“A fleet of silver, come to torment us”: Sea-ice variations off the coasts of Iceland from the Settlement to the Present

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Nicolaus Copernicus University in Toruń
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Open university lecture, 6 December 2021

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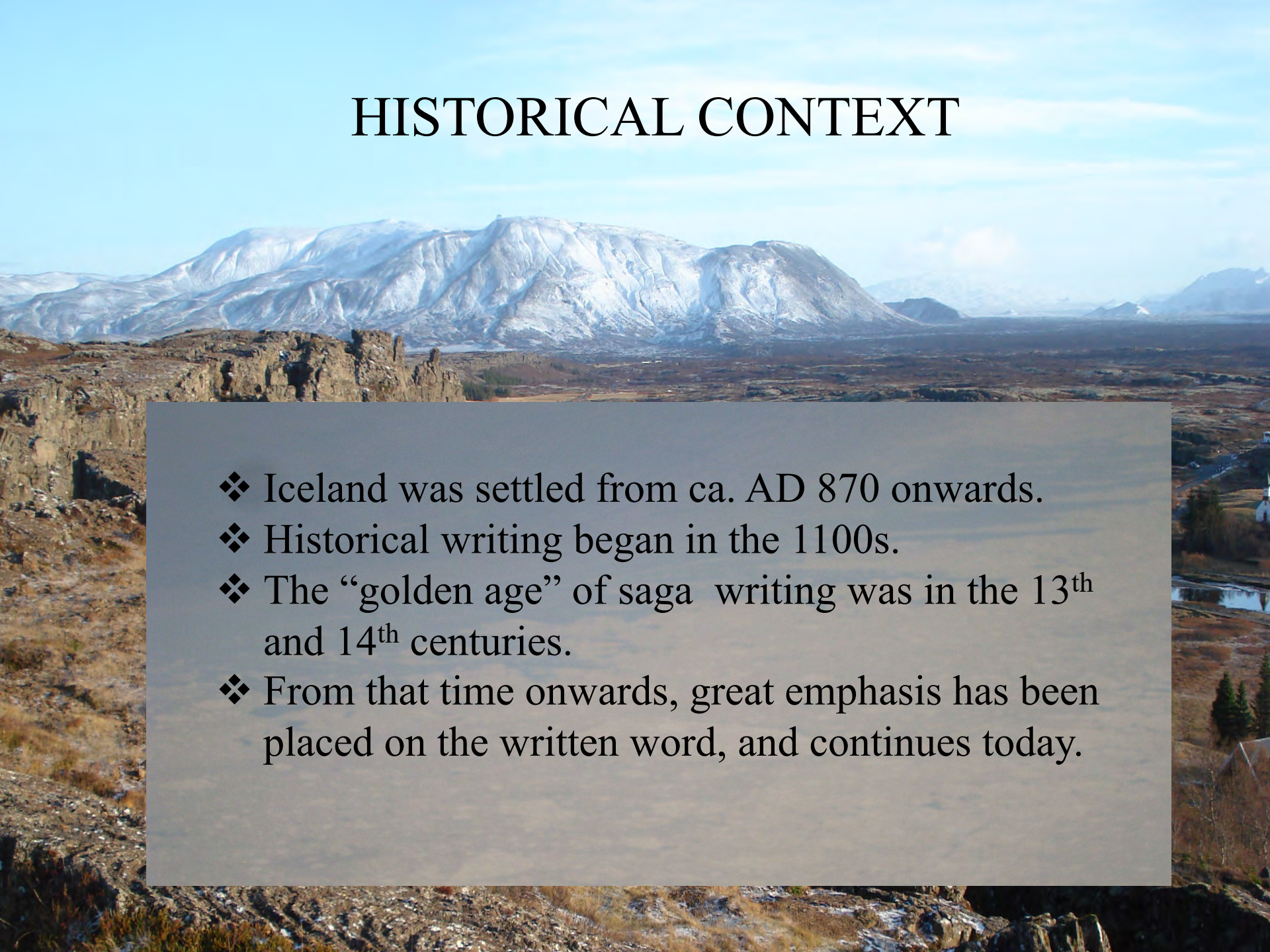
THE CONTEXT

For much of Iceland's ca. thousand-year long settlement history the country has been affected by a severe climate and the sea ice that drifted to the country´s shores on the East Greenland Current.

HISTORICAL CONTEXT



- Iceland was settled from ca. AD 870 onwards.
- Historical writing began in the 1100s.
- The "golden age" of saga writing was in the 13th and 14th centuries.
- From that time onwards, great emphasis has been placed on the written word, and continues today.

PRESENTATION OUTLINE: THE PLAN

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- To consider the nature of sea ice - what it is and where it comes from …
- Some context - a poem and a story …

Hafísinn

by

Icelandic poet, playwright and translator

Matthías Jochumsson (1835-1920)

Ertu kominn, landsins forni fjandi?
Fyrstur varstu enn ad sandi,
fyrr en sigling, sól og bjargarráð.
Silfurfloti, sendur oss að kvelja!
situr ei í stafni kerling Helja,
hungurdiskum hendandi yfir gráð

THE SEA ICE

Have you come, our country´s ancient enemy?
You arrived upon the sandy shore
Before sailing ship, sun and urgent help
A fleet of silver, come to torment us
Is that not the goddess Hel sitting in the bow?
Bringing us plates of hunger …

Written Easter, 1888, Akureyri, Iceland

First verse of poem translated by Astrid Ogilvie and Níels Einarsson

The sea ice ... has been the most important causal factor in the dearth-years, price-rises and famines, and has done more harm to the Icelandic population than all the volcanic eruptions and earthquakes (Thoroddsen, 1914, p. 205).

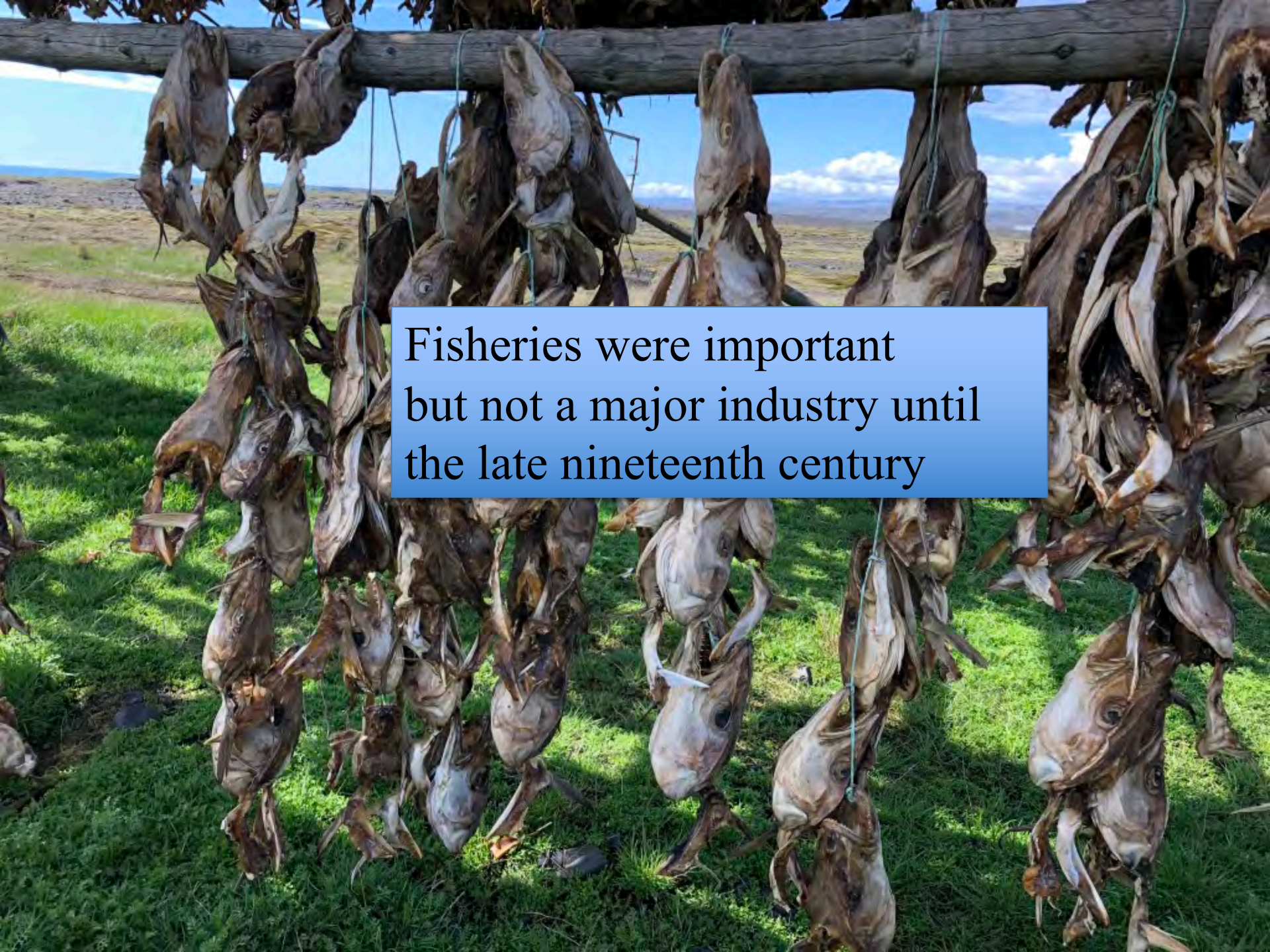
ÞORVALDUR THORODDSEN
1855-1921
Icelandic geologist and the major author on the past climate of Iceland

So why was the sea ice so troublesome?

FIRST, SOME FACTS ….

A FEW WORDS ON THE ECONOMY

Based on livestock farming:
sheep, cattle and horses


Fisheries were important
but not a major industry until
the late nineteenth century

THE ALL-IMPORTANT GRASS CROP

The story of Flóki Vilgerðarson
known as “Raven Flóki”: The Naming of Iceland

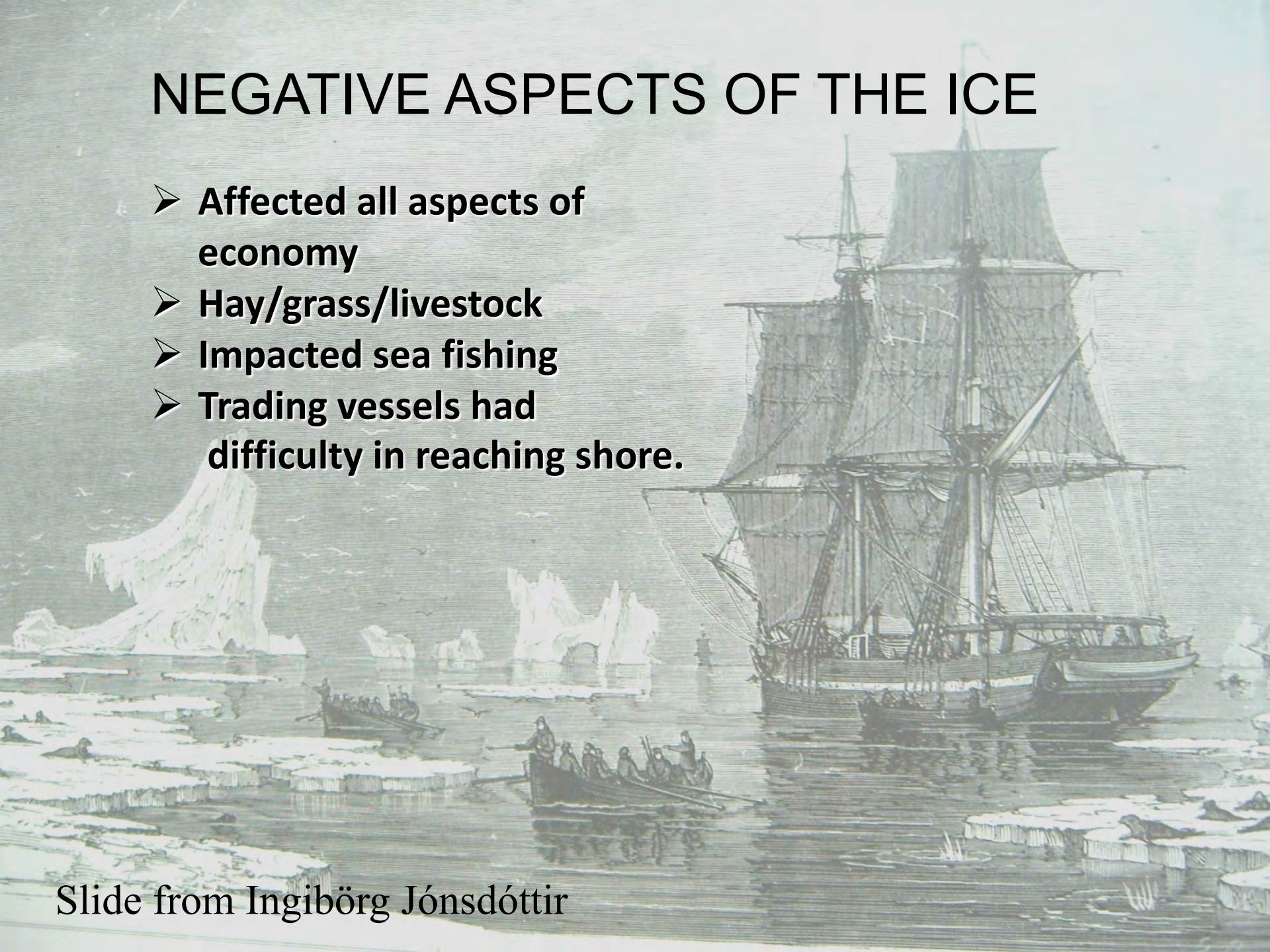
Recounted in *Landnámabók* (“The Book of Settlements”)
His supposed first visit to Iceland
suggested to have occurred c. AD 868

The attempted settlement of Flóki Vilgerðarson ca. AD 865


Raven Flóki´s story is told again and again throughout Iceland´s history ….

NEGATIVE ASPECTS OF THE ICE

- **Affected all aspects of economy**
- **Hay/grass/livestock**
- **Impacted sea fishing**
- **Trading vessels had difficulty in reaching shore.**



Slide from Ingibörg Jónsdóttir

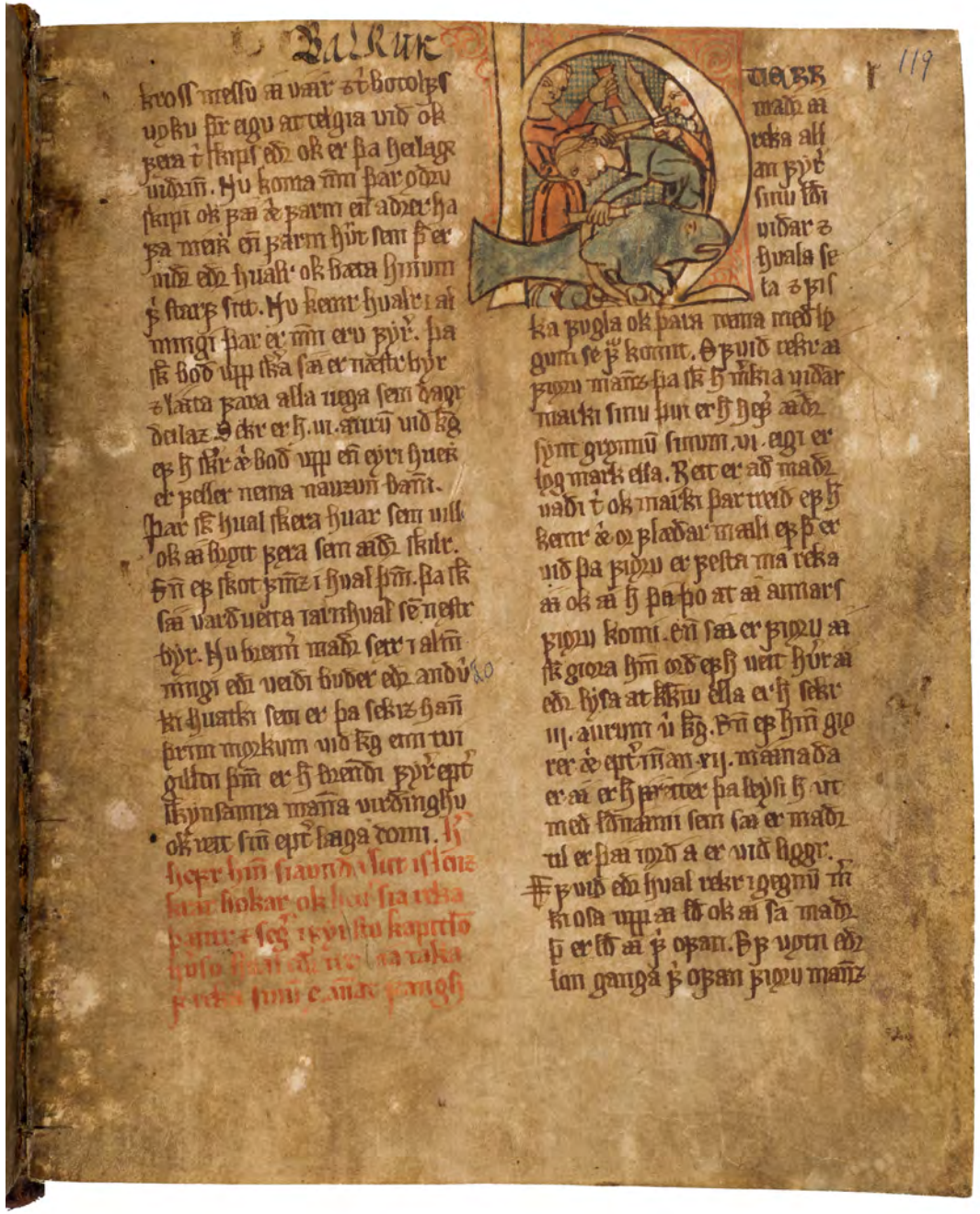
THE ICE ALSO BROUGHT SOME BENEFITS

Marine mammals, seals and whales
Driftwood

Slide from Ingibjörg Jónsdóttir

... the winter was among the best, but the spring was very cold, especially after the sea ice, which lay here for some time, had embraced the coasts. In the similarly cold summer, the grass growth was thus very poor ... on 19 October the fishing stopped due to encroaching drift ice. The two whales washed up ... by the sea ice in June, helped much in preventing hunger deaths in the dearth at that time

(extract from letter written by Sheriff Jón Jónsson, dated 3 January 1816, Bær, Hrútafirði, Strandasýsla. Translated by Astrid Ogilvie).



The Icelandic expression for “windfall” is hvalreki or a “whale stranding”.

That shows how important such an event was. This page from a medieval Icelandic law code illustrates a whale being cut up. There were strict rules regarding who had the rights to a stranded whale.

Jónsbók GKS 3269 a 4to
Courtesy of Árnastofnun


SOME FUN FACTS ON THE
SEA ICE THAT REACHES (REACHED)
THE SHORES OF ICELAND

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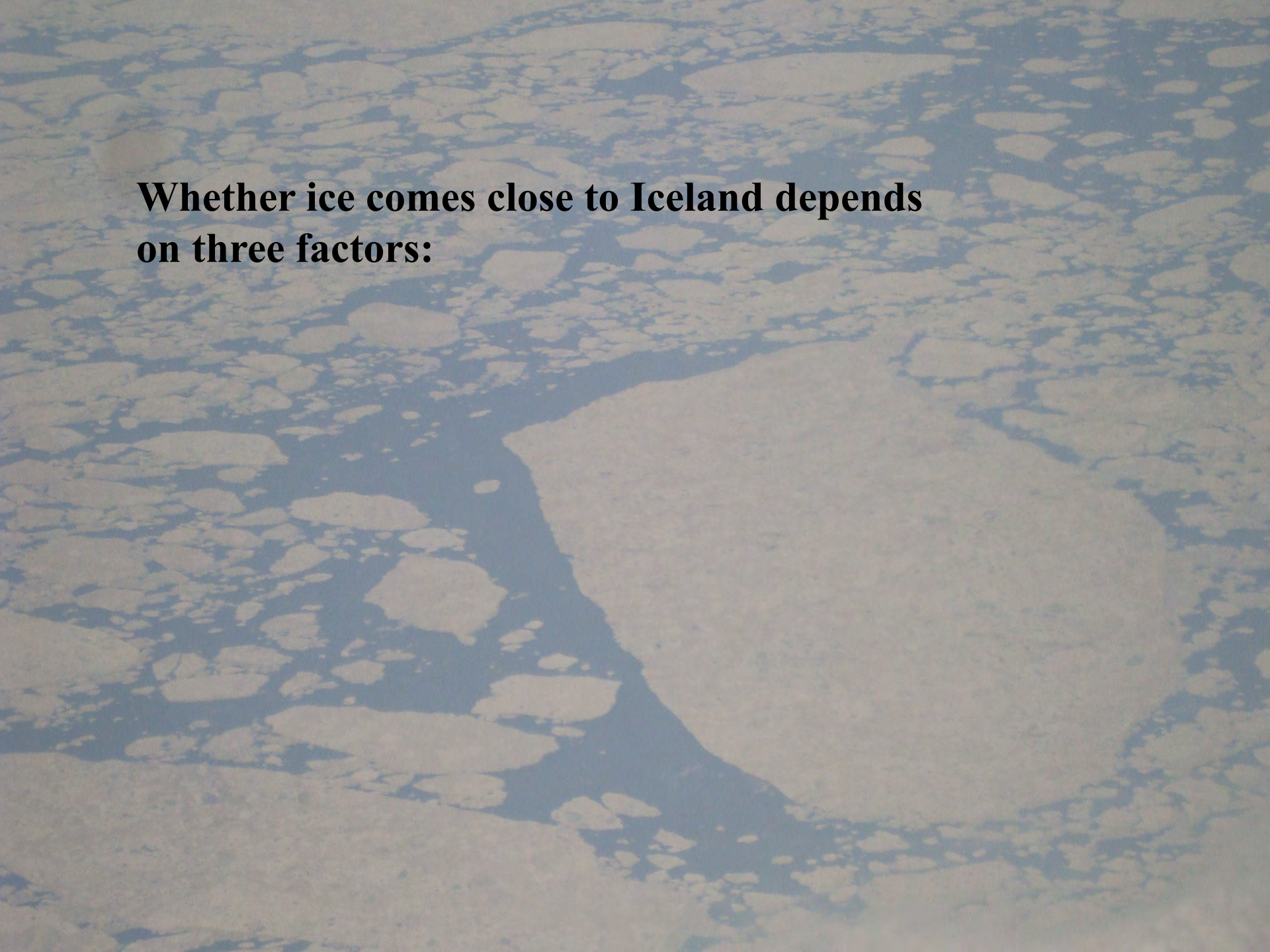
❖ This is the East-Greenland current which flows from the Arctic Ocean due south along the east coast of Greenland, passing northwest Iceland.

❖ This cold current transports a lot of ice southwards, both sea ice which is formed in sea water and ice bergs which break off from the Greenland glaciers.



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"Fun facts" courtesy of https://en.vedur.is/sea-ice/

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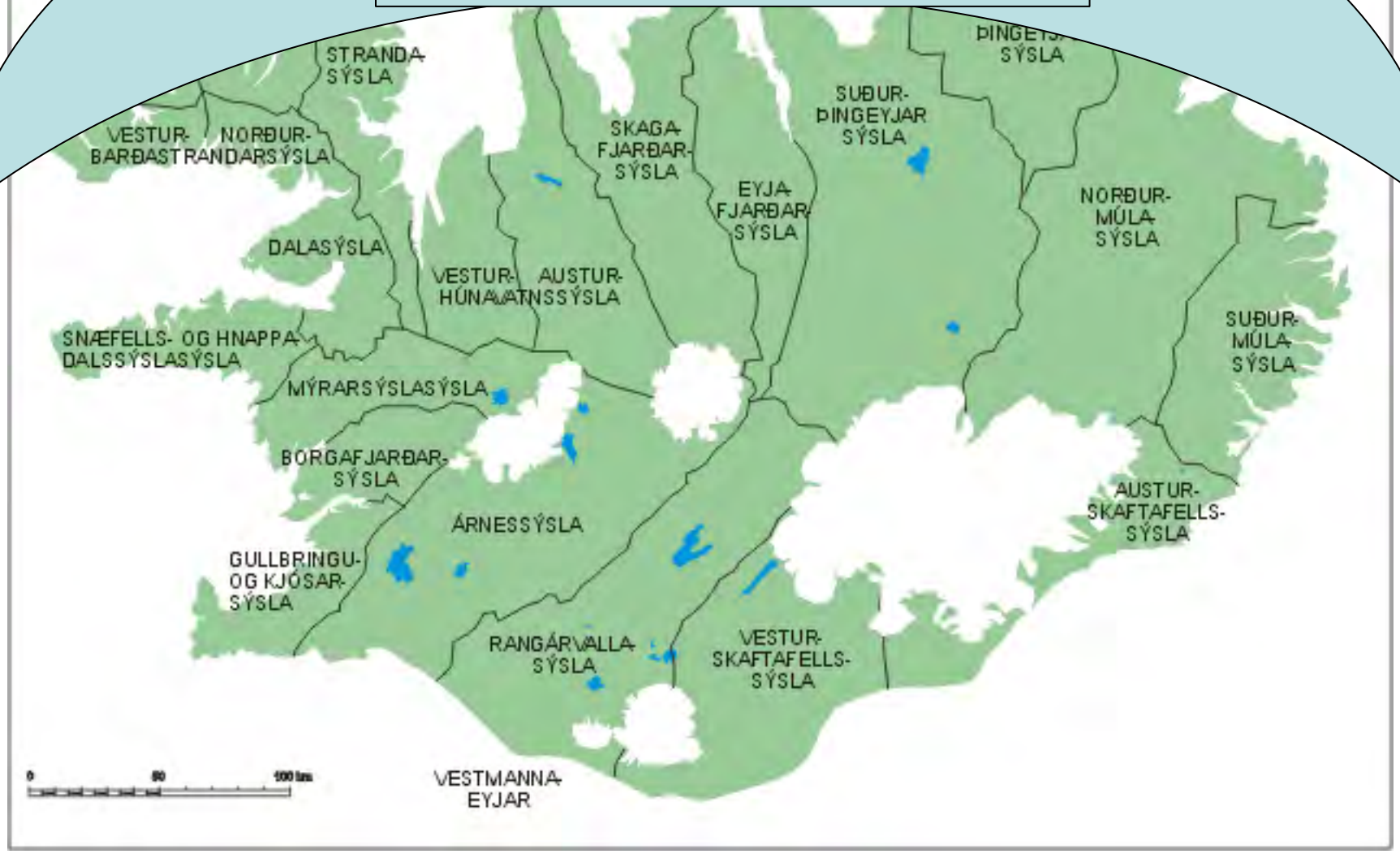
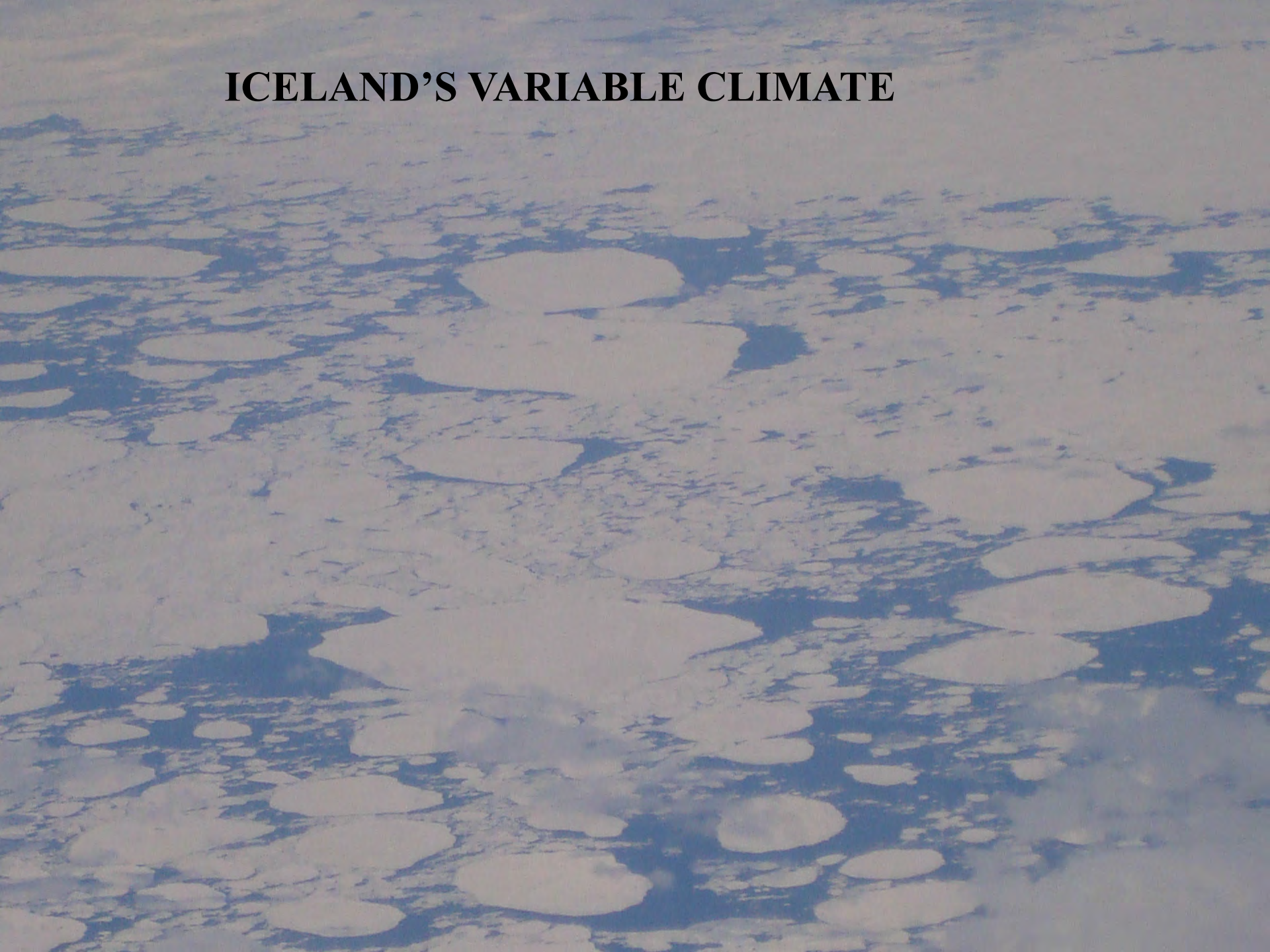
- The months April and May were likely to have the greatest extent of ice, and September to December the least.

The ice most frequently reached the northern, northwestern and eastern coasts



ICELAND'S VARIABLE CLIMATE



ICELAND'S VARIABLE CLIMATE

❖ Iceland is located in a climatologically sensitive area close to major and contrasting features of the Northern Hemisphere's atmospheric and oceanic circulations at the intersection of cold Polar air and warmer Atlantic air, and the relatively warm Irminger current, and the colder East Iceland and East Greenland currents.

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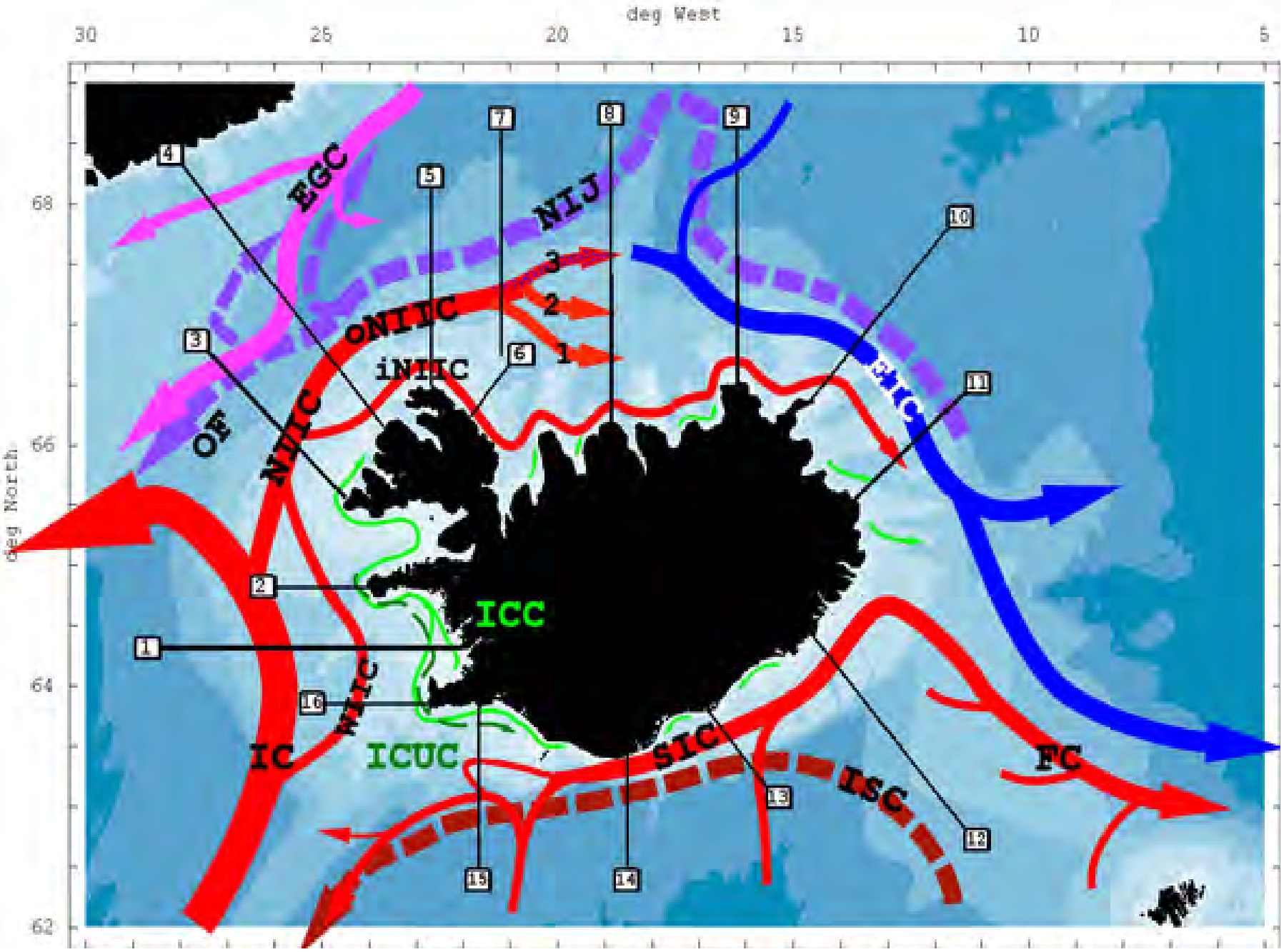
- Iceland's vulnerability to climate impacts in the past, and potentially in the future, is due, in large part, to this variability of the climate.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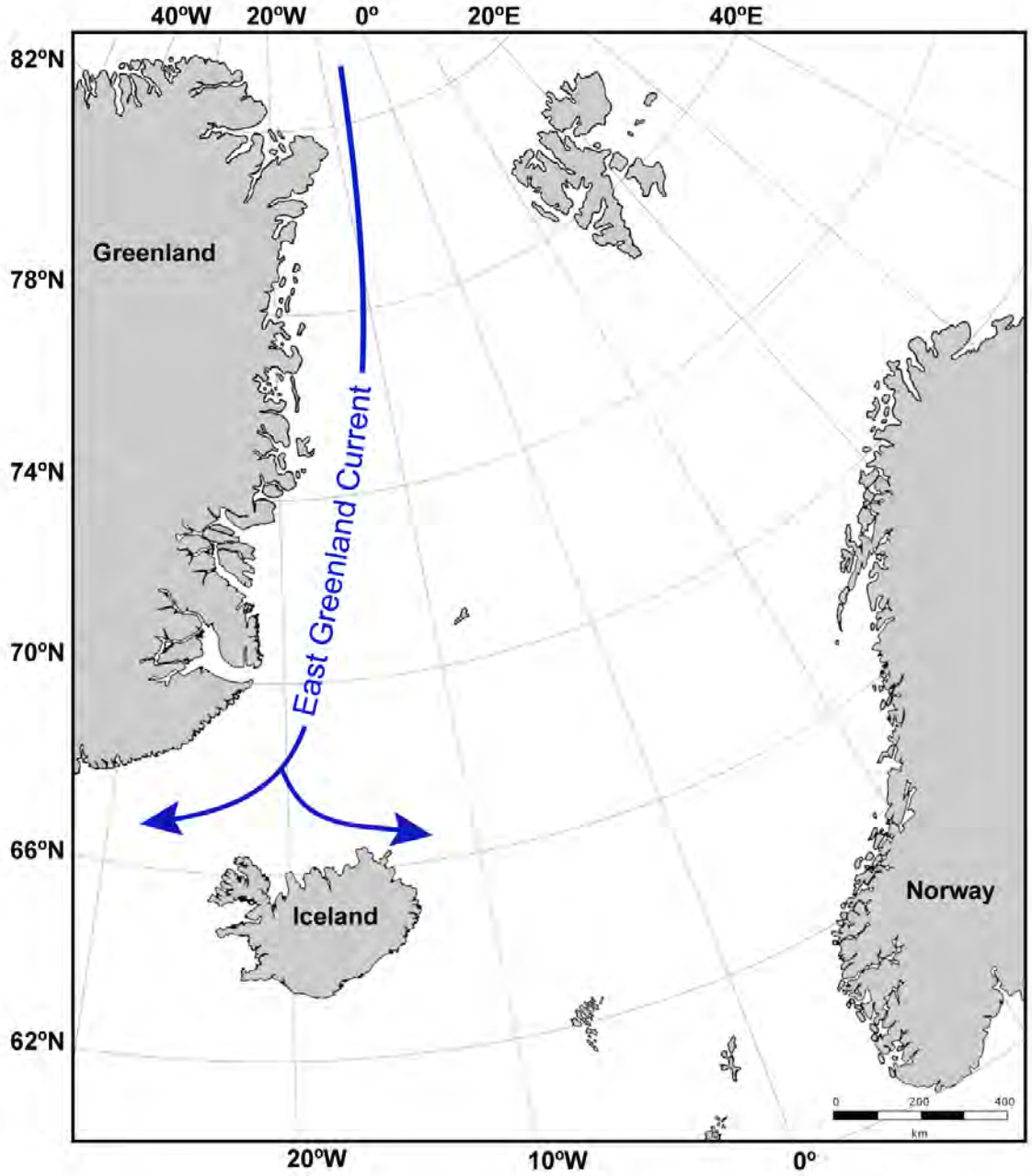
Source for the circulation map

The circulation of Icelandic waters – a modelling study
K. Logemann1, J. Ólafsson1,2, Á. Snorrason3,
H. Valdimarsson2, and G. Marteinsdóttir1
Ocean Sci., 9, 931–955, 2013
www.ocean-sci.net/9/931/2013/ doi:10.5194/os-9-931-2013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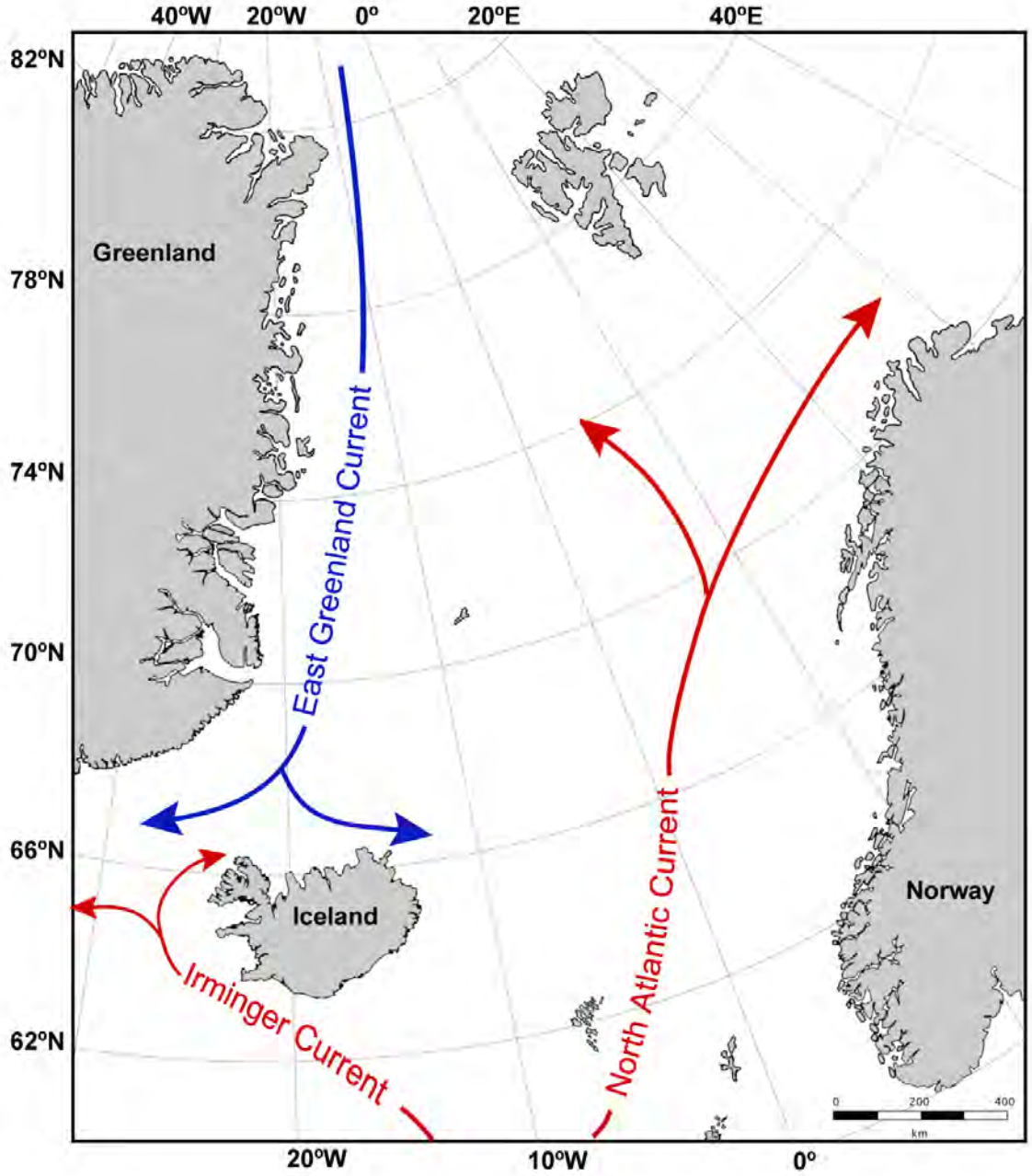
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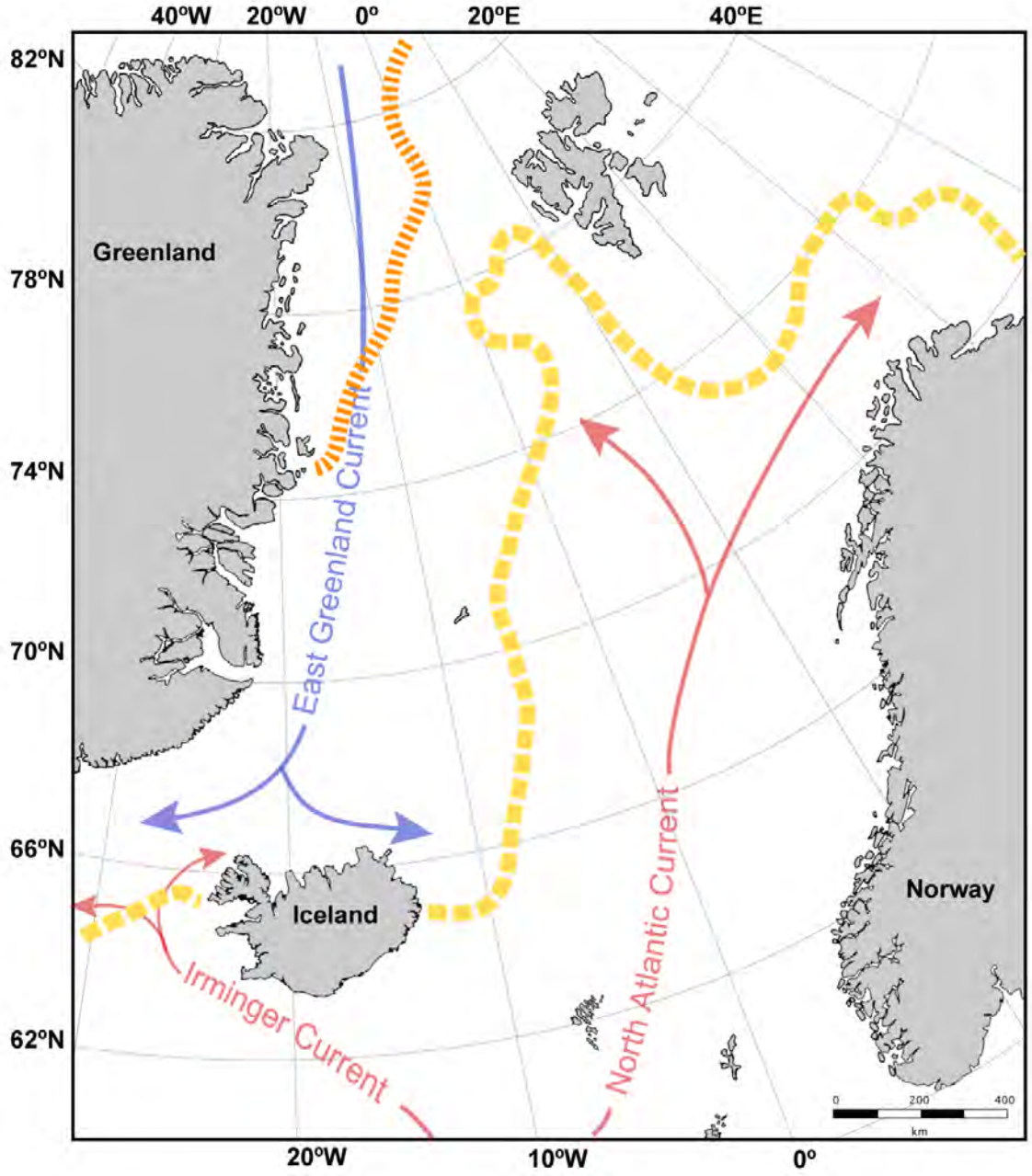
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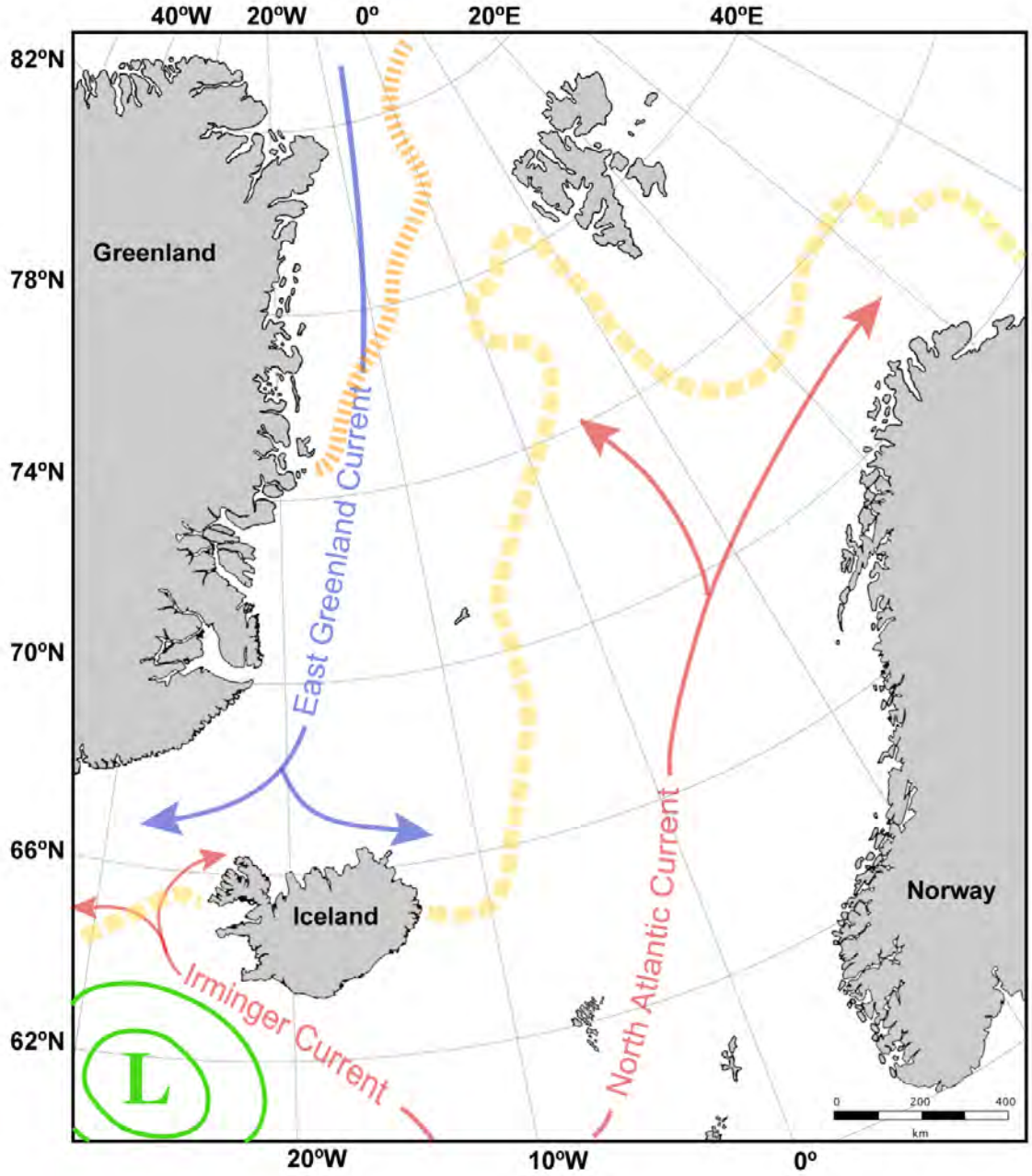
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THE SEA-ICE HISTORY OF ICELAND

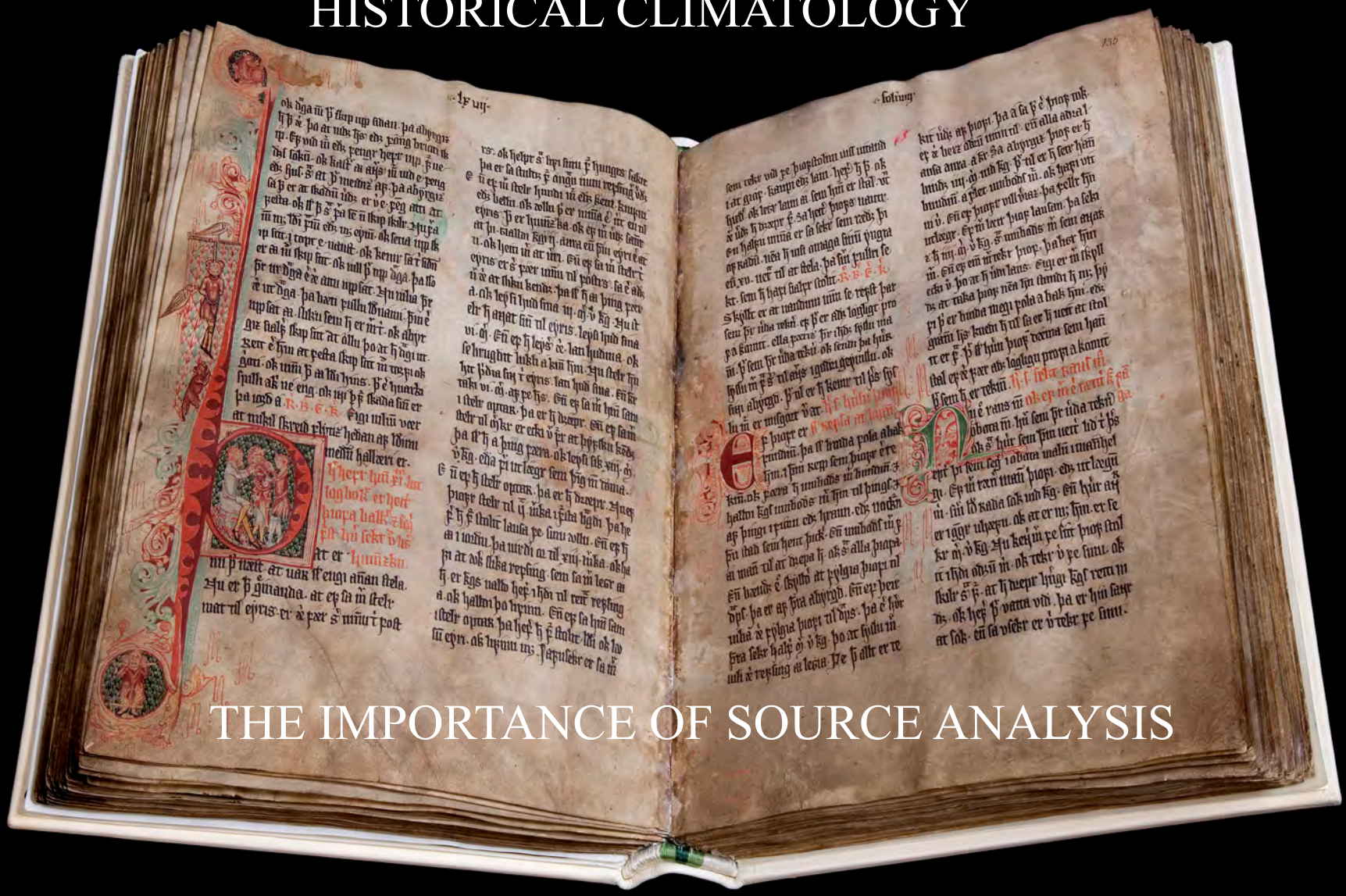
HISTORICAL/DOCUMENTARY RECORDS

Written **records of climate change**

- **Diaries**
- **Annals**
- **Official (State) Records**
- **Ecclesiastical Records**
- **Farming records/Vine Harvests**
- **Early Newspapers**
- **Harbour Records**
- **Trade Records**
- **Shipping Records – Log Books**

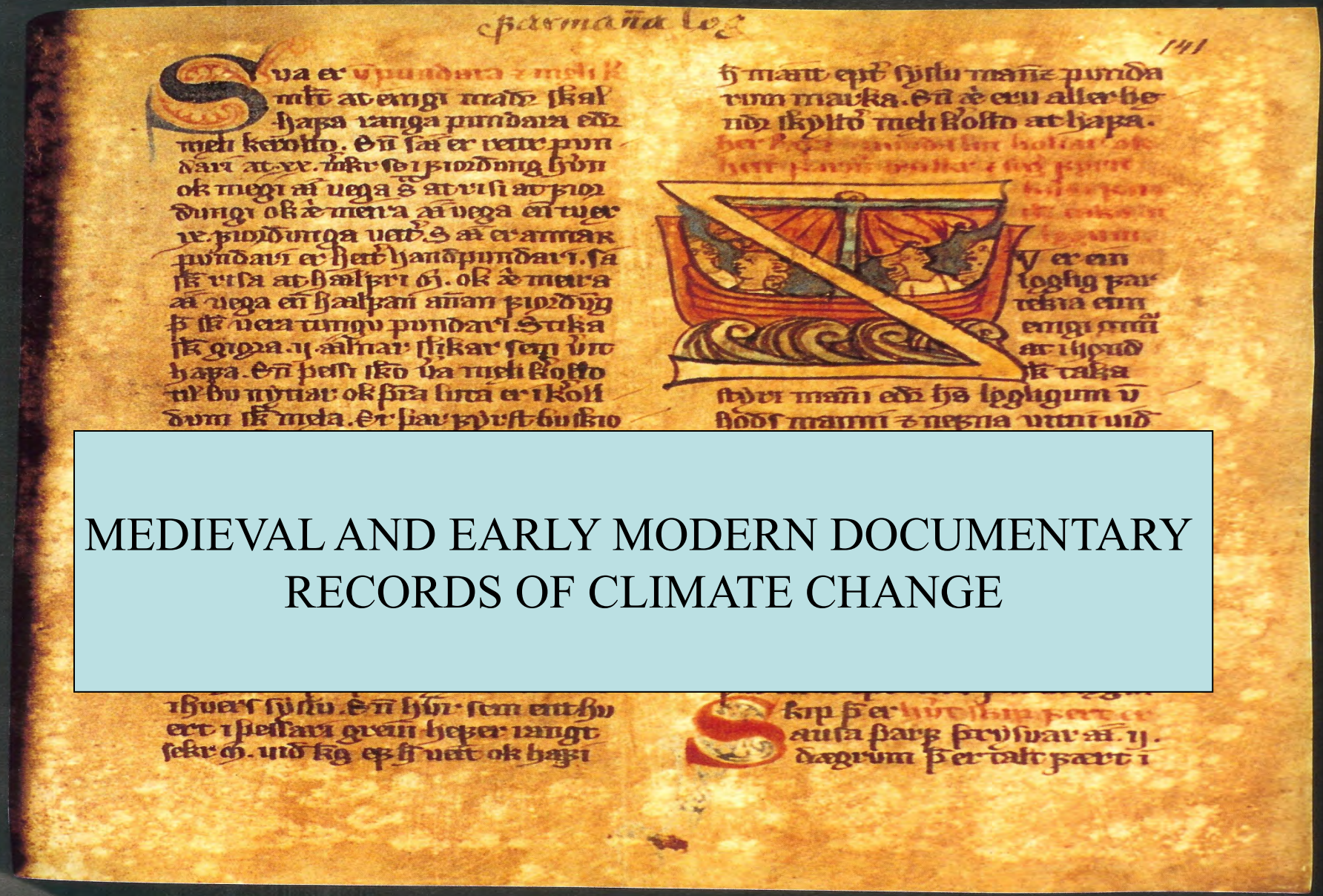
In Iceland these are particularly detailed and extensive, allowing us to reconstruct time series of temperature and sea-ice incidence.

HISTORICAL CLIMATOLOGY



THE IMPORTANCE OF SOURCE ANALYSIS


where
why
what
who
when
how
www.mikeaskewgraphics.co.uk



MEDIEVAL AND EARLY MODERN DOCUMENTARY RECORDS OF CLIMATE CHANGE

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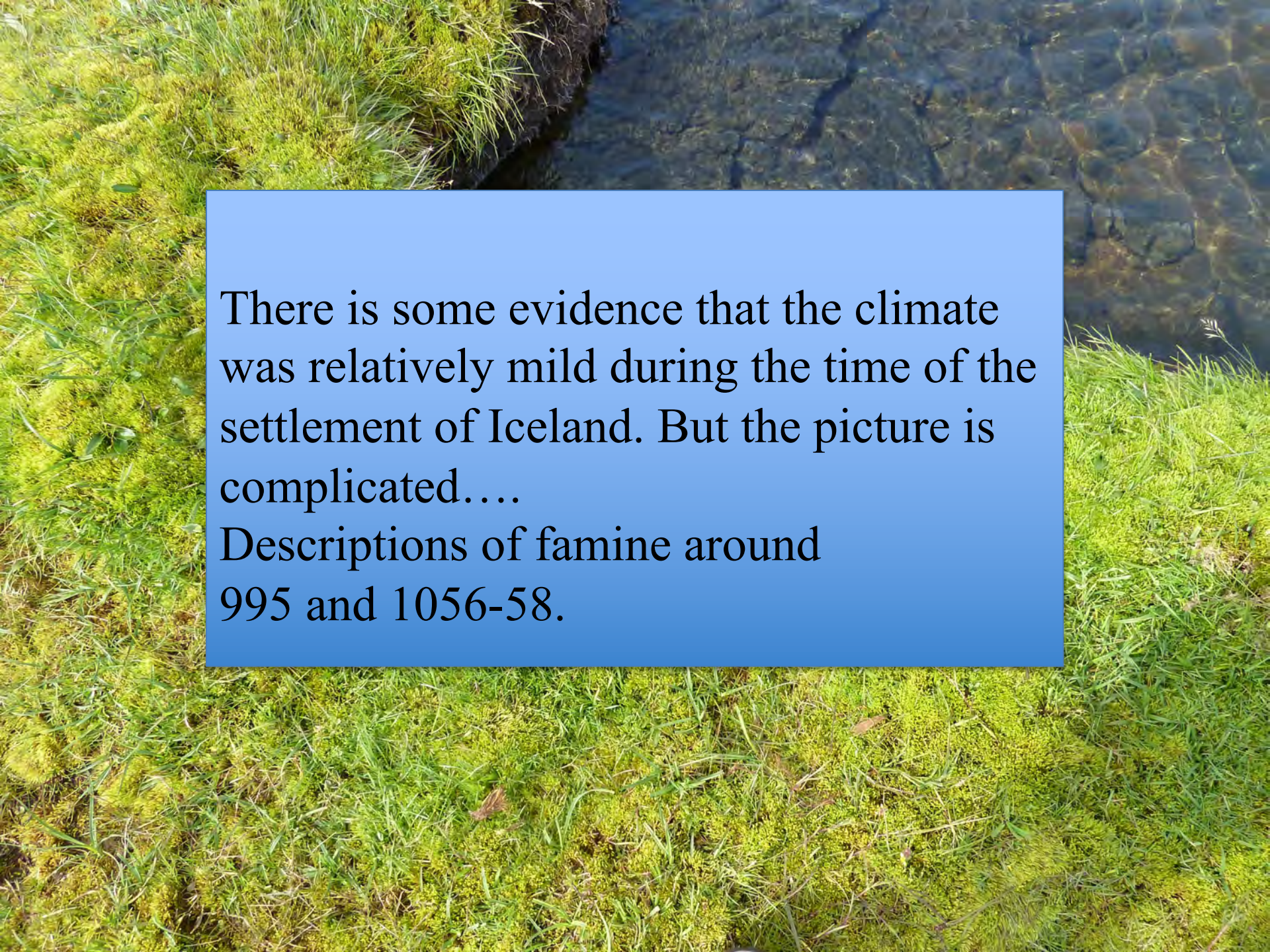
- **1431-1490**: Very little direct historical climate information.
- **c. 1490-1560**: A few interesting historical works, mainly non-contemporary.
- **c. 1560-1600**: A few excellent accounts

SETTLEMENT PERIOD TO THE LATE 12TH CENTURY



There is some evidence that the climate was relatively mild during the time of the settlement of Iceland. But the picture is complicated….
Descriptions of famine around
995 and 1056-58.


The settlers to Iceland came to a pristine environment. This is important to remember when thinking about possible changes in climate.

AD 1200-1400

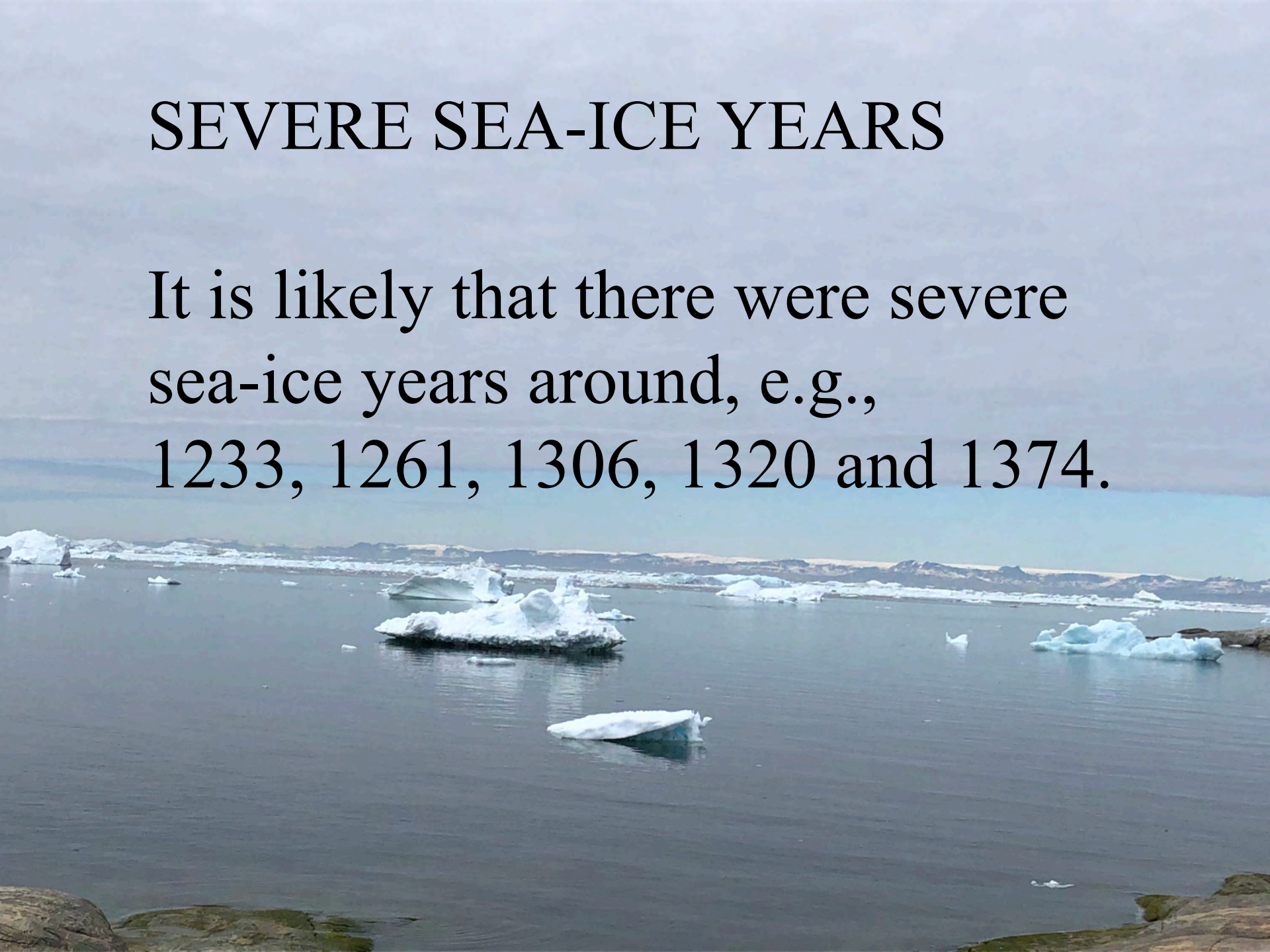
For the period 1200 to 1400 there are reliable historical data that are contemporary …

Cold periods ca. 1180 to ca. 1300

Relatively cold periods are suggested during ca. 1180 to 1210, possibly around 1250, and again during the 1280s and 1290s.

SEVERE SEA-ICE YEARS

It is likely that there were severe sea-ice years around, e.g., 1233, 1261, 1306, 1320 and 1374.



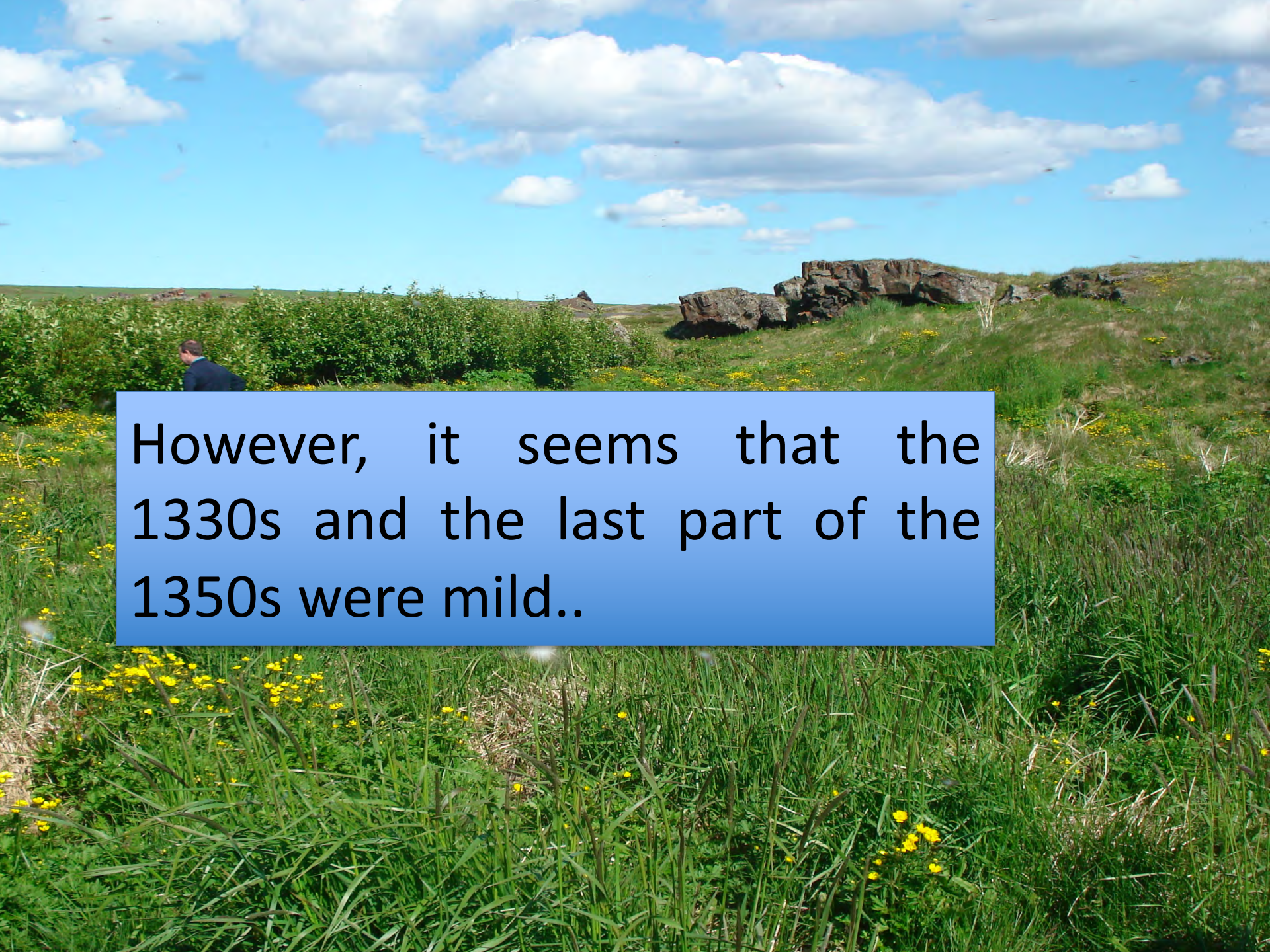
ca. 1300

- **The cold period around 1300 is well documented in written sources.**
- **Palaeoglacial work also indicates major glacial advances at that time.**

- **This time may perhaps be termed the "late medieval cold period" in Iceland.**

1300-1400

The fourteenth century was very variable climatically. Sources mention cold periods in the 1340s, 1360s and 1370s.
A description of Iceland from around 1350 emphasizes heavy sea-ice conditions and glaciers.


However, it seems that the 1330s and the last part of the 1350s were mild..

Not severe during 1412 to 1470?

Between 1430 and 1490 there are very few contemporary climate sources. However, circumstantial evidence may suggest a climatic regime that was not unduly harsh during the period ca. 1412 to 1470.

It was at this time that the English dominated the trade with Iceland and the major import item into Iceland was cloth – not grain or other food items – implying that food was not in short supply at this time due to dearths or failure of the grass crop.

1560s and 1570s

For the 1560s, a reliable account (*Gottskálksannáll*)
suggests that the 1560s were very cold
with much sea ice while the 1570s were mild.

Two very interesting descriptions of Iceland from the late sixteenth century …

Brevis Commentarius de Islandia/
"A Brief Commentary on Iceland"
Written by Árngrímur Jónsson (1568-1648)

Qualiscunque descriptio Islandiæ/
"A Brief Description of Iceland"
Written by Oddur Einarsson (1559-1630)

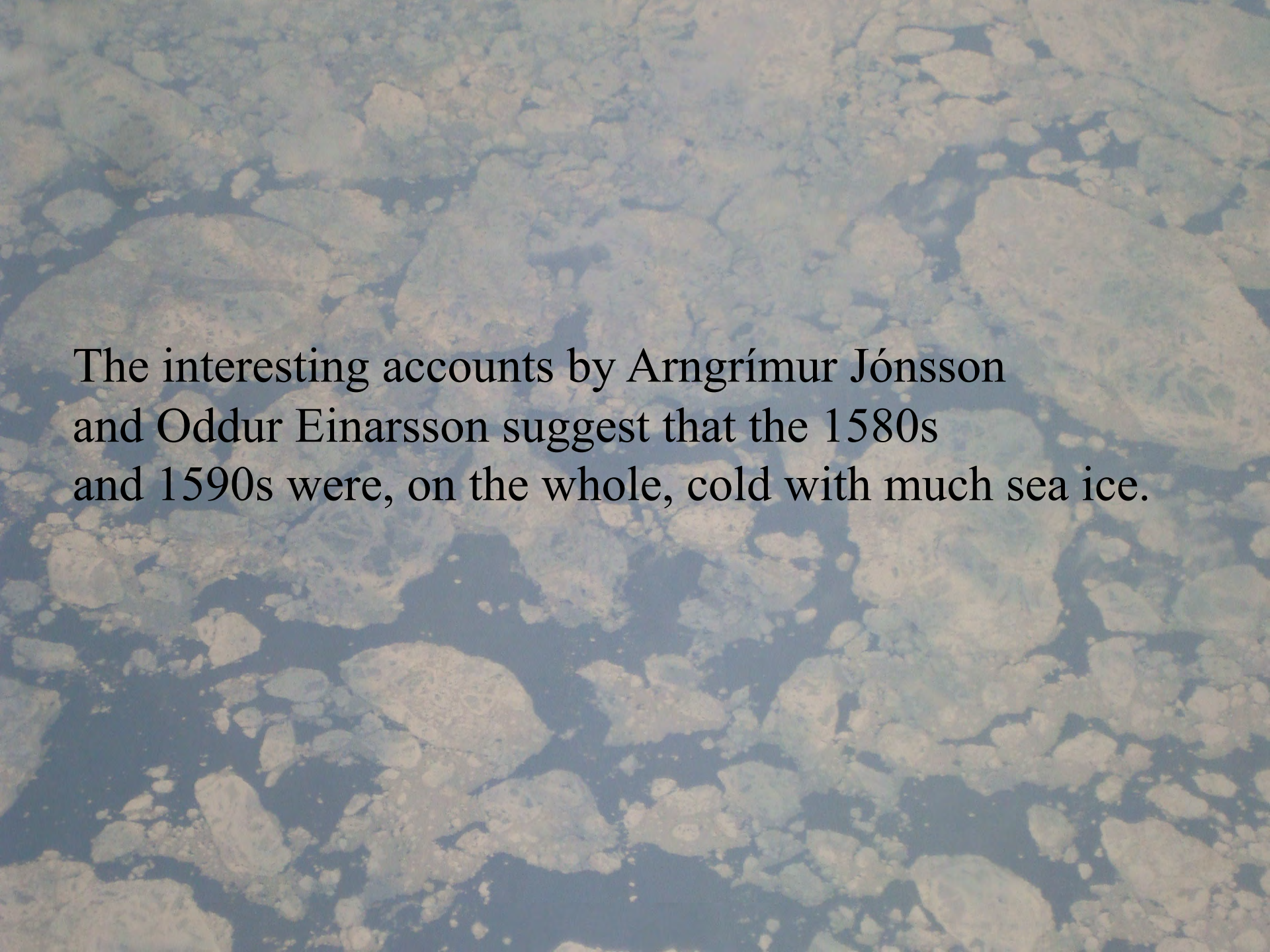
Both written in the 1590s

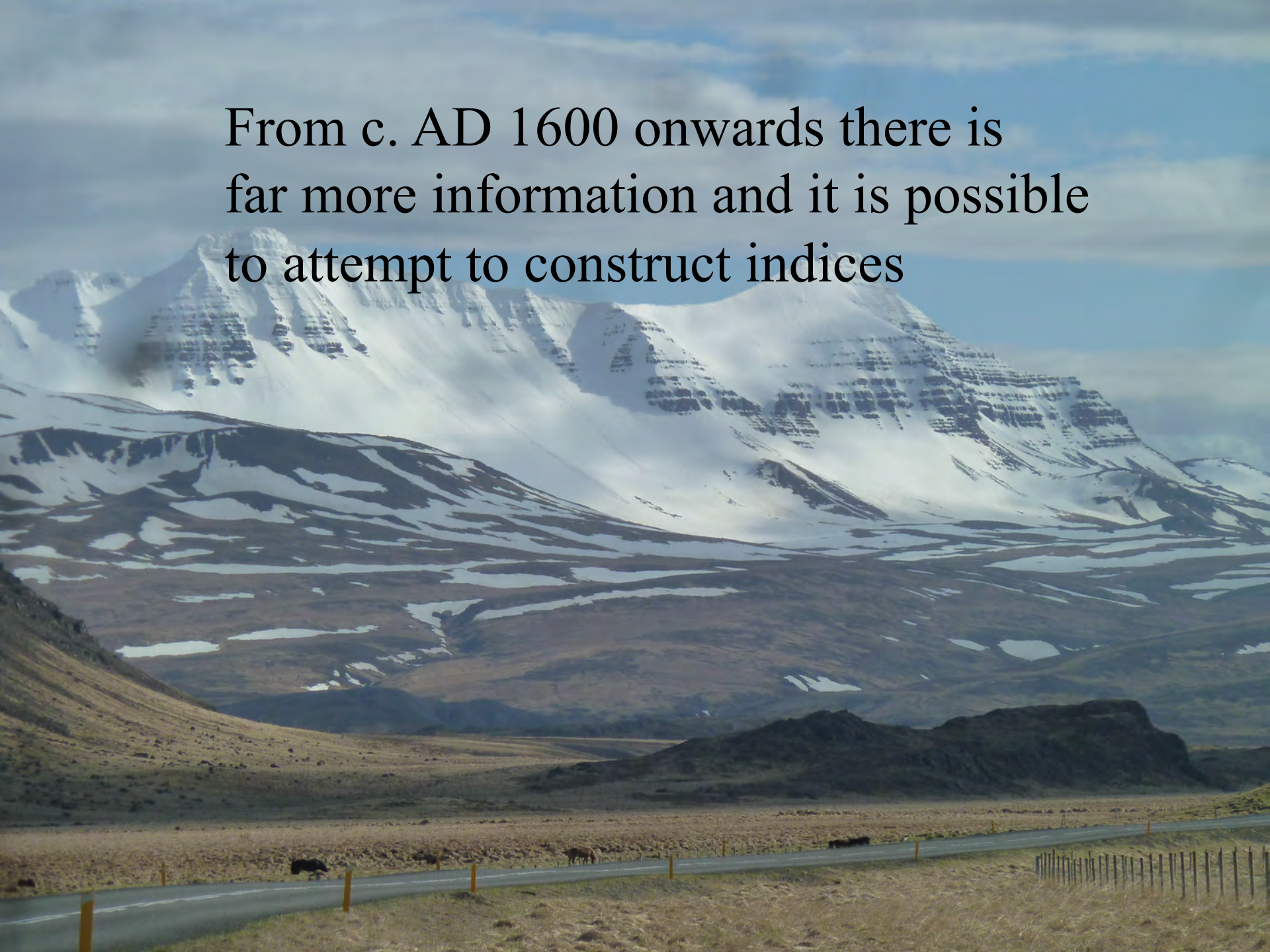
Certainly those who live in these regions (the north) suffer from great hardship caused by its presence when it has been evident for long periods of the time. In particular, on account of the barrenness of the fields which it caused. This occurs because the vitality goes out of the earth and the sap which gives fertility is wasted as soon as the ice has become land-fast and the damaging cold has touched the fields. This island could not be inhabited by men for long if such an unwelcome guest came to trouble it every year.

Qualiscunque descriptio Islandia.

Oddur Einarsson.

Regarding the notion that sea ice is always land-fast to Iceland, or ... that it is fast for 8 consecutive months; neither of them are true.
For the most part the ice melts in April or May and is driven towards the west. It does not then return before January or February and very often even later. It would be possible to count up many years in which this ice ... has not been seen at all around Iceland. This was the case in this year, 1592.
Brevis Commentarius de Islandiæ. Arngrímur Jónsson.


The interesting accounts by Arngrímur Jónsson
and Oddur Einarsson suggest that the 1580s
and 1590s were, on the whole, cold with much sea ice.



From c. AD 1600 onwards there is far more information and it is possible to attempt to construct indices

SOURCES OF CLIMATE INFORMATION

- Later Annals (About 40. 1600-1800)
- Geographical works
- Weather Diaries
- Travellers' Accounts (Local and Foreign)
- Early Newspapers
- Official Reports sent to Denmark
- Early Meteorological Observations

THE LATER ICELANDIC ANNALS

- Cover the period ca. 1600 to 1800.
- Some 40 different works written in different parts of the country.

- Unlike the medieval annals, it is almost always known who the authors of the later annals were. They were invariably educated men, and usually combined a life as a farmer with a professional position such as a minister or a teacher.

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- As farmers and people living close to the land they took a keen interest in the weather and thus many of the later annals contain excellent contemporary descriptions of weather events in addition to more general information.

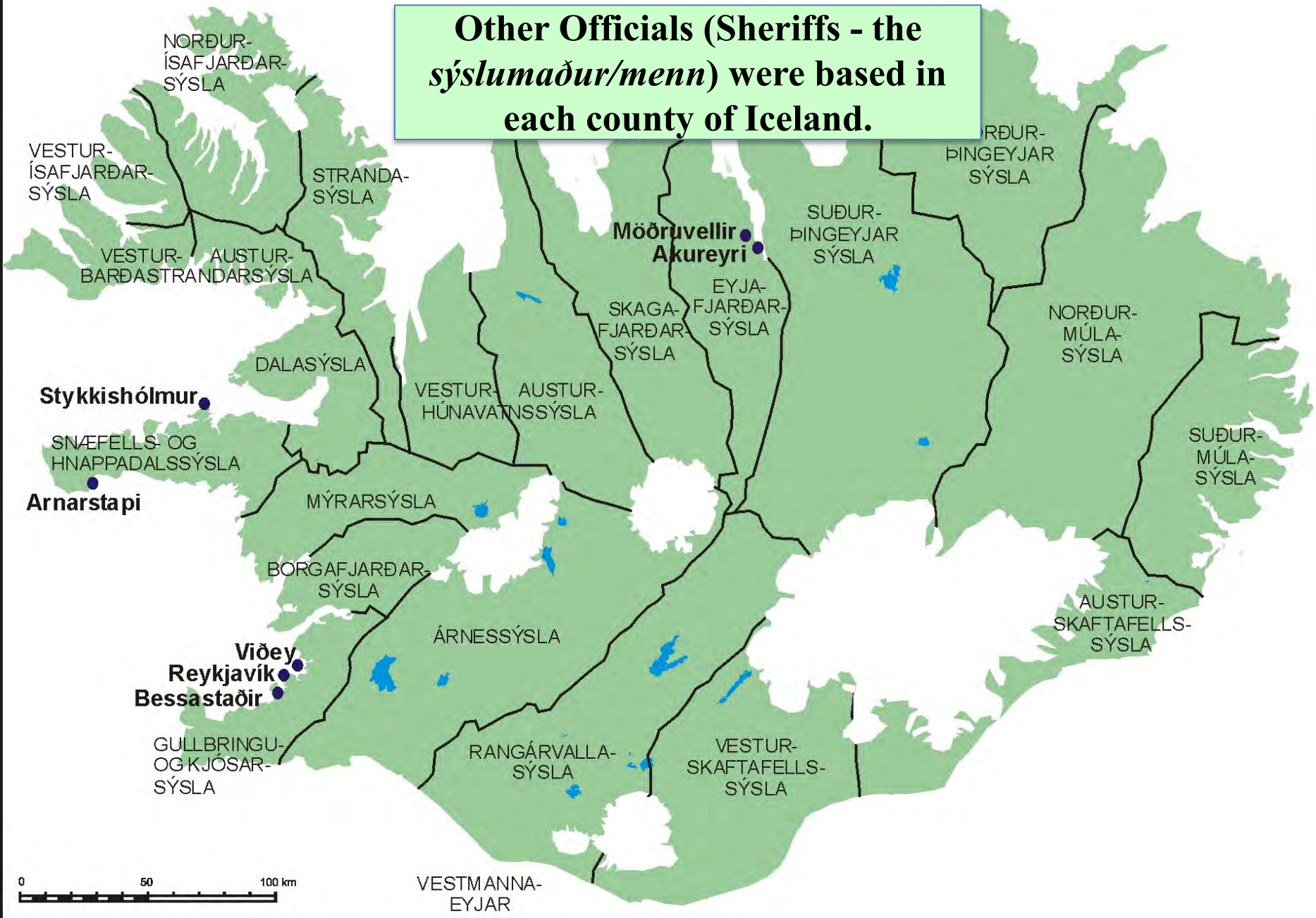
A Bit of History

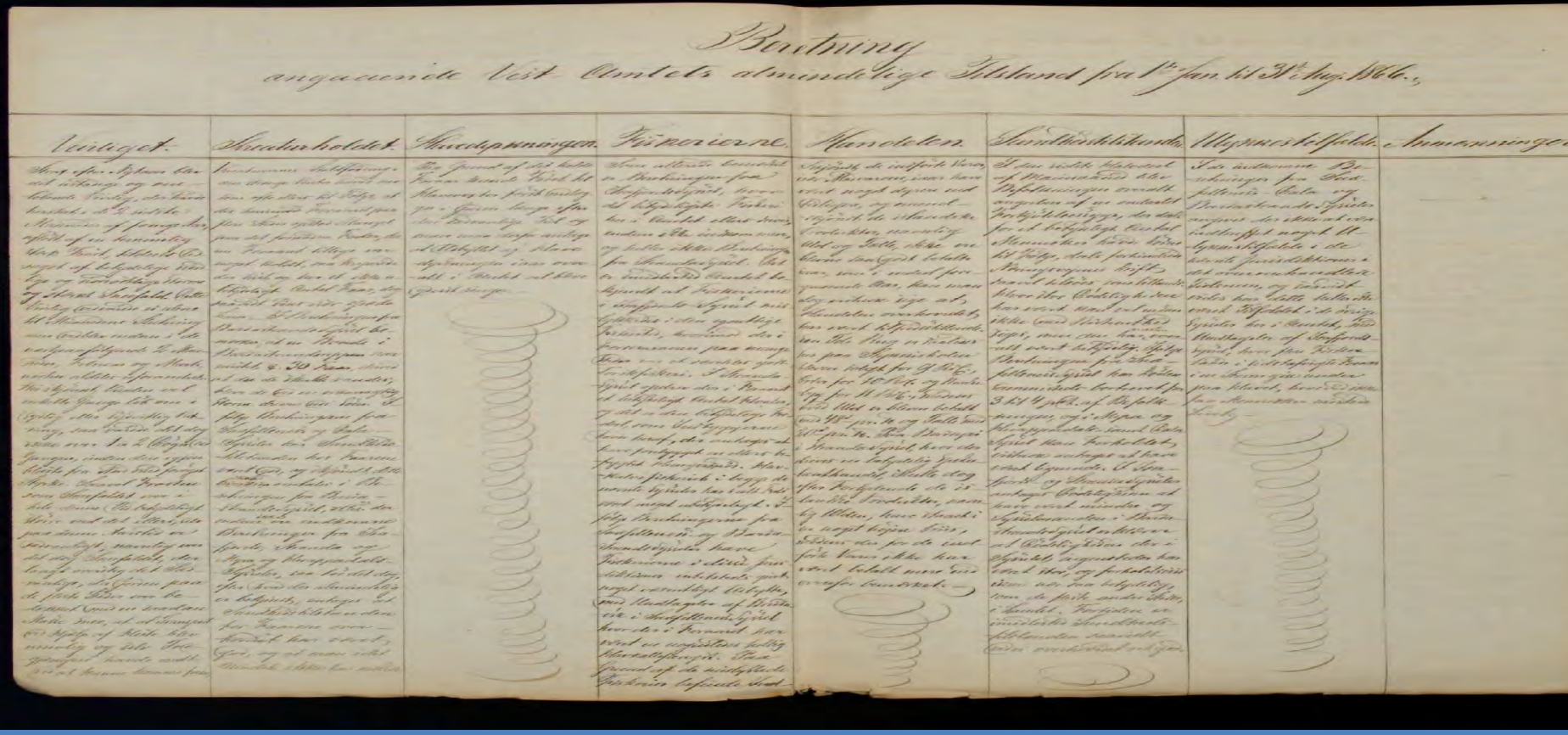
In 1662 Danish administration was directly imposed on Iceland with the initiation of the Danish Absolute Monarchy.

At that time, for administrative purposes, the Danish kingdom was divided into separate districts, each called an *Amt*.

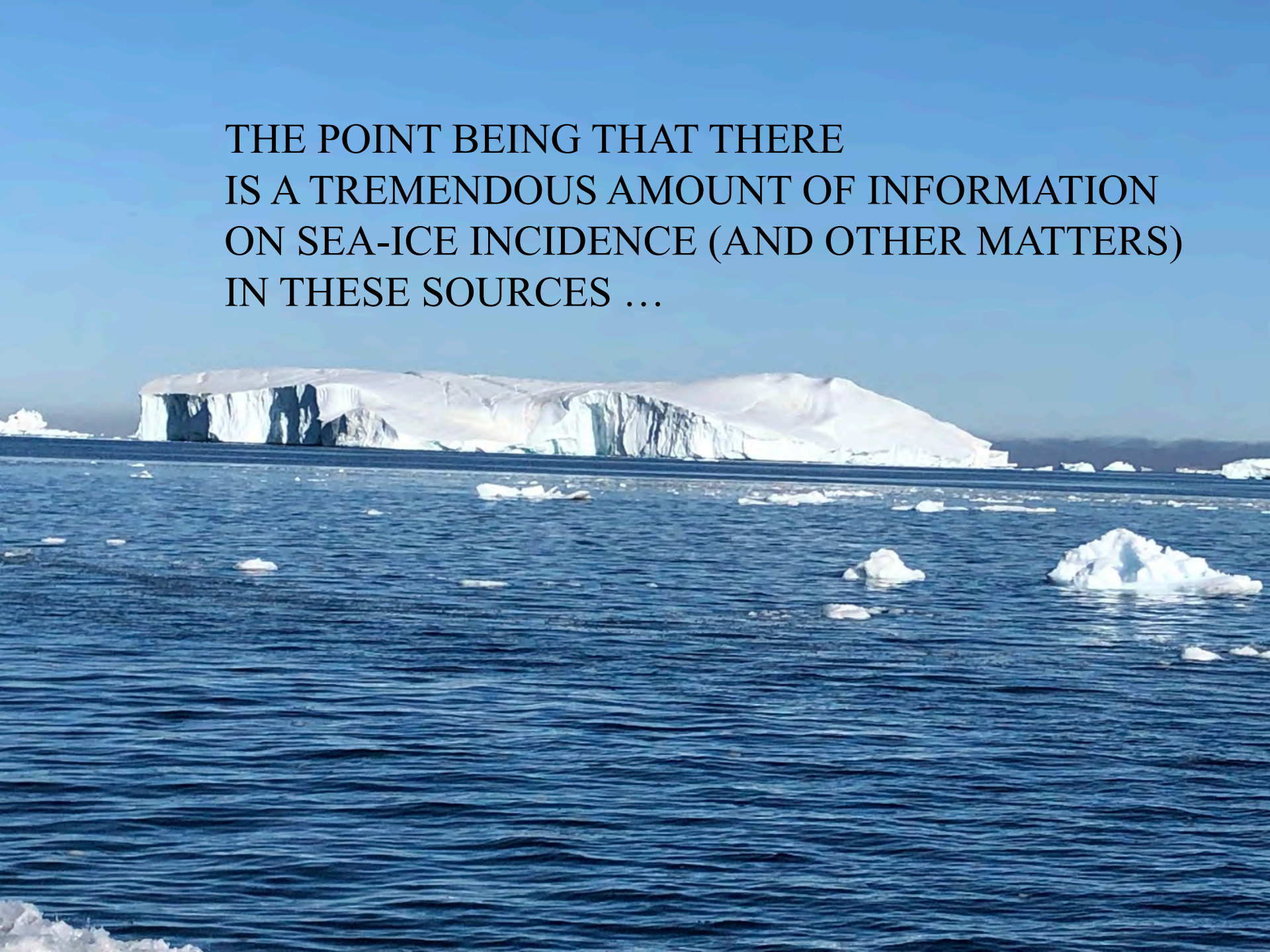
Iceland in entirety was considered to be one “Amt”.
The “Amt” was to have a Governor or *Stiftamtmaður* in charge of it.

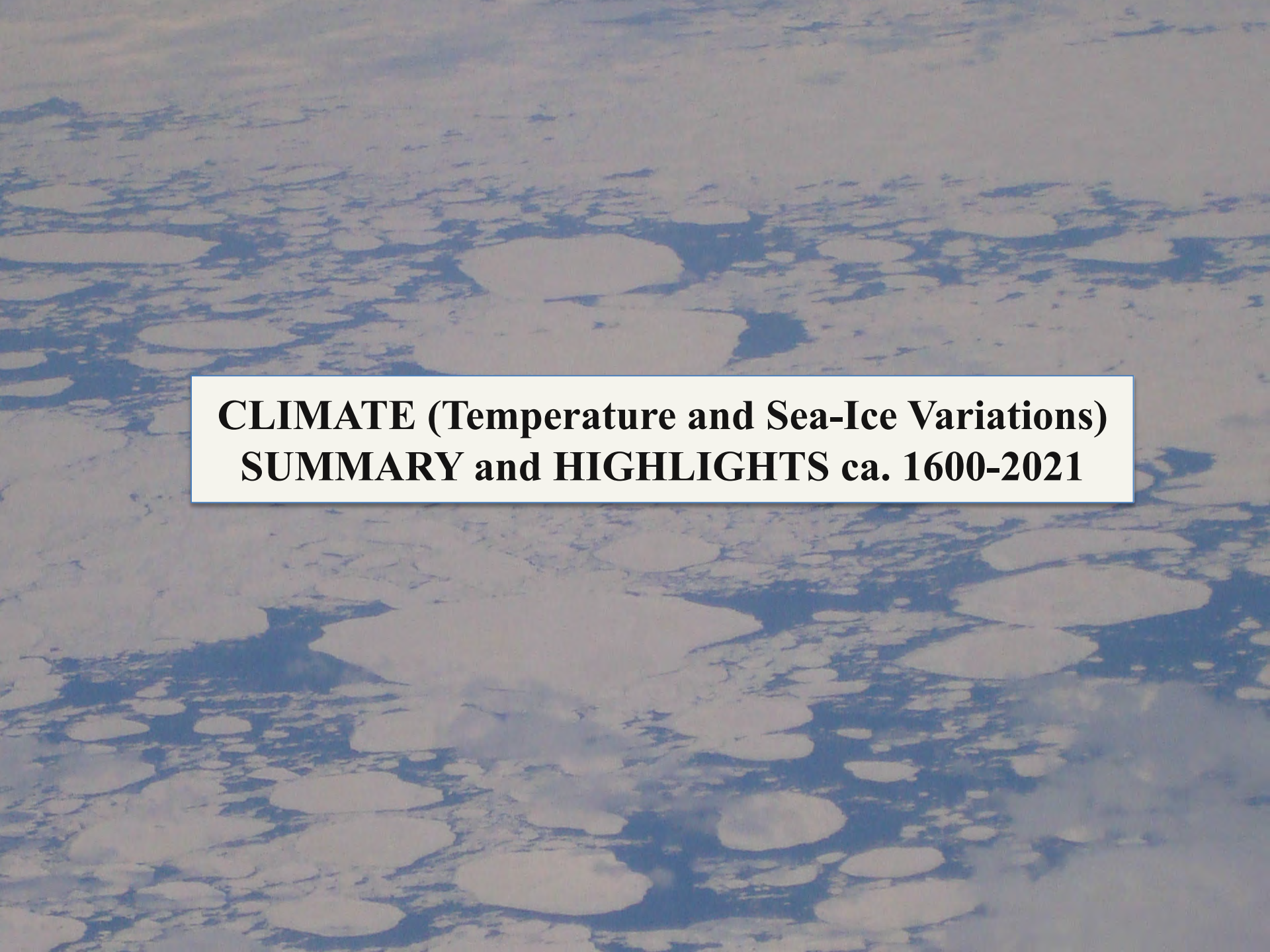
The Governors of Iceland (*Stiftamtmaður*, *Amtmaður)* were required to send the Danish government annual reports on the economy of the country. As were the officials in all the different counties of Iceland.


Other Officials (Sheriffs - the *sýslumaður/menn*) were based in each county of Iceland.
NORÐUR-ÍSAFJARÐAR-SÝSLA
VESTUR-ÍSAFJARÐAR-SÝSLA
STRANDA-SÝSLA
VESTUR-BARÐASTRANDARSÝSLA
AUSTUR-
Mööruvellir
Akureyri
SUÐUR-ÞINGEYJAR SÝSLA
EYJA-FJARÐAR-SÝSLA
SKAGA-FJARÐAR-SÝSLA
NORÐUR-MÚLA-SÝSLA
DALASÝSLA
Stykkishólmur
VESTUR-HÚNAVATNSSÝSLA
AUSTUR-
SNÆFELLS- OG HNAPPADALSSÝSLA
SUÐUR-MÚLA-SÝSLA
Arnarstapi
MÝRARSÝSLA
BORGAFJARÐAR-SÝSLA
AUSTUR-SKAFTAFELLS-SÝSLA
ÁRNESSÝSLA
Viðey
Reykjavík
Bessastaðir
GULLBRINGU- OG KJÓSAR-SÝSLA
RANGÁRVALLA-SÝSLA
VESTUR-SKAFTAFELLS-SÝSLA
0
50
100 km
VESTMANNA-EYJAR



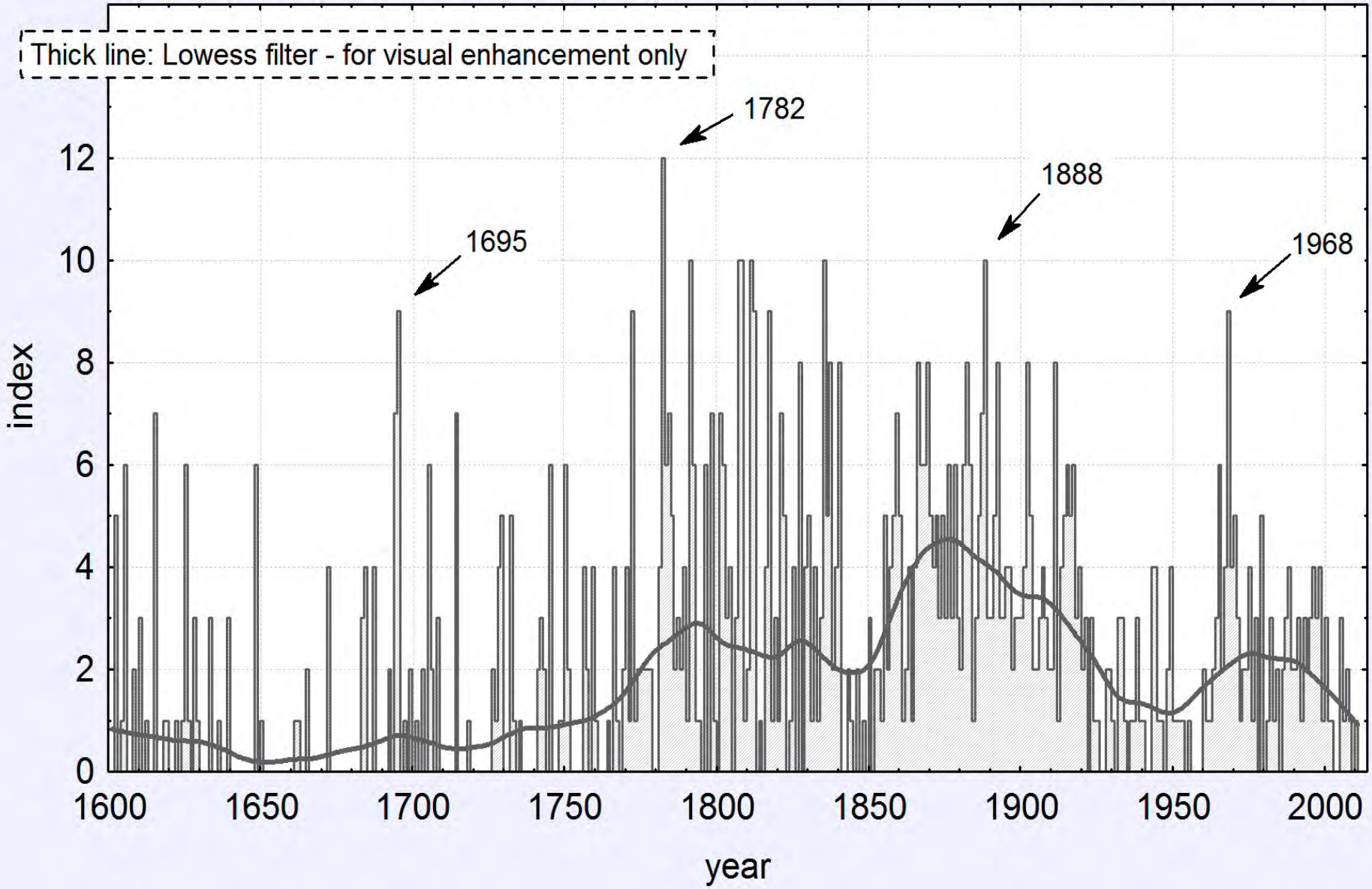
The photograph shows the front of a letter dated 18 October 1866 signed by the *Amtmaður* for the western district, Bergur Ólafsson Thorberg (1829-1886). The heading means "Account regarding the western district's general situation from 1 January to 31 August 1866". The headings refer to: weather and sea ice, livestock, fisheries, trade, health etc.


THE POINT BEING THAT THERE
IS A TREMENDOUS AMOUNT OF INFORMATION
ON SEA-ICE INCIDENCE (AND OTHER MATTERS)
IN THESE SOURCES …



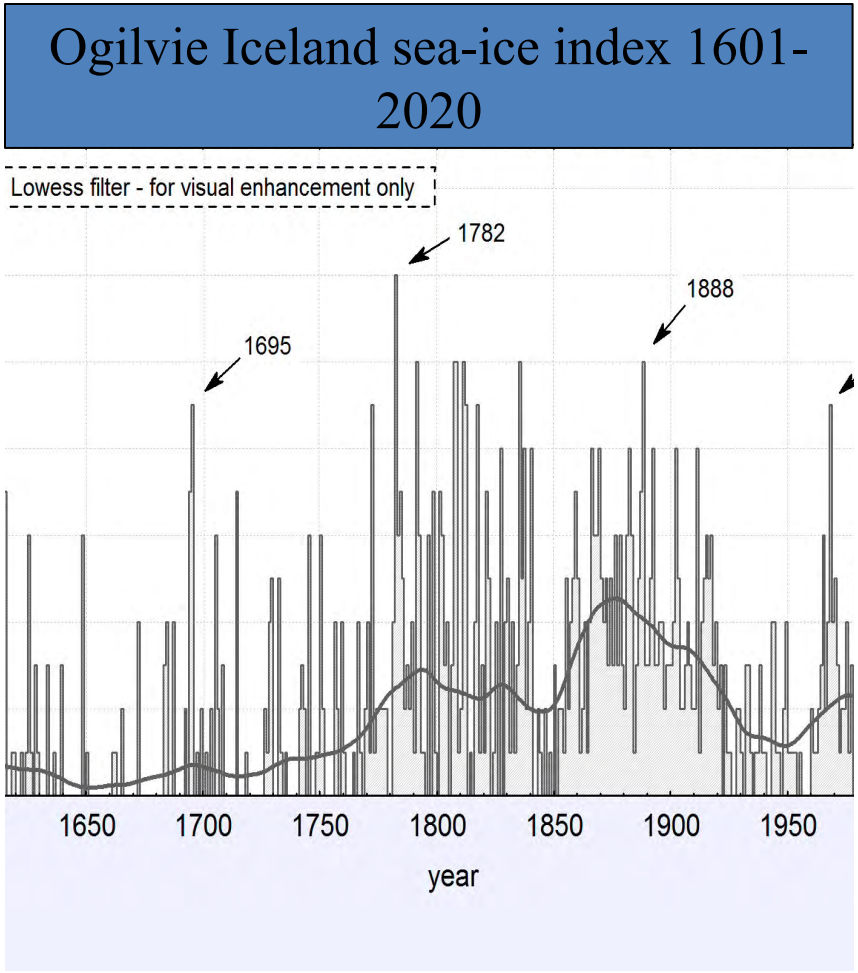
CLIMATE (Temperature and Sea-Ice Variations)
SUMMARY and HIGHLIGHTS ca. 1600-2021

Ogilvie Iceland sea-ice index 1601-2020



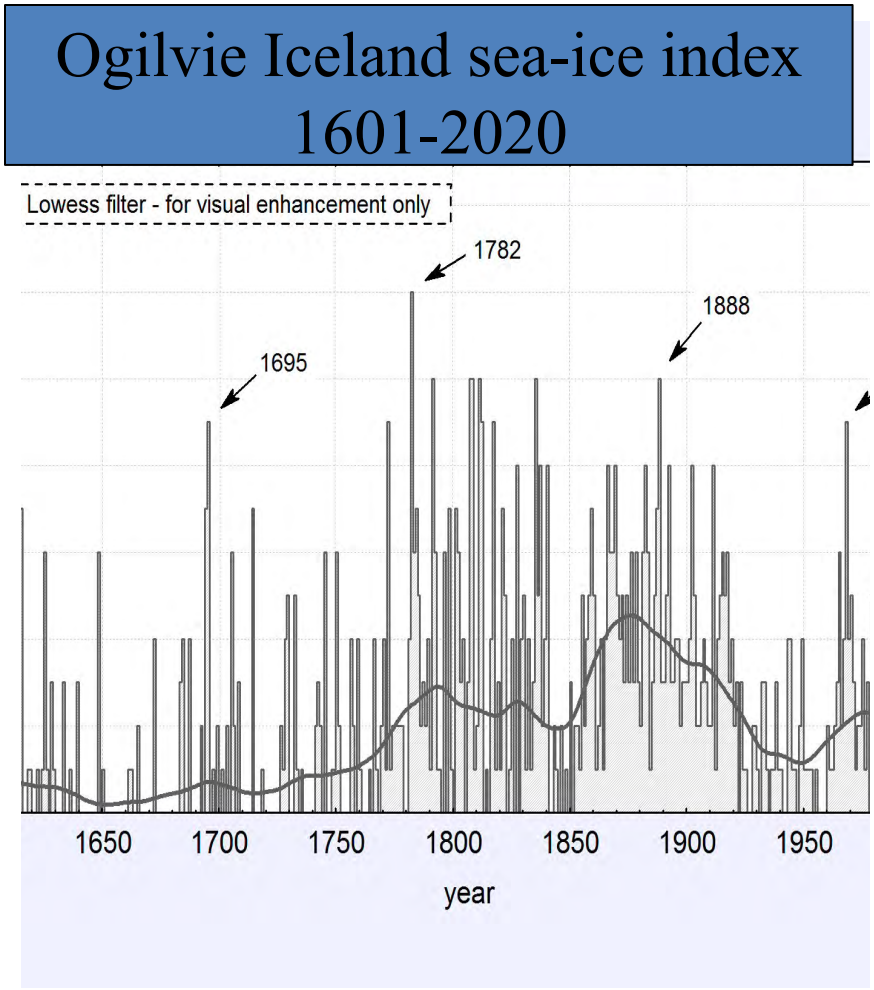
The index is formed by counting up the number of seasons of ice occurrence (winter, spring and/or summer) weighted by the number of regions reporting ice, i.e., 1 to 4.

ca. 1600, ca. 1700



- The early and latter decades of the seventeenth century were years with much ice present.

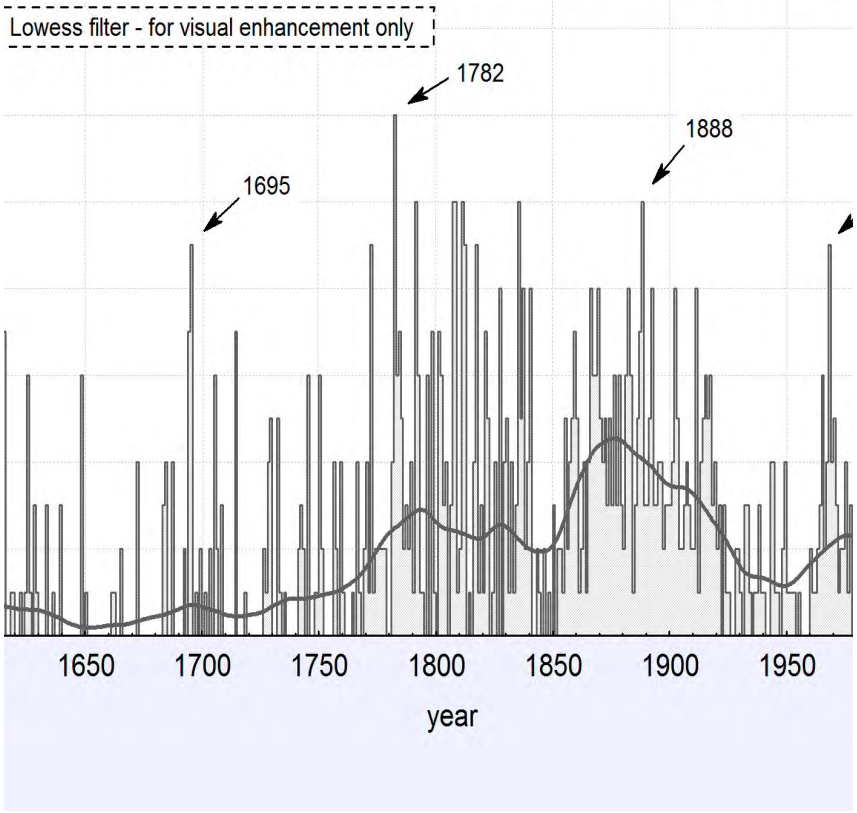
1640-1680



- From ca. 1640 to ca. 1680 there appears to have been little sea ice off Iceland's coasts.

MUCH ICE 1780S, EARLY 1800s and 1830s

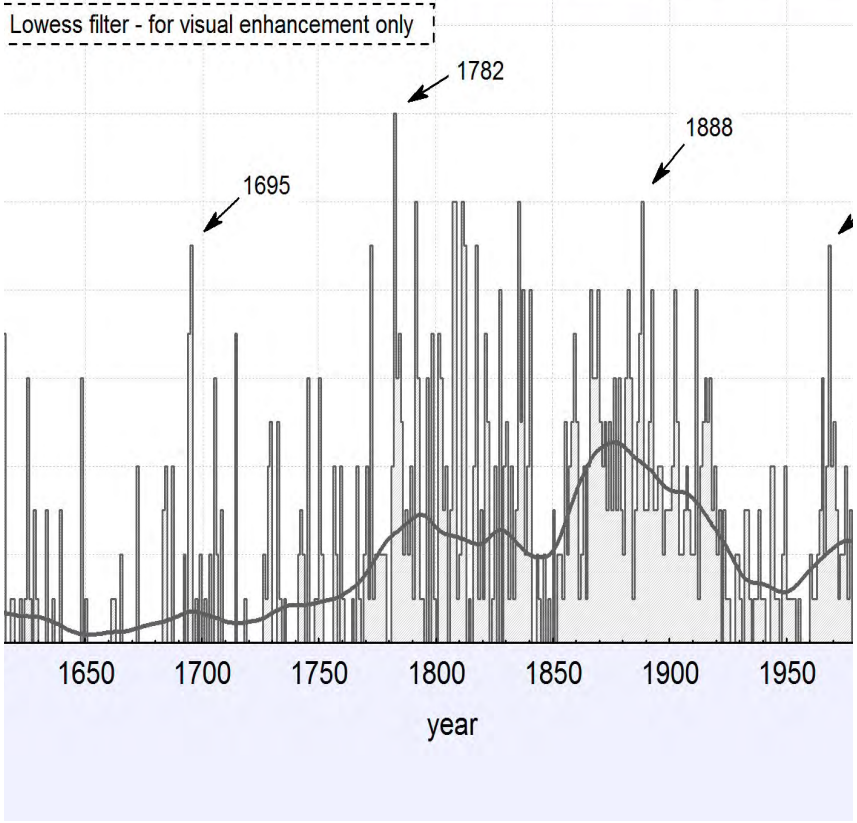
Ogilvie Iceland sea-ice index 1601-2020



- During the period 1600 to 1850, the decades with most ice present were probably the 1780s, early 1800s and the 1830s .

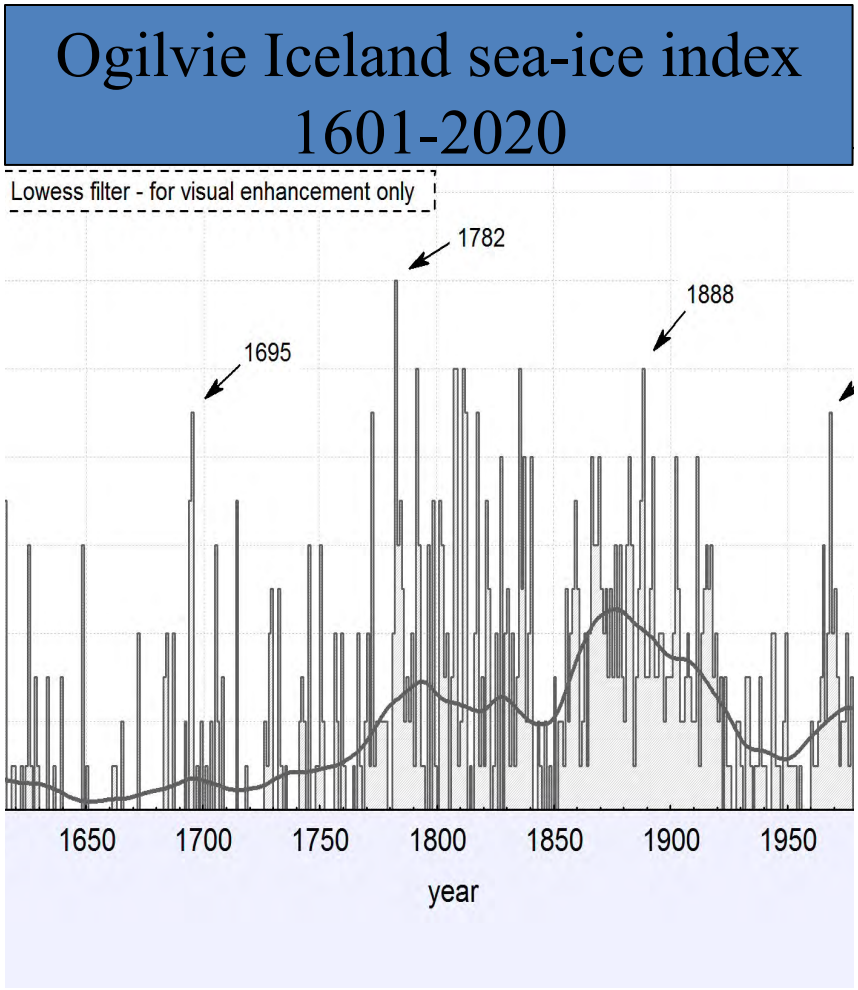
1840-1855 virtually no ice; more to 1860

Ogilvie Iceland sea-ice index 1601-2020



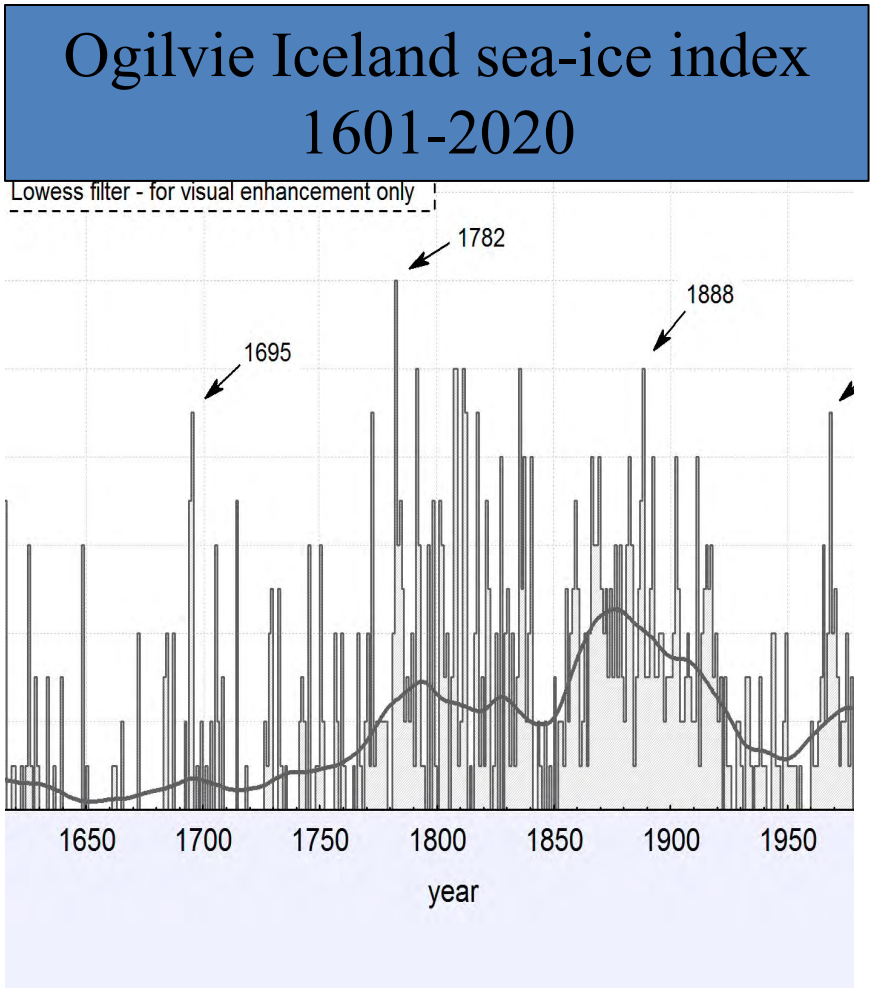
- From 1840 to 1855 there was virtually no ice off the Icelandic coasts. From that time to 1860 there was frequent ice again.

1864-1872: Some ice



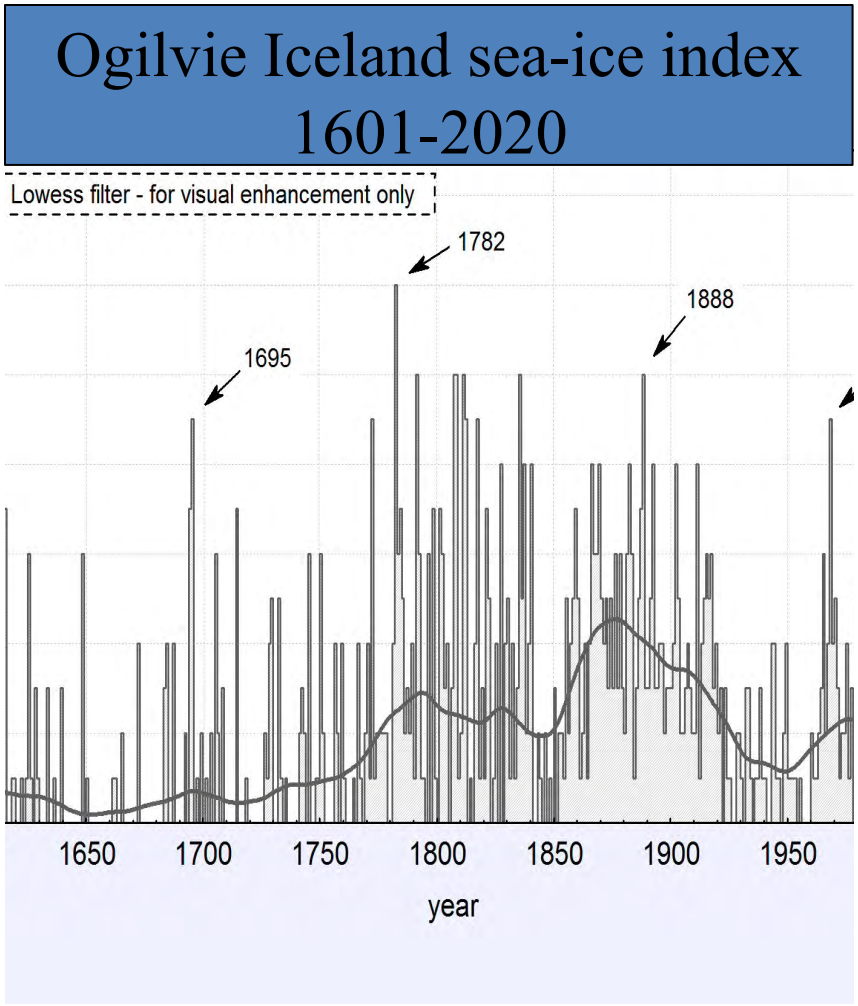
- Further clusters of sea-ice years occurred again from ca. 1864 to 1872.

1880s



- Several very heavy sea-ice years occurred during the 1880s.

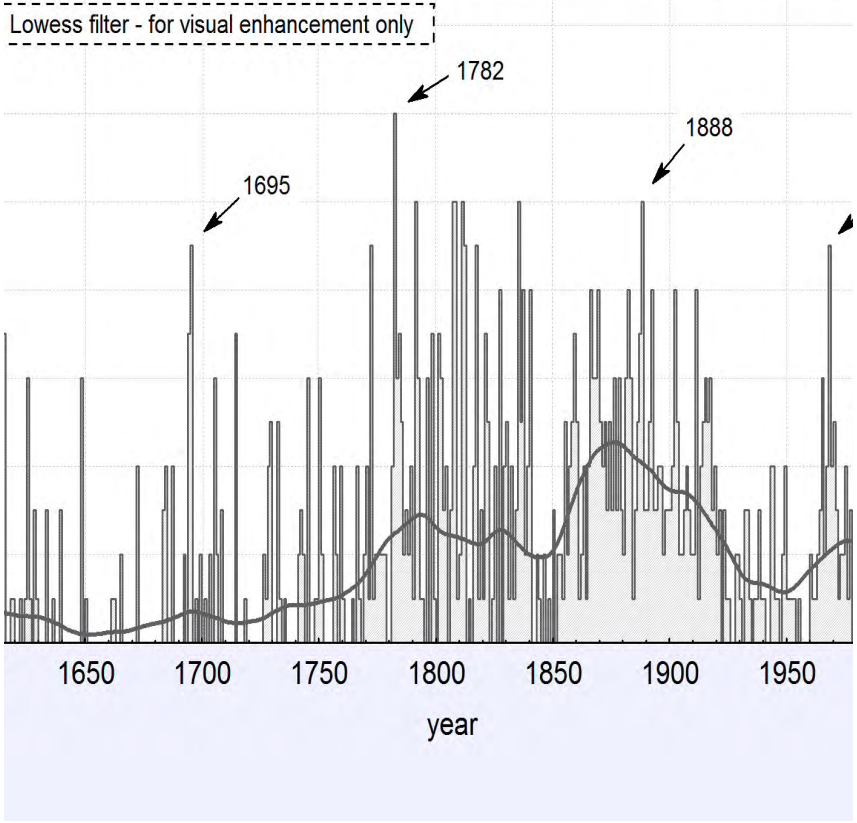
1890s



- Some sea-ice years occurred in the 1890s, but far less than in the 1880s.

Decrease in ice in 20th and 21st Centuries

Ogilvie Iceland sea-ice index 1601-2020



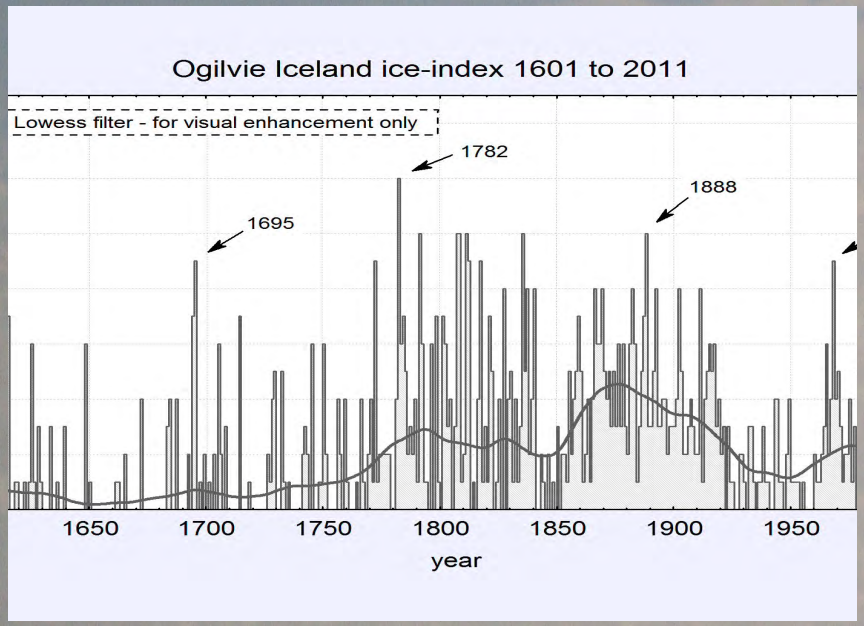
From 1900 onwards sea-ice incidence falls off dramatically.

(Except for the "Ice-years" around 1968.)

SEA-ICE INCIDENCE ALSO GIVES A GOOD INDICATION OF TEMPERATURE VARIATIONS.

First observed by Páll Bergþórsson,
e.g., Bergþórsson, 1969, *Jökull* 19.

PERIODS OF SEVERE CLIMATE AND SEA ICE

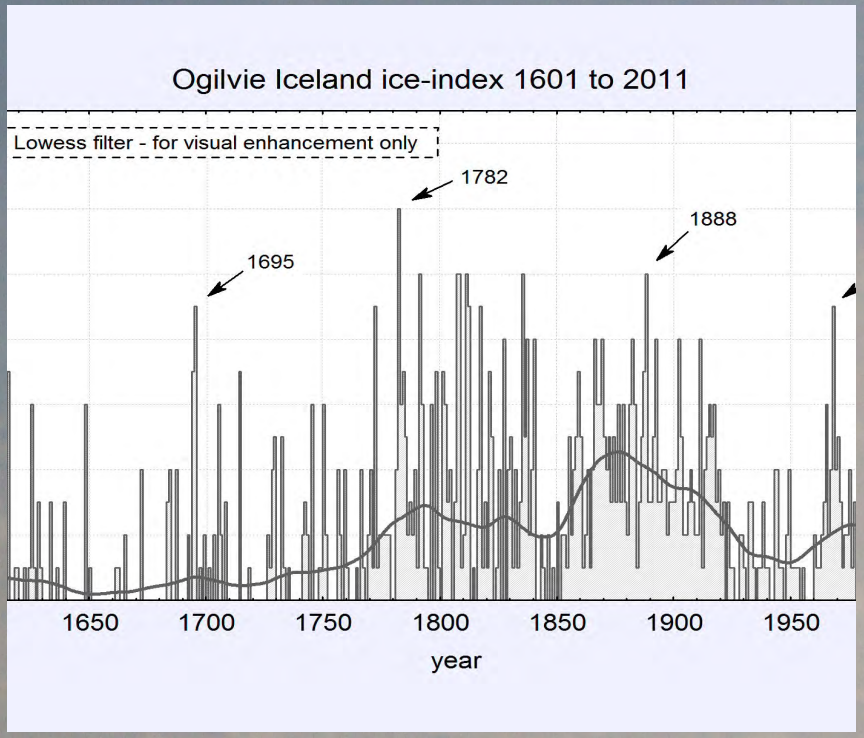


- Early 1600s
- 1685-1702

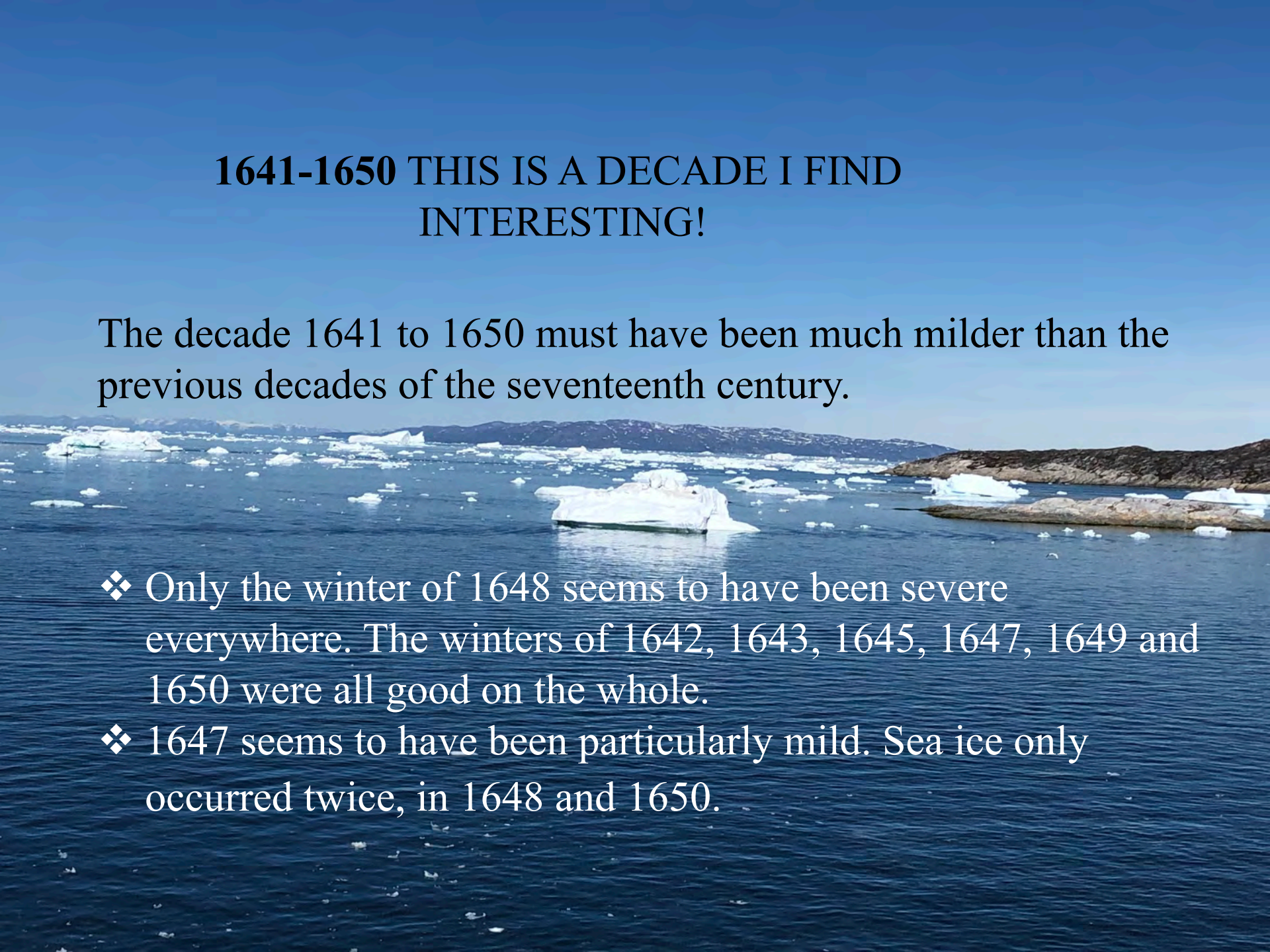
- **The first decade of the seventeenth century was extremely severe with harsh winters, especially in 1602, 1604, and 1605.**
- **There was sea ice present in 1602, 1604, 1605 and in 1608.**
- **Several accounts stress the severity of 1602 -**

It was a violent and harsh winter with long-lasting ice and snow and terrible loss of livestock.

ca. 1640-1670



- *There was a mild period with little ice from ca. 1640 to 1670.*



1641-1650 THIS IS A DECADE I FIND INTERESTING!

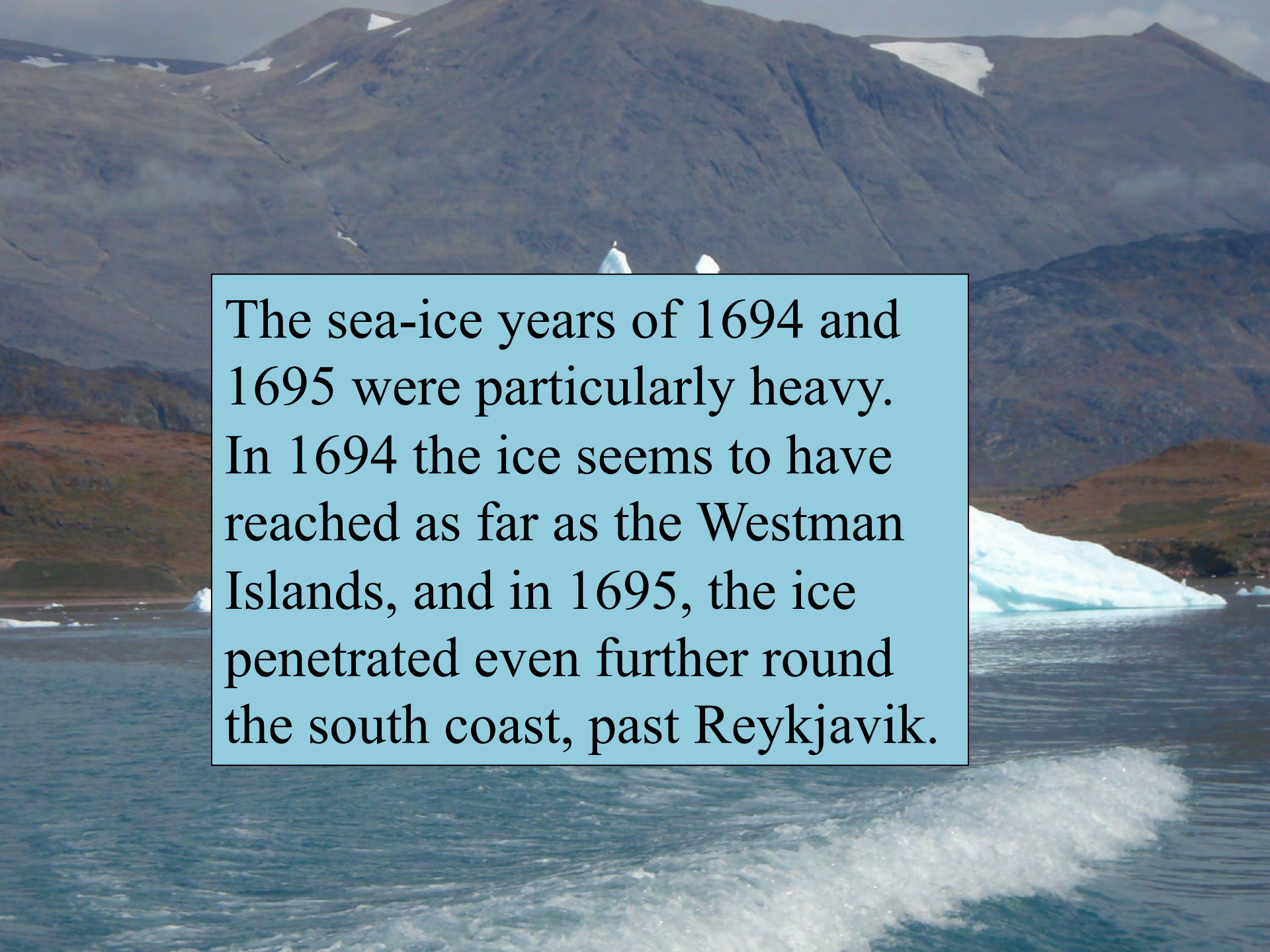
The decade 1641 to 1650 must have been much milder than the previous decades of the seventeenth century.

- Only the winter of 1648 seems to have been severe everywhere. The winters of 1642, 1643, 1645, 1647, 1649 and 1650 were all good on the whole.
- 1647 seems to have been particularly mild. Sea ice only occurred twice, in 1648 and 1650.

The period from 1649 to 1682 was on the whole much milder than either the beginning or end of the seventeenth century

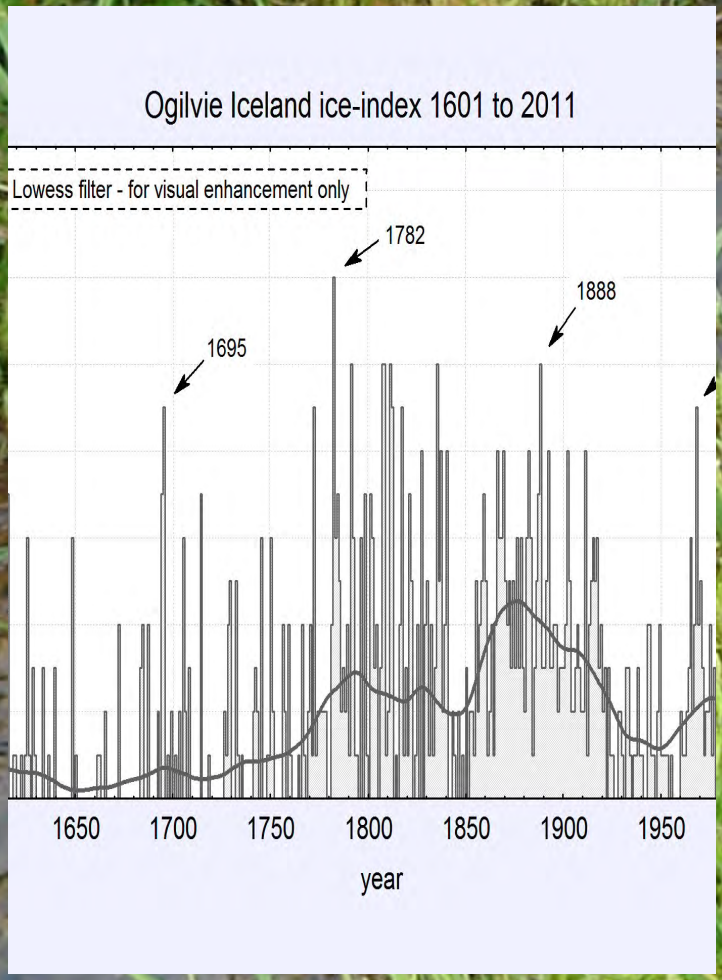
- This mild period could also be said to have set in with the mild winter of 1642.
- The decade 1651 to 1660 seems to have been particularly favourable.
- There was no sea ice and only one winter, 1659, was very severe


Very severe years with a lot of sea ice in the 1690s



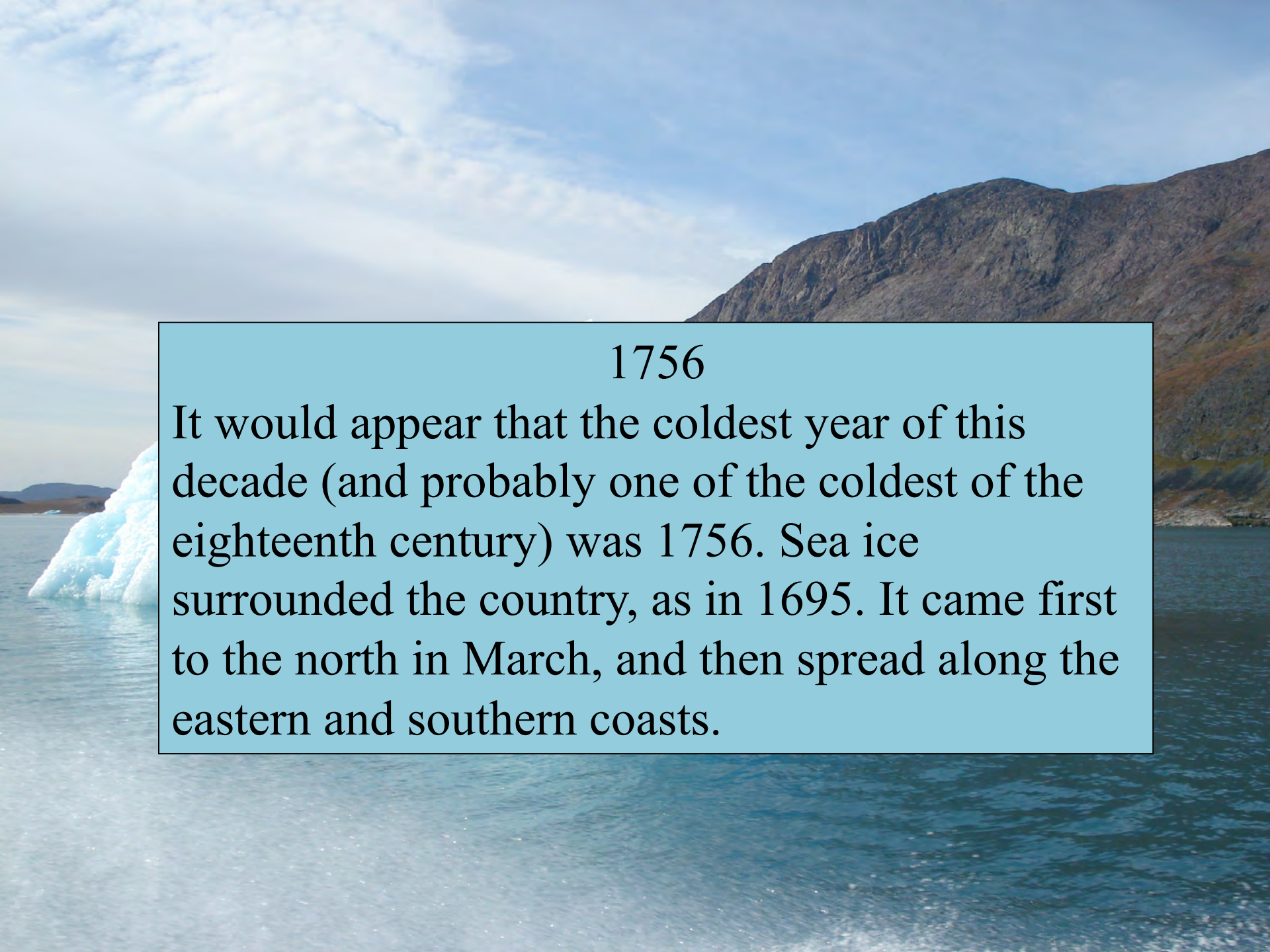
The sea-ice years of 1694 and 1695 were particularly heavy. In 1694 the ice seems to have reached as far as the Westman Islands, and in 1695, the ice penetrated even further round the south coast, past Reykjavik.


Grímsey
Kópasker
Raufarhöfn
Bakkafloi
Þórshöfn
Siglufjörður
Ólafsfjörður
Húsavík
Hrísey
Dalvík
Vopnafjörður
Skagaströnd
Sauðárkrókur
Akureyri
Mývatn
Blönduós
Hólmavík
Patreksfjörður
Breiðafjörður
Egilsstaðir
Seyðisfjörður
Fljótsdalshérað
Neskaupsstaður
Eskifjörður
Fáskrúðsfjörður
Stykkishólmur
Hellissandur
Ólafsvík
Askja
Kjölur
Hofsjökull
Langjökull
Djúpavogur
Borganes
Vatnajökull
Akranes
Geysir
Gullfoss
Reykjavík
Þórisvatn
Höfn í Hornafirði
Keflavík
Hafnarfjörður
Þingvellir
Hekla
Öræfa-jökull
Selfoss
Hella
Grindavík
Þorlákshöfn
Mýrdals-jökull
Vík í Mýrdal
Vestmannaeyjar
Surtsey
Heimaey
Iceland
National capital
All-weather road
Seasonal road
0 25 50 Kilometers
0 25 50 miles



1700s

The early decades of the 1700s were relatively mild in comparison with the very cold 1690s, 1730s, 1740s and 1750s. The 1760s and 1770s show a return to a milder regime in comparison.



1756

It would appear that the coldest year of this decade (and probably one of the coldest of the eighteenth century) was 1756. Sea ice surrounded the country, as in 1695. It came first to the north in March, and then spread along the eastern and southern coasts.

Report from Sheriff of Skagafjarðarsýsla for 1756

“During the present summer I have not had the good fortune to receive letters that were expected from Copenhagen with the Skagastrond ship as its arrival has been prevented by the drift ice off the whole of the northern coast. However, I should not wish to neglect to tell your noble Excellency of the present circumstances here in the district which are now, in truth, far worse than they have ever been in the memory of man; in all these severe seasons and difficult times, no place in the country is in such a terrible situation as this, and the neighbouring Skagafjord district, as much of the cattle was lost; the rest sold to Copenhagen”.

The sea was covered by ice the whole summer and this has prevented all fishing and all delivery of foodstuffs from Copenhagen and also affected the grass crop. And it has not been possible to harvest the little which has grown because of the continual fog, sleet and rainy weather caused by the ice, together with a strange cold in the air.
In this district during the winter and spring.
70 people died of hunger and lack of food, but many left the farms on which they lived and sought help and charity in other parts of the country.”

TEMPERATURE SUMMARY 1700-1800

- The temperature pattern in Iceland correlates well with the sea-ice variations.
- The early decades of the 1700s were relatively mild in comparison with the very cold 1690s, 1730s, 1740s and 1750s.
- The 1760s and 1770s show a return to a milder regime in comparison.
- The 1780s are likely to have been the coldest decade of the century, but this was compounded by volcanic activity (the Lakagígar volcanic eruption 1782-3).

1800s Sea Ice and Temperature

The 1810s, 1830s and 1880s were very cold years, especially the 1880s. These years were accompanied by heavy sea-ice incidence.

The 1880s: Much Ice

- The 1880s, specifically the period from 1881 to 1888, were unusually severe climatically, and they have come to be known as the “Dire Years”.
  Sea ice was present in 1881, 1882, 1883, 1886, 1887 and 1888.

- It is most unusual for the ice to reach the south coasts, but this was the case in three of these years, in 1881, 1882 and 1888.


Sea Ice reaches the Southwest Coast
NORÐUR-ÍSAFJARÐAR-SÝSLA
VESTUR-ÍSAFJARÐAR-SÝSLA
STRANDA-SÝSLA
VESTUR-BARÐASTRANDARSÝSLA
AUSTUR-
Mööruvellir
Akureyri
SUÐUR-ÞINGEYJAR SÝSLA
NORÐUR-ÞINGEYJAR SÝSLA
EYJA-FJARÐAR-SÝSLA
SKAGA-FJARÐAR-SÝSLA
NORÐUR-MÚLA-SÝSLA
DALASÝSLA
Stykkishólmur
VESTUR-HÚNAVATNSSÝSLA
AUSTUR-
SNÆFELLS- OG HNAPPADALSSÝSLA
Arnarstapi
MÝRARSÝSLA
BORGAFJARÐAR-SÝSLA
ÁRNESSÝSLA
AUSTUR-SKAFTAFELLS-SÝSLA
Viðev
Reykjavík
Bessastaði
Sea ice to here (unusual!)
GULLBRIN
OG KJÓSAR-SÝSLA
VESTUR-
SÝSLA
0
50
100 km
VESTMANNA-EYJAR

1880-1881

One of the most severe winters of the period, and indeed, of the entire nineteenth century occurred in 1880-1881. This winter, a precursor to the famine, is described in many sources of the time, and in all of the sheriffs letters for this year.

The extremely severe weather which began in earnest in the middle of November (1880) lasted until the beginning of April (1881). It was the general opinion, that no one now living had experienced such long-lasting and severe frost. This was frequently between 12 and 30 degrees Réamur and was often around 20 degrees. There was frequent fog due to the sea ice, and the bay of Húnaflói was full of sea ice. The spring was cold and dry and the grass growth was of the poorest quality. The summer was also cold and dry and there was also night frost.

Extract from letter written by Sheriff Lárus Blöndahl,
dated 1 October 1881, Kornsá, Húnavatnsýsla.

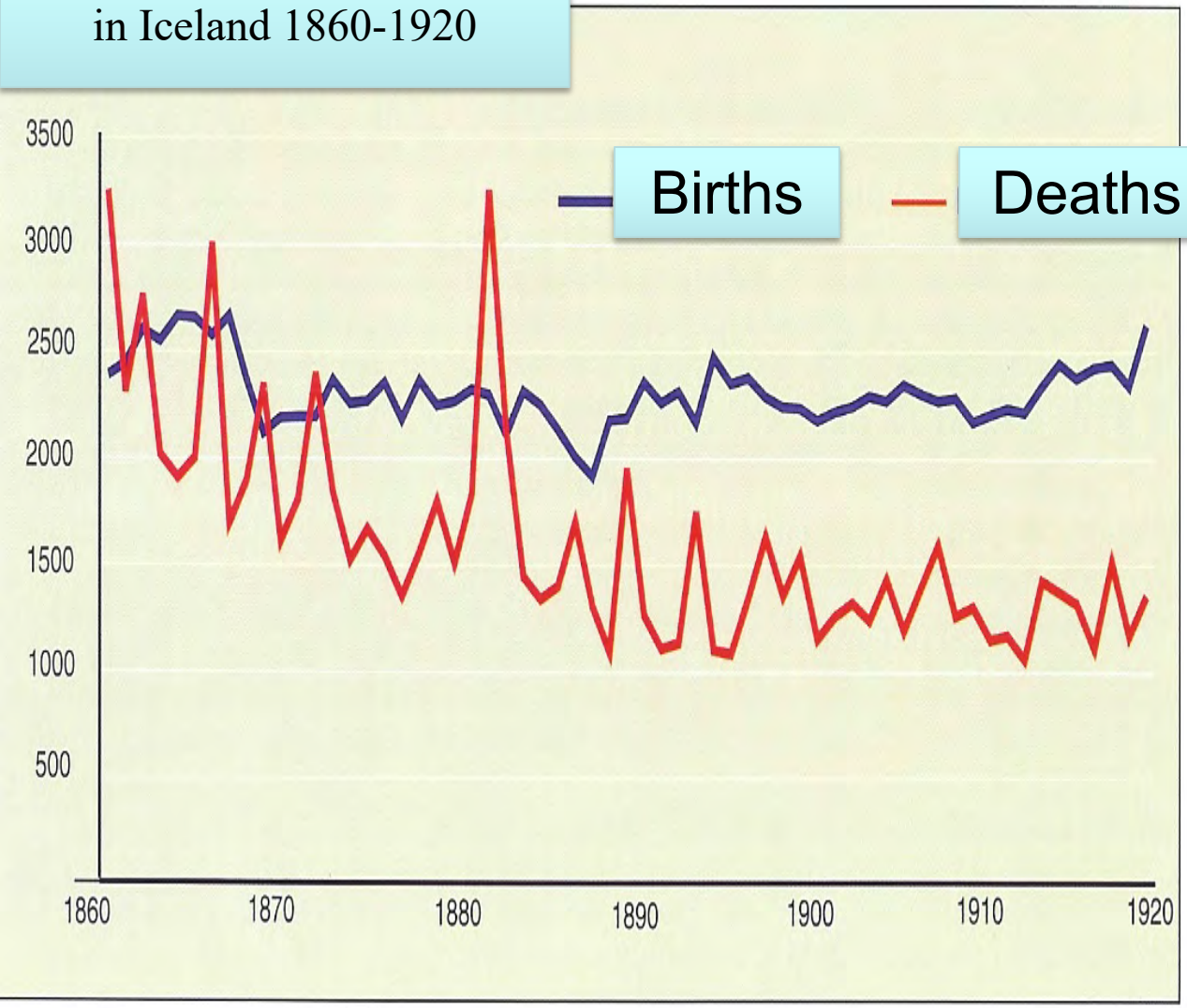
In addition to cold winters and springs and heavy sea ice, a succession of poor summers caused consecutive hay-crop failure.
It was during the “Dire Years” that many people abandoned their homes and left Iceland, and emigration to the United States and Canada reached a peak.
The reasons for this were complex, but doubtless the severe weather played a part.

The “Dire Years” 1880-1888

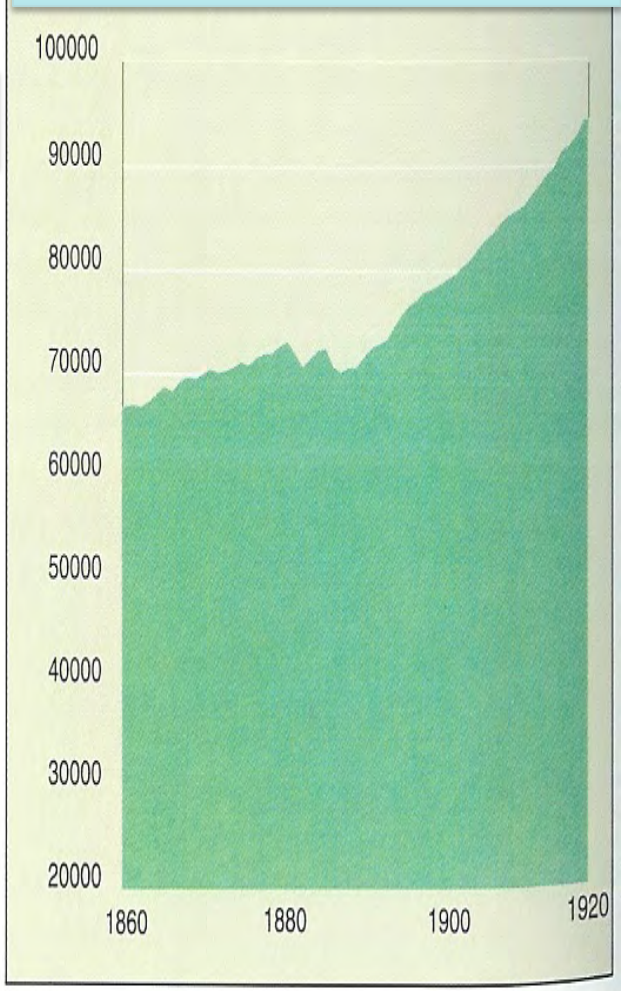
- Photographs by English visitors Maitland James Burnett and Walter H. Trevelyan
- Ponzi, Frank (1995) *Ísland fyrir aldamót: harðindaárin 1882-1888. Iceland: the dire years: 1882-1888, úr ljósmyndum og dagbókum Maitland James Burnett og Walter H. Trevelyan*, Mosfellsbær, Brennholt.

This sketch of “pancake ice” (called *hungurdiskur* by the Icelandic poet Matthías Jochumsson) made by the explorer and great humanitarian Fridtjof Nansen during his first visit to the Arctic in 1882.

Births and Deaths
in Iceland 1860-1920



Population 1860-1920



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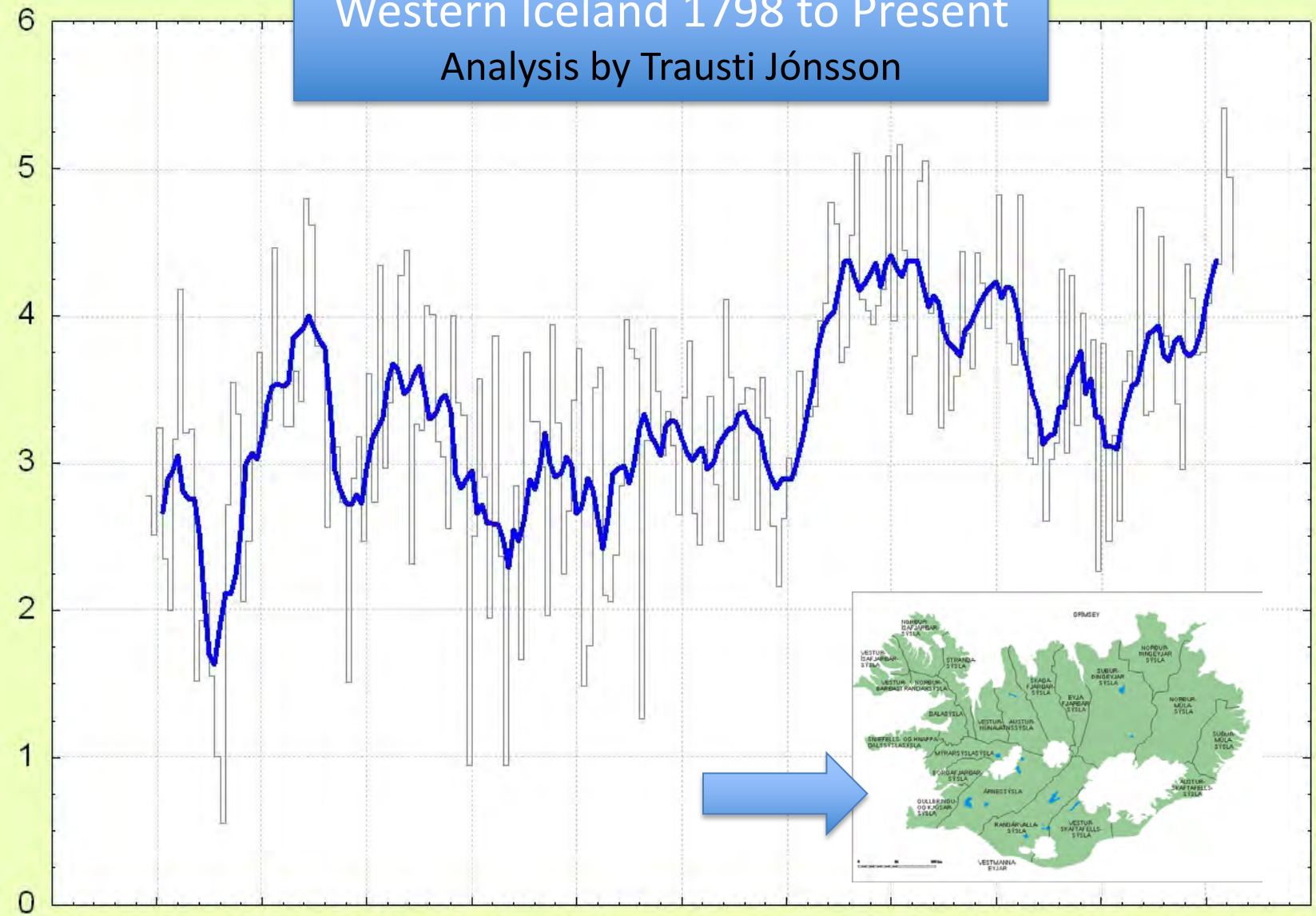
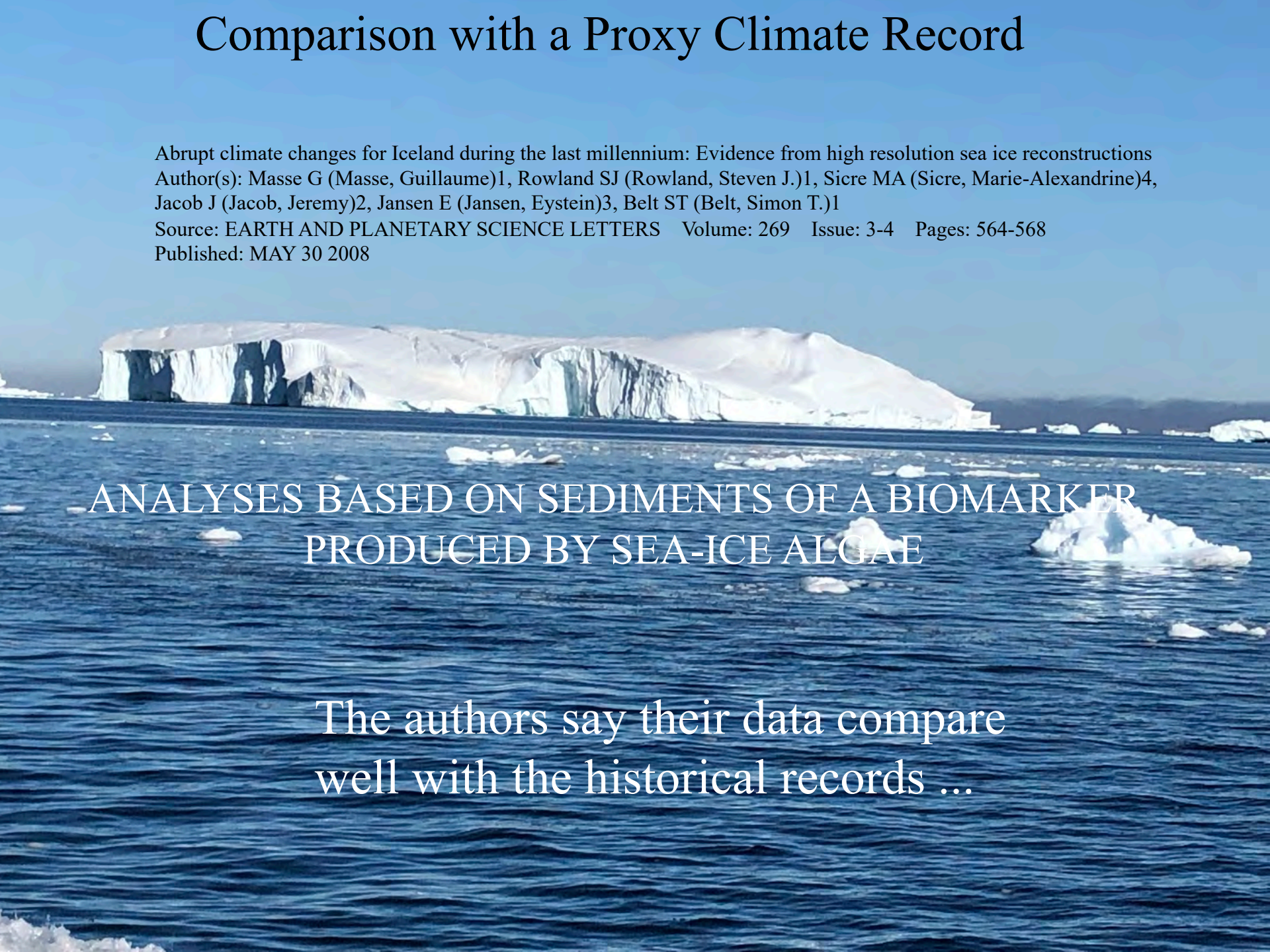
Average temperatures in Western Iceland 1798 to Present

Analysis by Trausti Jónsson



Comparison with a Proxy Climate Record

Abrupt climate changes for Iceland during the last millennium: Evidence from high resolution sea ice reconstructions
Author(s): Masse G (Masse, Guillaume)1, Rowland SJ (Rowland, Steven J.)1, Sicre MA (Sicre, Marie-Alexandrine)4, Jacob J (Jacob, Jeremy)2, Jansen E (Jansen, Eystein)3, Belt ST (Belt, Simon T.)1
Source: EARTH AND PLANETARY SCIENCE LETTERS Volume: 269 Issue: 3-4 Pages: 564-568
Published: MAY 30 2008

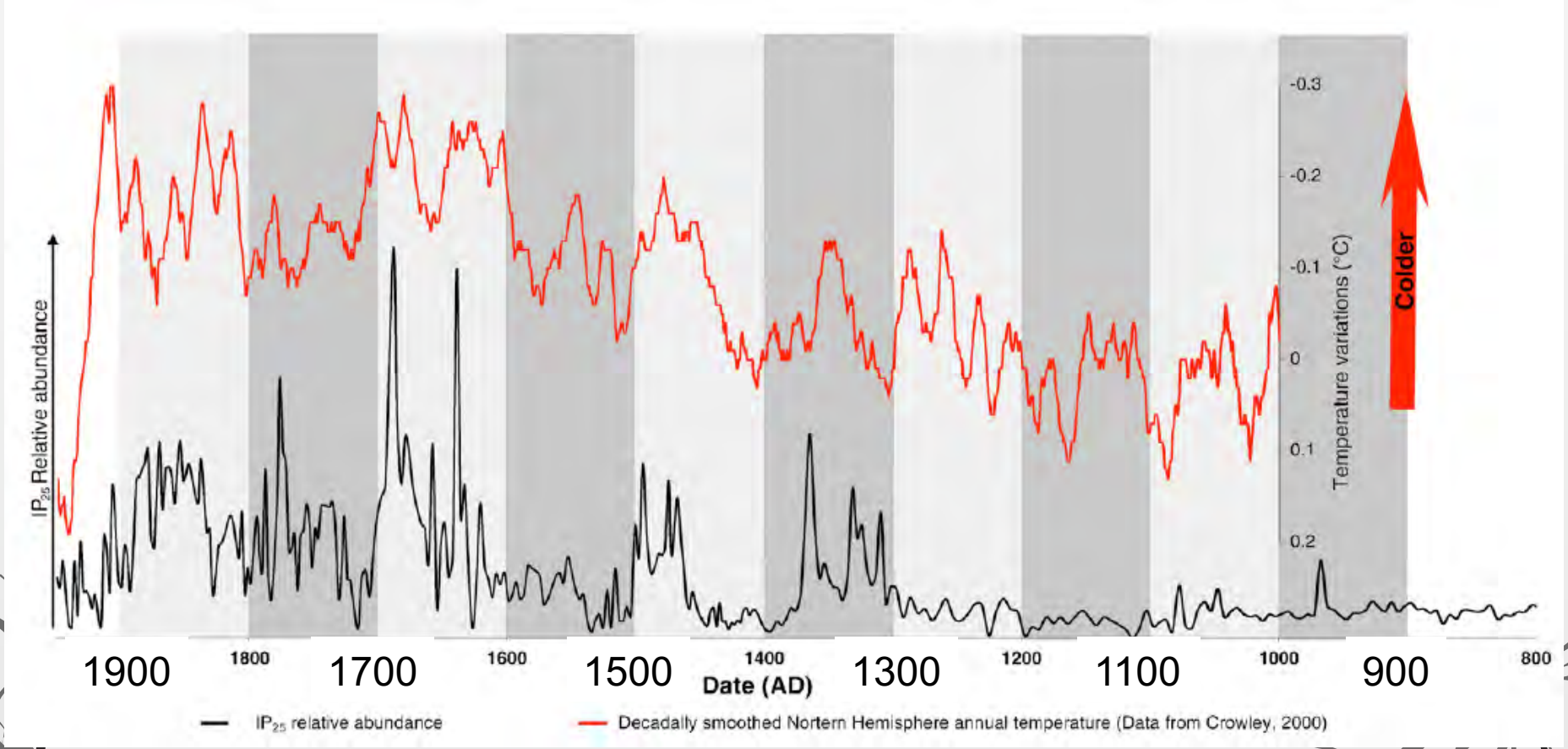


ANALYSES BASED ON SEDIMENTS OF A BIOMARKER PRODUCED BY SEA-ICE ALGAE

The authors say their data compare well with the historical records ...

2008

IP25 (Ice Proxy with 25 carbon atoms - isoprenoid mono-unsaturated alkene)



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Source: EARTH AND PLANETARY SCIENCE LETTERS Volume: 269 Issue: 3-4 Pages: 564-568
Published: MAY 30 2008

Highly variable reconstructed SSTs after AD 1300 indicate that the LIA was not a continuously cold period on the North Icelandic shelf.
It appears that the SSTs in the area experienced quasi-periodic changes during the LIA,
with four particularly cold intervals at
AD 1325–1375, AD 1460–1500,
AD 1610–1670 and AD 1810–1910, separated by relatively mild intervals.

Lihua Ran,*, Hui Jiang, Karen Luise Knudsen, Jón Eiríksson
Diatom-based reconstruction of palaeoceanographic changes on the North Icelandic shelf during the last millennium
Palaeogeography, Palaeoclimatology, Palaeoecology 302 (2011) 109–119

Cold periods suggested:

1) 1325–1375; 2)1460–1500;
3) 1610–1670; 4) 1810–1910, *separated by relatively mild intervals*.

HOW DOES THIS COMPARE WITH THE DOCUMENTARY RECORD?

1) Yes; 2)?; 3) Partly; 4) Yes, on the whole ....

CLIMATE AND SEA-ICE IMPACTS ON THE PAST POPULATION OF ICELAND

Clearly there were many factors involved (economic, political etc.) However, famine and loss of life invariably occurred during years of harsh weather and sea ice …


Impacts of Climate and Sea Ice
Loss of livestock
Famines
Desertion of farms

YEARS OF FAMINE AND LOSS OF LIFE

1508, 1520-21, 1525, 1532,1565-6,
1598, 1580s, 1590s,
1602, 1604, 1605, 1610, 1615
1630, 1633, 1637, 1690, 1691, 1692,
1695, 1696, 1698, 1699,
1700, 1730s, 1740s, 1750s, 1780s,
1810s, 1830s, 1880s

Just a rough guide!

- Broadly speaking, the impact of sea-ice variability on human life can be traced back to the role of the North Atlantic Oscilliation (NAO) - the Atlantic component of the Arctic Oscillation (AO) – and potentially a forcing mechanism in the high Arctic climate system.

- Broadly speaking, the impact of sea-ice variability on human life can be traced back to the role of the North Atlantic Oscilliation (NAO) - the Atlantic component of the Arctic Oscillation (AO) – and potentially a forcing mechanism in the high Arctic climate system.
- A positive NAO implies an anomalous low pressure over Iceland, leading to warm easterly winds over the Greenland Sea. The warm easterly winds will push back the East Greenland ice westward, keeping the coasts of Iceland ice-free.
  A negative NAO will have opposite effects.

THE PRESENT CLIMATE OF ICELAND: VERY LITTLE SEA ICE

Iceland has experienced very warm years recently, and the glaciers are melting at record rates. Iceland, like other northerly regions is feeling the impacts of a warming Arctic with longer growing seasons for crops and vegetation in general, coupled with increased uncertainty concerning the movements and locations of fish stocks.


https://www.icelandreview.com/nature-travel/sea-ice-approaches-icelandic-coast/
2018
Hafísaðstæður breytast hratt, ekki er unnt að greina allan ís með gervitunglamyndum eða ratsjám.
12,5 sjómílur frá Hælavíkurbjargi
Ískönnun LHG 04.06.2018
Hafísjaðar 03.06.2018
Hafísþekja 01.06.2018
Ískönnunargögn frá Landhelgisgæslu Íslands 4.6.2018
SENTINEL-1 ratsjármyndir ESA Copernicus 1. & 3.6.2018
Kortagrunnur frá Landmælingum Íslands (IS50V) og ÍSOR
Háskóli Íslands, Ingibjörg Jónsdóttir (ij@hi.is)

THE “ICE YEARS” 1965-1971

The **Great Salinity Anomaly** (GSA) an event in the late 1960s to early 1970s where a large influx of freshwater from the Arctic Ocean led to a salinity anomaly in the northern North Atlantic Ocean

Future Research: New Project

Synthesizing historical sea-ice records to constrain and understand Great Sea-Ice Anomalies (ICEHIST)

PI: Martin Miles, Co-PI: Astrid Ogilvie.

Anchored at Institute of Arctic and Alpine Research (INSTAAR), University of Colorado

Funded by National Science Foundation, USA

Start date 1 November 2021

ICEHIST

The overarching research objective is to advance conceptual understanding of the role of arctic sea ice as an agent of change in the climate system.

ICEHIST:
3 MAIN RESEARCH HYPOTHESES

- GSIAs of decadal to near-century duration are recurrent events (1960s-70s most recent)
- GSIAs can be initiated spontaneously from natural internal climate-system variability
- Sea-ice anomalies east of Greenland are interactively linked to Atlantic multidedacal variability (AMV) and can lead to AMV changes downstream

ACKNOWLEDGEMENTS

Páll Bergþórsson, Níels Einarsson, Steven Hartman, Brian Hill, Viðar Hreinsson, Jón Haukur Ingimundarson, Ingibjörg Jónsdóttir, Trausti Jónsson, Árni Daníel Júlíusson, Sjöfn Kristjánsdóttir, Martin Miles

For technical assistance:Thanks to Przemyslaw Wyszynski

THANK YOU FOR YOUR ATTENTION!

Dziękuję Ci!

astrid.ogilvie@colorado.edu

Photos by Astrid Ogilvie unless otherwise stated