Closed waters)</i>	57.9	32.2	66.3	20.7	5.6	52.9	19.1	16.6	19.3	22.1	78.5	48.1	31.1
Alle Stationer... <i>(All stations)</i>	30.3	10.1	38.8	5.7	2.4	31.5	7.4	6.0	6.1	7.3	44.9	15.3	11.6
Middeltal af Kuldemængde for Stat. i Tab. II... <i>(Mean amount of cold for the stations in Tab. II.)</i>	121.1	65.8	151.6	37.9	23.9	128.6	31.9	49.2	66.3	68.2	169.5	79.4	65.2