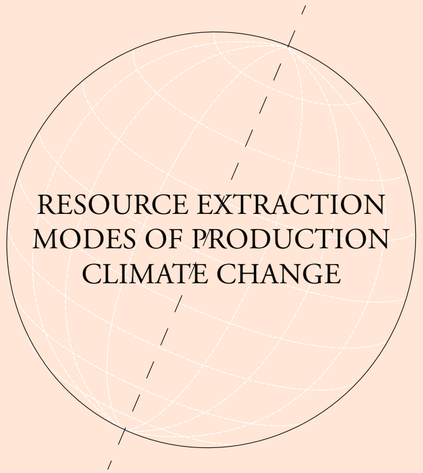
ARCTIC FRONTIER:

FRAGILITY OF THE MONUMENT, POWER OF THE ENVIRONMENT.

EMILY AQUILINA

Research Question:

What is the role of architecture in territorial space-power relations found in the extreme environment of the Arctic?

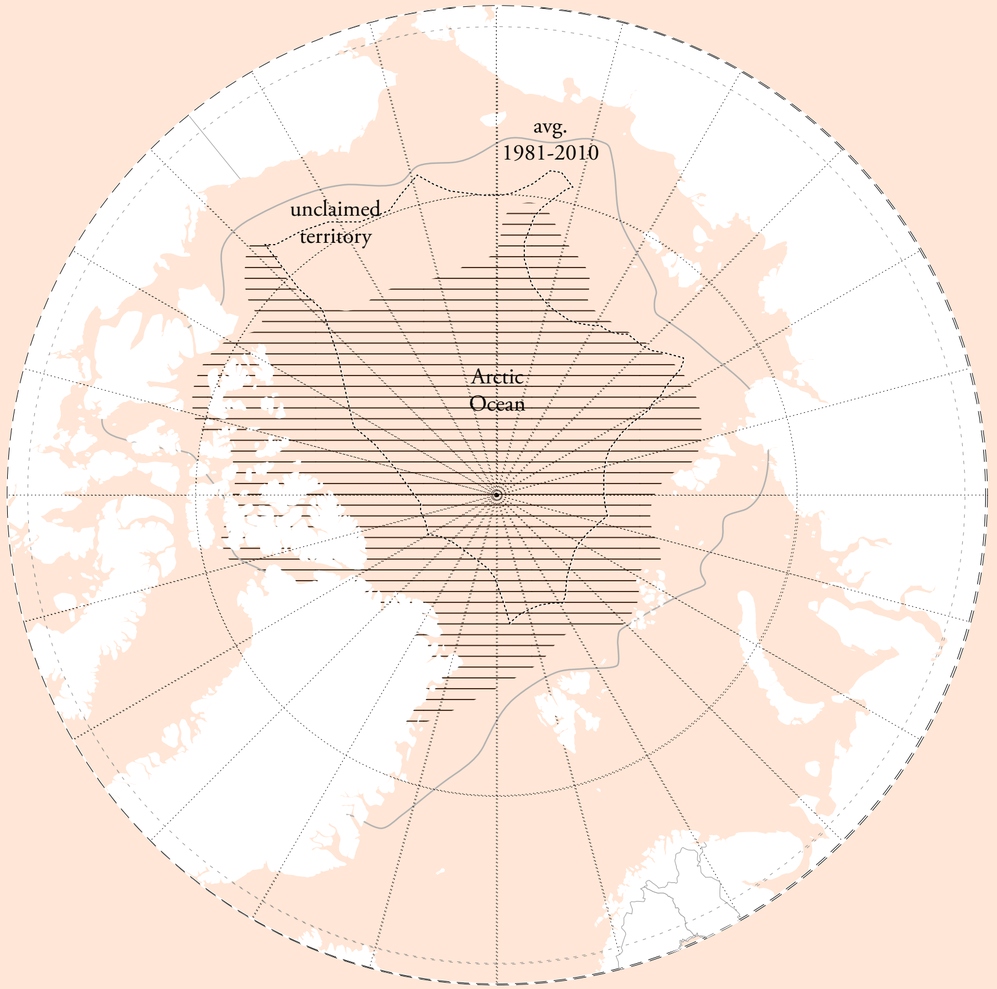


shifting global trends
environmental crisis

Buckminister Fuller's world projection
Dymaxion map

rapid increase in the melting of
the ice within the polar regions

new found interest in the
unclaimed territory



sea-ice extent averge Septembet

Legend

Sept avg. 1981-2010

Sept 2018

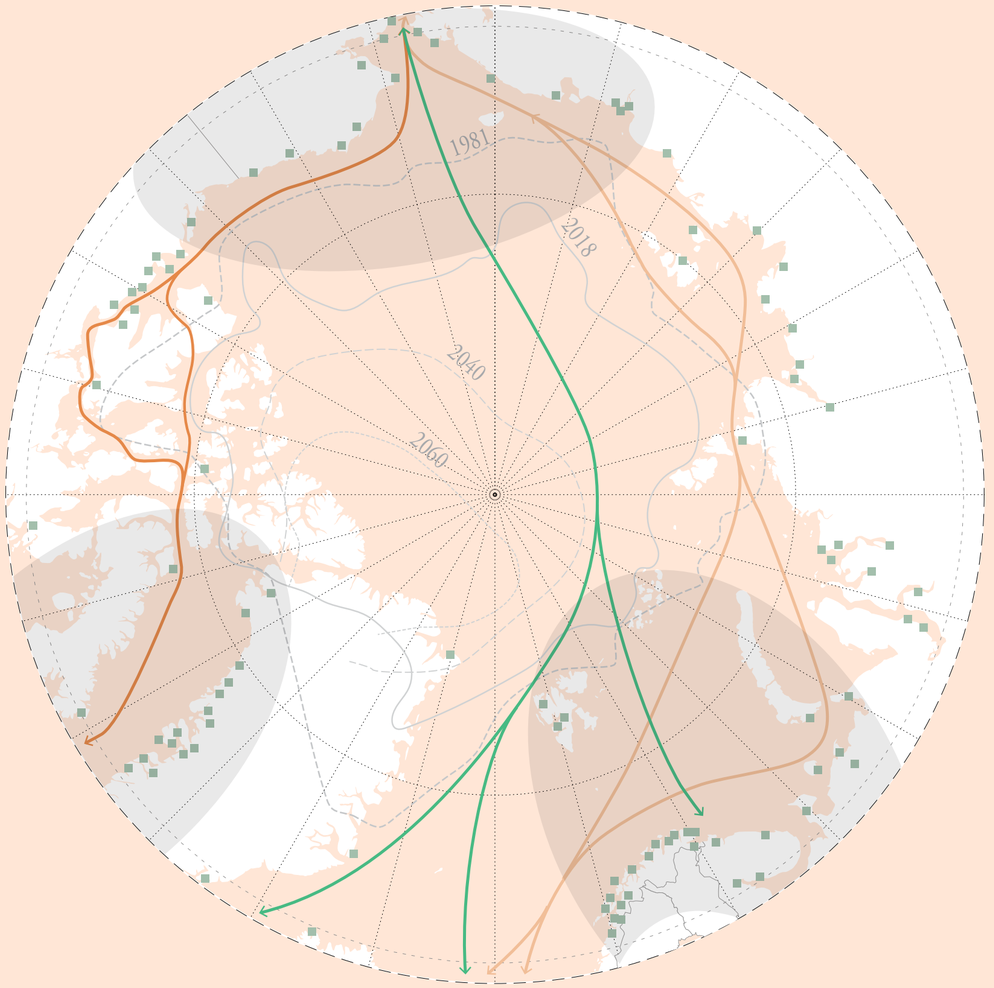
Arctic Circle

Unclaimed Territory

new uncharted territory

30% untapped gas and oil resources

international shipping trade routes



shipping routes and predicted ice extent

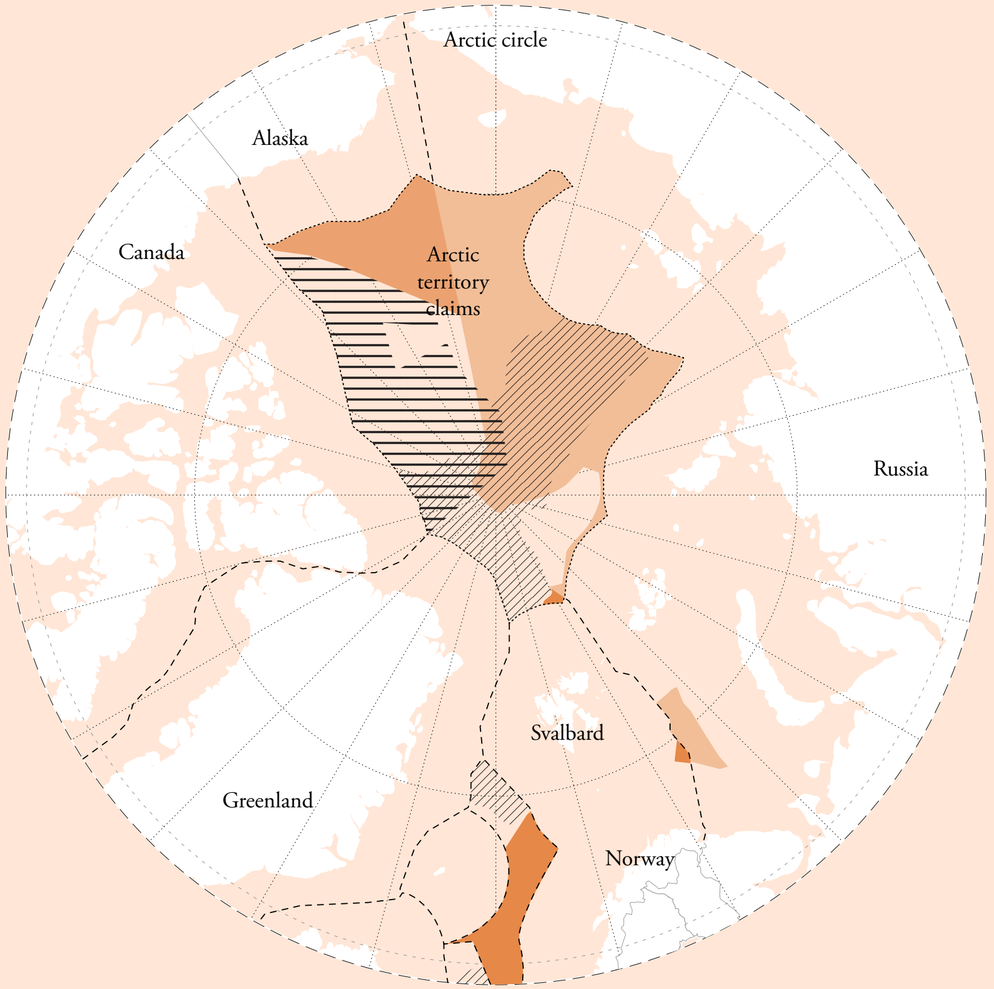
Legend

Ice sheet
- 1981
- 2018
- 2040 (predicted)
- 2060 (predicted)

Main Shipping Routes
- Transpolar Sea Passage
- Northern Sea Passage
- North-West Passage

- Main Harbours
- Arctic Circle
- Unclaimed Territory

current claims made by arctic nations



territorial claims by arctic nations

Legend

- United States
- Canada
- Norway
- Denmark
- Russia
- Arctic Circle
- Unclaimed Territory
- International Sea Boundary

who owns the Arctic?

CARTOGRAPHY

polarity

DECONSTRUCTION

power

TERRAFORMATION

project-ion

CARTOGRAPHY

tool of mapping
analysis
comparison

DECONSTRUCTION

architecture
power
territory

TERRAFORMATION

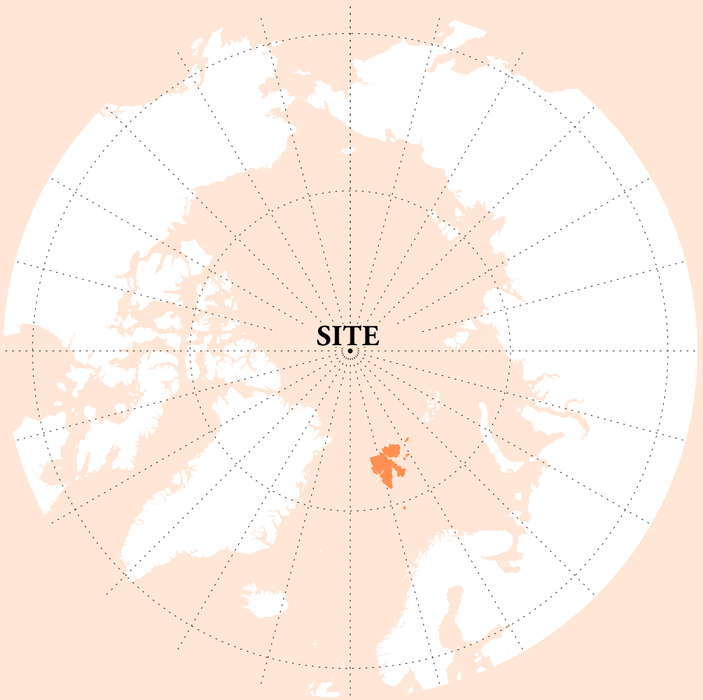
project-ion

CARTOGRAPHY

mapping, narrative

POLAR COMPARISON

Arctic // Antarctica



SITE

Svalbard

CARTOGRAPHY

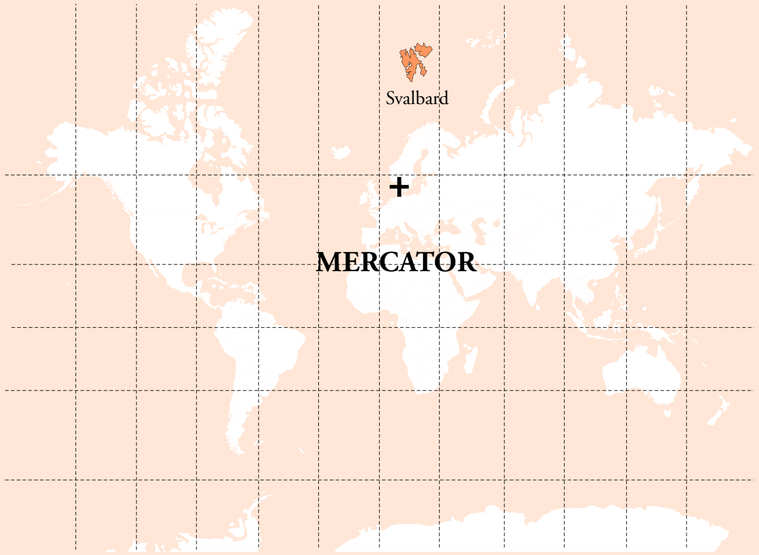
mapping, narrative

POLAR COMPARISON

Arctic // Antarctica

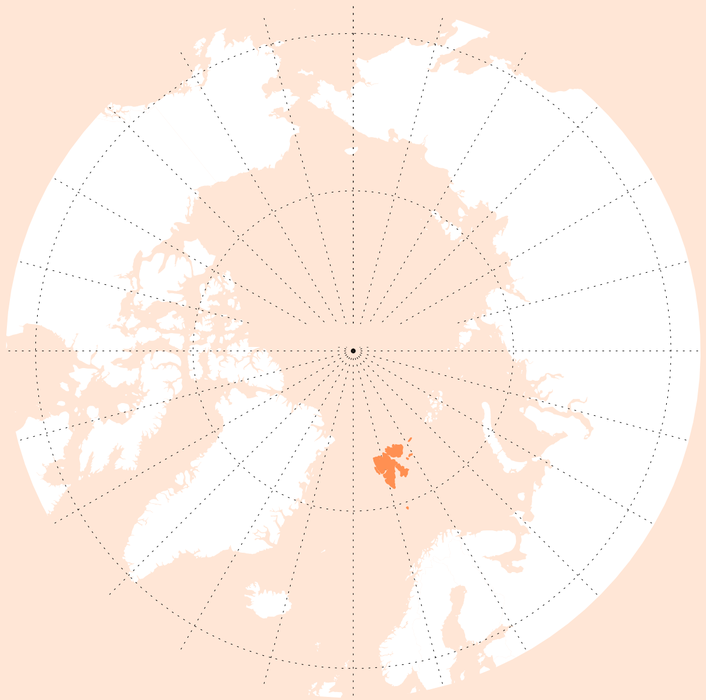
SITE

Svalbard



european centric

SHIFT IN CENTRE

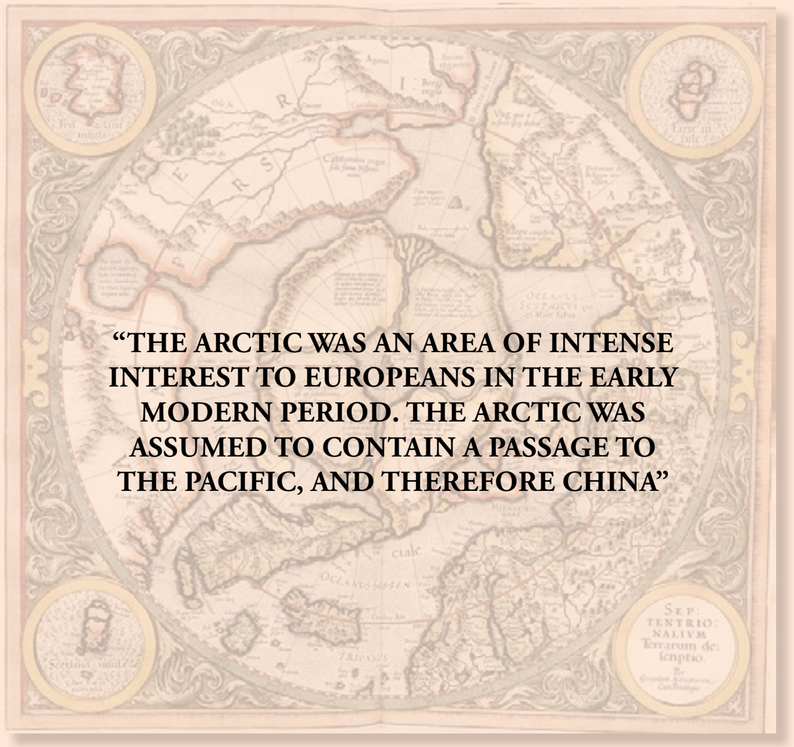


circumpolar

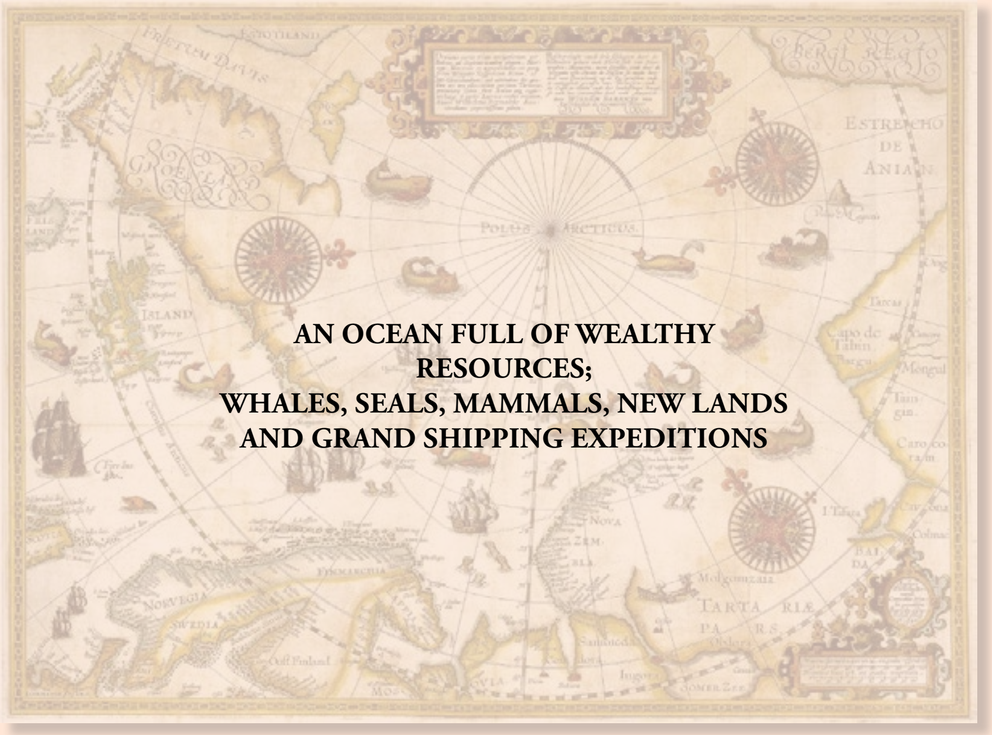
Gerard Mercator, 1595
Septentrionalium Terrarum descriptio, 2
First projection of the arctic circle

TOOL OF POWER

Willem Barentsz, 1598
Het Nuiewe Land
After the discovery of Svalbard (1596)



“THE ARCTIC WAS AN AREA OF INTENSE INTEREST TO EUROPEANS IN THE EARLY MODERN PERIOD. THE ARCTIC WAS ASSUMED TO CONTAIN A PASSAGE TO THE PACIFIC, AND THEREFORE CHINA”

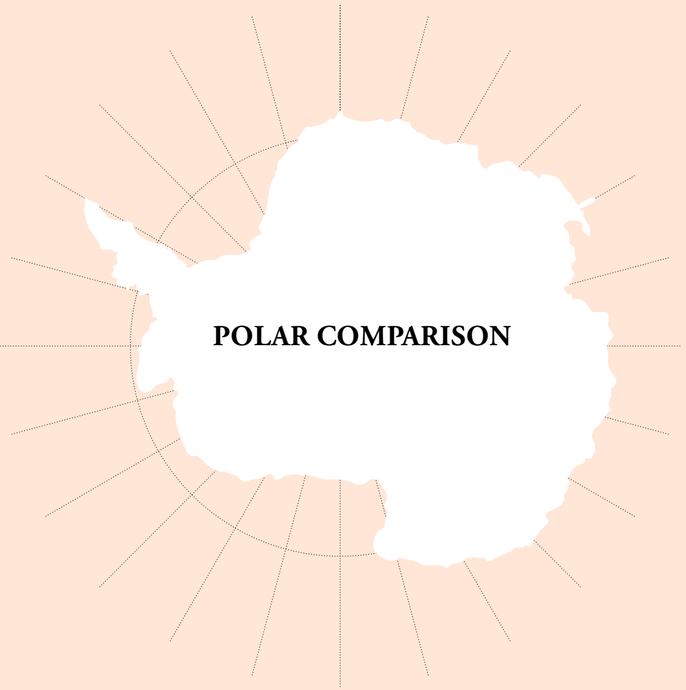


**AN OCEAN FULL OF WEALTHY RESOURCES;
WHALES, SEALS, MAMMALS, NEW LANDS AND GRAND SHIPPING EXPEDITIONS**

MAPPING VALUES OF THE TIME

CARTOGRAPHY

mapping, narrative



POLAR COMPARISON

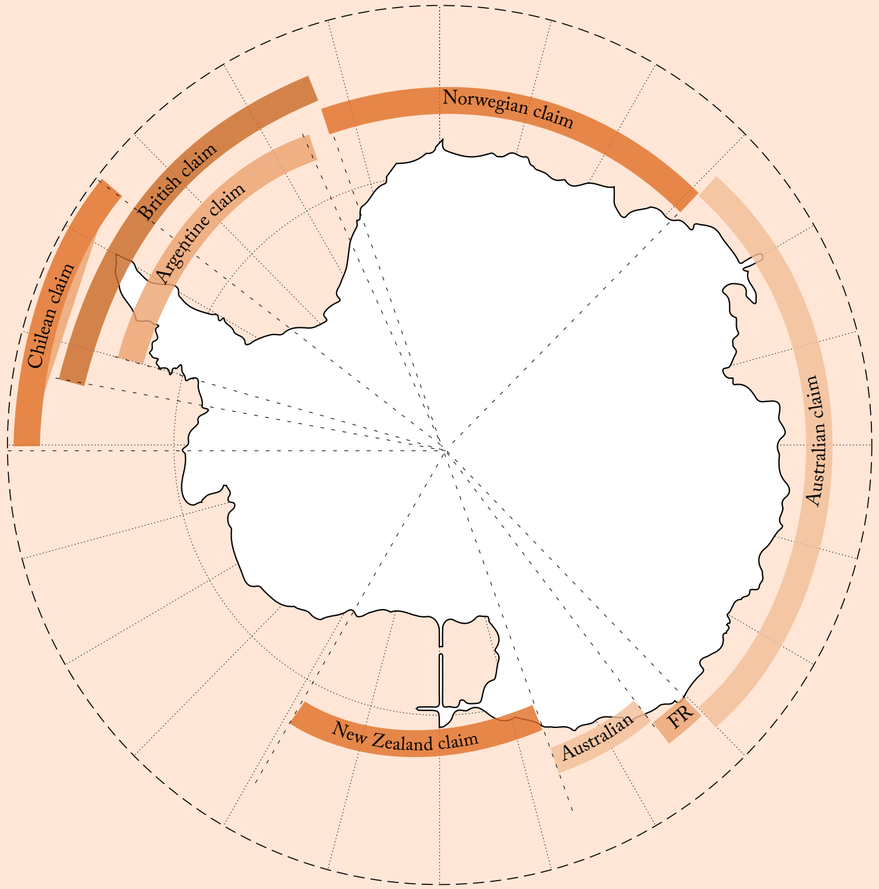
Arctic // Antarctica

SITE

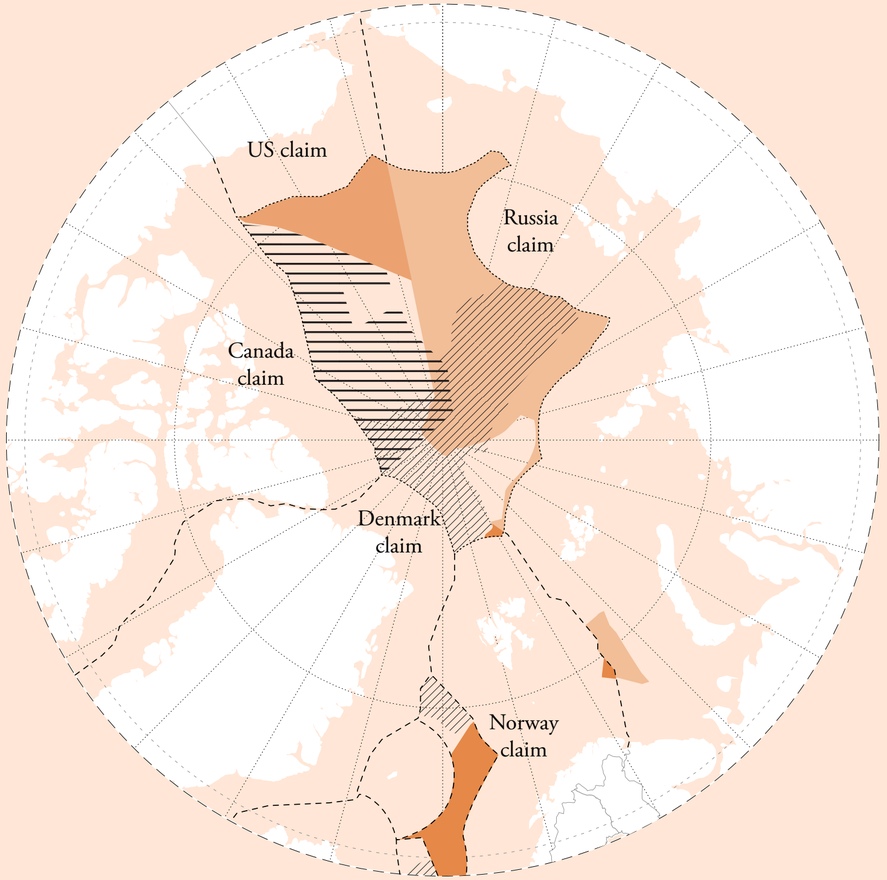
Svalbard

continent surrounded by ocean

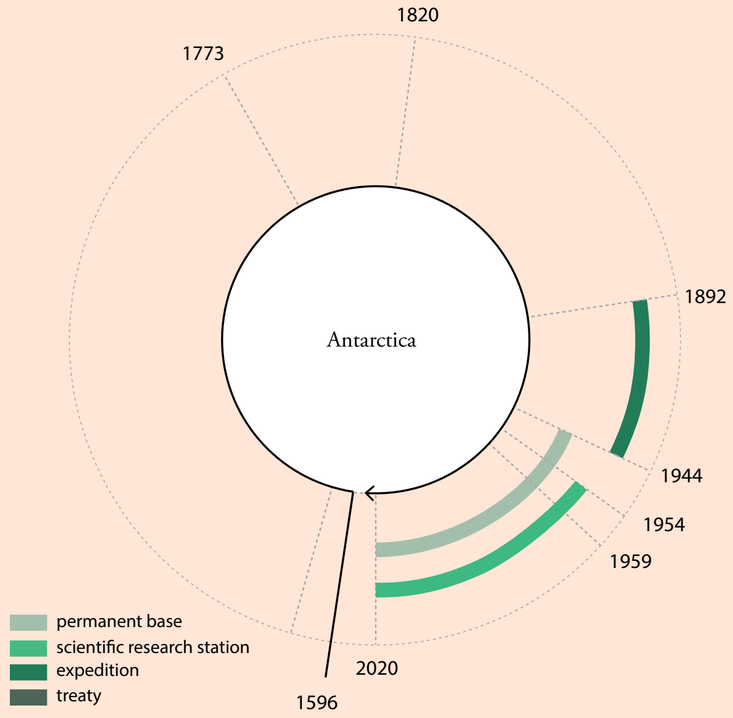
ocean surrounded by continents

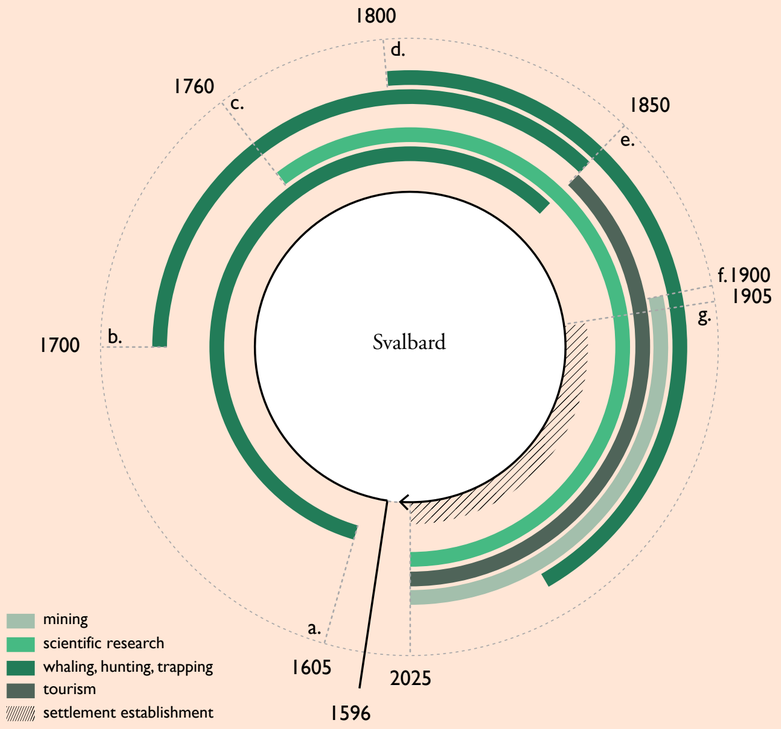


Antarctic claims frozen and have resulted in a peace agreement



Arctic claims are being considered with some already approved (Norway)


1820
1773
1892
Antarctica
1944
1954
1959
2020
1596
permanent base
scientific research station
expedition
treaty

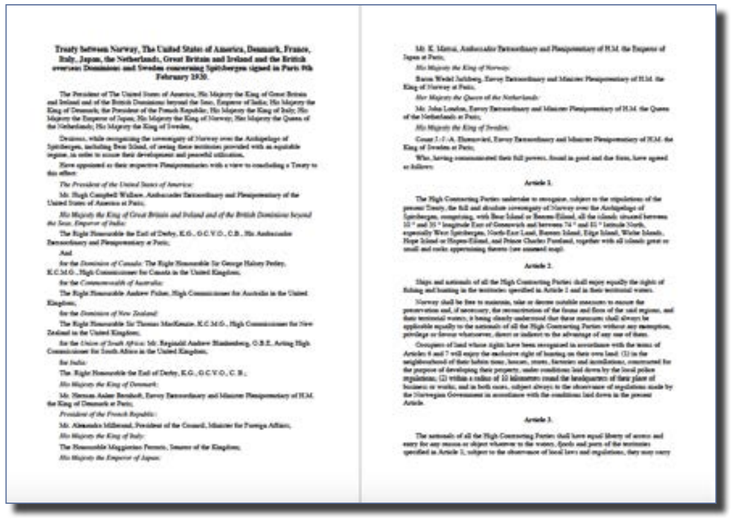

1800
d.
1760
c.
1850
e.
f. 1900
1905
g.
1700
b.
Svalbard
a.
1605
2025
1596
mining
scientific research
whaling, hunting, trapping
tourism
settlement establishment

"...***peaceful purposes only***."

Resources
"..Antarctica shall continue for ever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord" (Intro)

cooperation / research
No government

The Antarctica Treaty
1959



Treaty between Norway, The United States of America, Denmark, France, Italy, Japan, the Netherlands, Great Britain and Ireland and the British overseas Dominions and Sweden concerning Spitzbergen signed in Paris 9th February 1920.

The President of The United States of America, His Majesty the King of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India, His Majesty the King of Denmark, the President of the French Republic, His Majesty the King of Italy, His Majesty the Emperor of Japan, His Majesty the King of Norway, Her Majesty the Queen of the Netherlands, His Majesty the King of Sweden,

Desirous, while recognizing the sovereignty of Norway over the Archipelago of Spitzbergen, including Bear Island, of seeing these territories provided with an equitable regime, in order to ensure their development and peaceful utilization,

Have appointed as their respective Plenipotentiaries with a view to conclusing a Treaty to this effect:

The President of the United States of America:

Mr. Hugh Campbell Wallace, Ambassador Extraordinary and Plenipotentiary of the United States of America at Paris;

His Majesty the King of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India:

The Right Honourable the Earl of Derby, K.G., G.C.V.O., C.B., His Ambassador Extraordinary and Plenipotentiary at Paris;

And

for the Dominion of Canada: The Right Honourable Sir George Halsey Perley, K.C.M.G., High Commissioner for Canada in the United Kingdom;

for the Commonwealth of Australia:

The Right Honourable Andrew Fisher, High Commissioner for Australia in the United Kingdom;

for the Dominion of New Zealand:

The Right Honourable Sir Thomas MacKenzie, K.C.M.G., High Commissioner for New Zealand in the United Kingdom;

for the Union of South Africa: Mr. Reginald Andrew Blankenberg, O.B.E., Acting High Commissioner for South Africa in the United Kingdom;

for India:

The Right Honourable the Earl of Derby, K.G., G.C.V.O., C.B.;

His Majesty the King of Denmark:

Mr. Herman Anker Bernhoft, Envoy Extraordinary and Minister Plenipotentiary of H.M. the King of Denmark at Paris;

President of the French Republic:

Mr. Alexandre Millerand, President of the Council, Minister for Foreign Affairs;

His Majesty the King of Italy:

The Honourable Maggiorino Ferraris, Senator of the Kingdom;

His Majesty the Emperor of Japan:

Mr. K. Matsui, Ambassador Extraordinary and Plenipotentiary of H.M. the Emperor of Japan at Paris;

His Majesty the King of Norway:

Baron Wedel Jarlsberg, Envoy Extraordinary and Minister Plenipotentiary of H.M. the King of Norway at Paris;

Her Majesty the Queen of the Netherlands:

Mr. John Loudon, Envoy Extraordinary and Minister Plenipotentiary of H.M. the Queen of the Netherlands at Paris;

His Majesty the King of Sweden:

Count J.-J.-A. Ehrensvärd, Envoy Extraordinary and Minister Plenipotentiary of H.M. the King of Sweden at Paris;

Who, having communicated their full powers, found in good and due form, have agreed as follows:

Article 1.

The High Contracting Parties undertake to recognize, subject to the stipulations of the present Treaty, the full and absolute sovereignty of Norway over the Archipelago of Spitzbergen, comprising, with Bear Island or Beeren-Eiland, all the islands situated between 10° and 35° longitude East of Greenwich and between 74° and 81° latitude North, especially West Spitzbergen, North-East Land, Barents Island, Edge Island, Wijde Islands, Hope Island or Hopen-Eiland, and Prince Charles Foreland, together with all islands great or small and rocks appertaining thereto (see annexed map).

Article 2.

Ships and nationals of all the High Contracting Parties shall enjoy equally the rights of fishing and hunting in the territories specified in Article 1 and in their territorial waters.

Norway shall be free to maintain, take or decree suitable measures to ensure the preservation and, if necessary, the reconstitution of the fauna and flora of the said regions, and their territorial waters; it being clearly understood that these measures shall always be applicable equally to the nationals of all the High Contracting Parties without any exemption, privilege or favour whatsoever, direct or indirect to the advantage of any one of them.

Occupiers of land whose rights have been recognized in accordance with the terms of Articles 6 and 7 will enjoy the exclusive right of hunting on their own land: (1) in the neighbourhood of their habita tions, houses, stores, factories and installations, constructed for the purpose of developing their property, under conditions laid down by the local police regulations; (2) within a radius of 10 kilometres round the headquarters of their place of business or works, and in both cases, subject always to the observance of regulations made by the Norwegian Government in accordance with the conditions laid down in the present Article.

Article 3.

The nationals of all the High Contracting Parties shall have equal liberty of access and entry for any excess or object whatever to the waters, fjords and ports of the territories specified in Article 1, subject to the observance of local laws and regulations, they may carry

"... ***never be used for warlike purposes***."

Resources
"shall enjoy equally the rights of fishing and hunting in the territories" (Art. II)

exploitation / extraction
Norway sovereignty

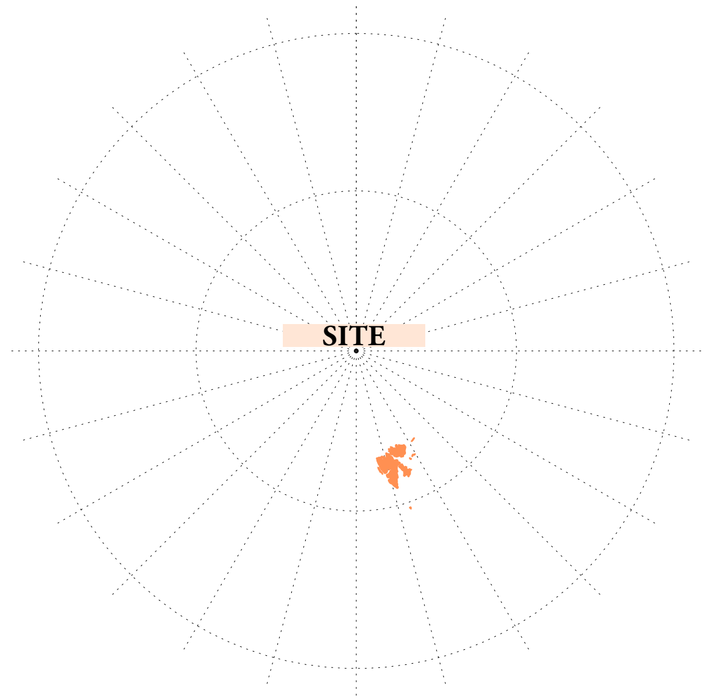
The Svalbard Treaty
1920

CARTOGRAPHY

mapping, narrative

POLAR COMPARISON

Arctic // Antarctica

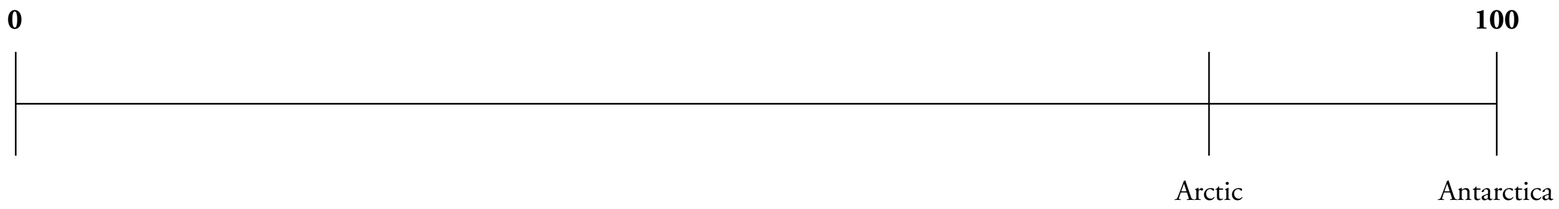


Svalbard

RULES OF THE
'EXCEPTIONAL'

TERRA NULLIUS:
NO MANS LAND

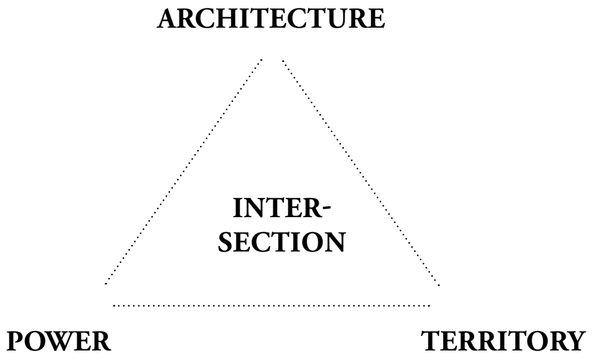
DEGREE OF ENVIRONMENTAL EXTREMITY

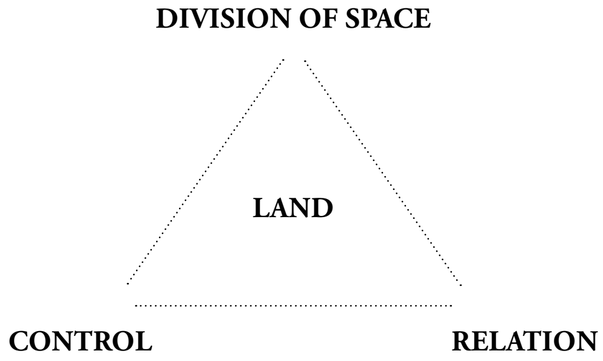


CARTOGRAPHY

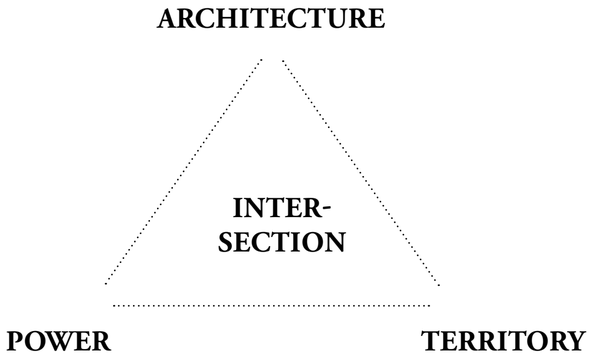
DECONSTRUCTION

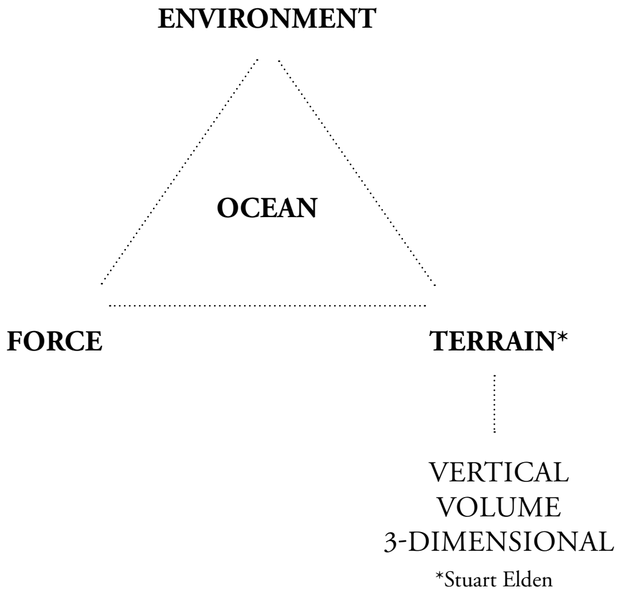
TERRAFORMATION





HISTORY OF CONCEPTS





CONCEPTS IN CONTEXT

REVERSE IMAGE

CARTOGRAPHY DECONSTRUCTION TERRAFORMATION

Scientists shocked by Arctic permafrost thawing 70 years sooner than predicted

- **Ice blocks frozen solid for thousands of years destabilized**
- **'The climate is now warmer than at any time in last 5,000 years'**

Chinese Oil Drillers Are Back in Russian Arctic

This is the third year in a row when the Chinese Nanhai-8 drilling rig has arrived in Russia's Murmansk for drilling in Arctic waters.

Russian Arctic shipping boost with support from Dubai

The developers of the Northern Sea Route team up with DP World, the global port operator based in the Arab gulf state. Container shipping is among the priorities.

The U.S. Military Wants to Build a Strategic Port in the Melting Arctic

A military spending bill has asked for a brand new Arctic port to face "future great power competition."

The end of the Arctic as we know it

Less oxygen and ice, more acid and heat. Jonathan Watts joins an expedition studying what this means for the planet

The demise of an entire ocean is almost too enormous to grasp, but as the expedition sails deeper into the Arctic, the colossal processes of breakdown are increasingly evident.

The first fragment of ice appears off the starboard bow a few miles before the 79th parallel in the Fram strait, which lies between Greenland and the Norwegian archipelago of Svalbard. The solitary floe is soon followed by another, then another, then clusters, then swarms, then entire fields of white crazy paving that stretch to the horizon.

through architecture can we construct alternative realities to the existing modes of production and extraction.

the creation of new paths of movement

can we work together with earth forces and ecological processes to create alternative ways of valuing the Arctic and its critic yet fragile environment?

a proposal presented by

THE STATE OF THE ARCTIC

The People of the Arctic Treaty

VALUE

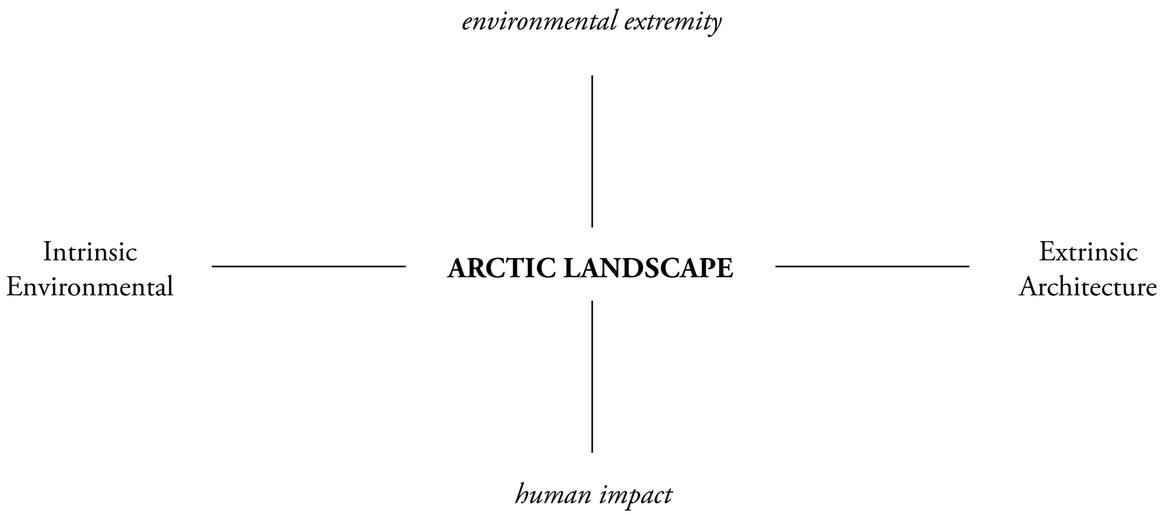
instating value into the Arctic environment,
just like the approach towards Antarctica

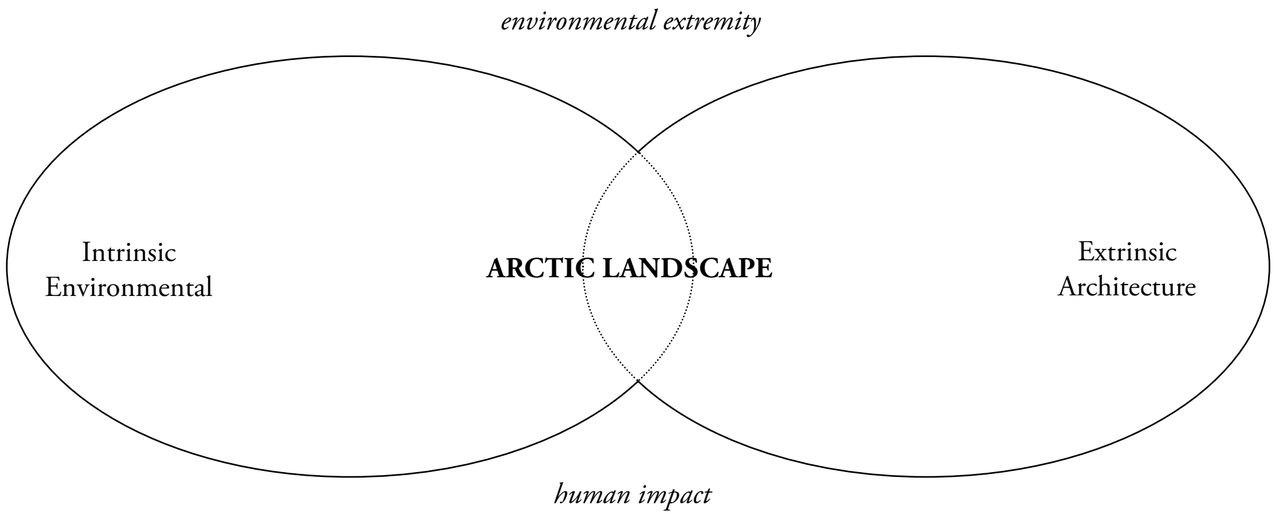
1. PRODUCTIVE

constructing alternative modes of production, rather than extracting, can we harvest earth forces and work together with them?

2. MONUMENTAL

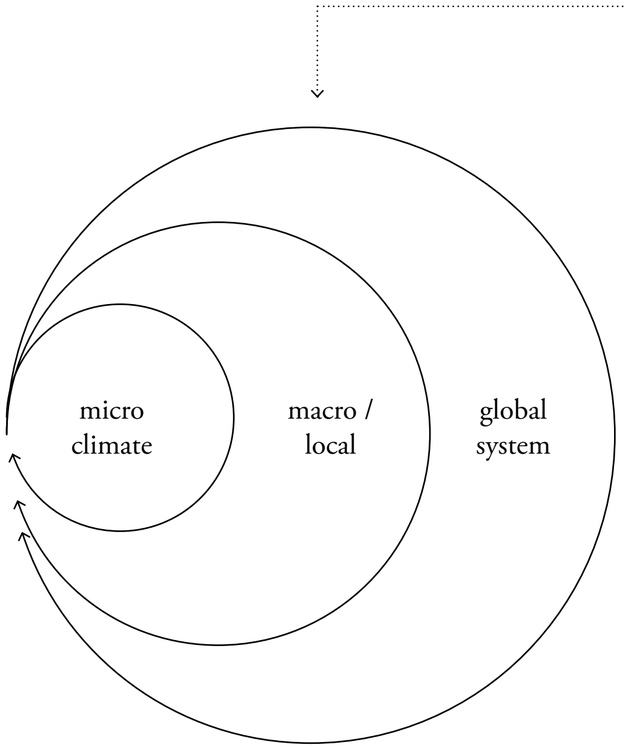
Can architecture be used as a tool to represent and make visible the powerful yet fragile ecosystems that are crucial for our environment?


environmental extremity
Intrinsic
Environmental
ARCTIC LANDSCAPE
Extrinsic
Architecture
human impact

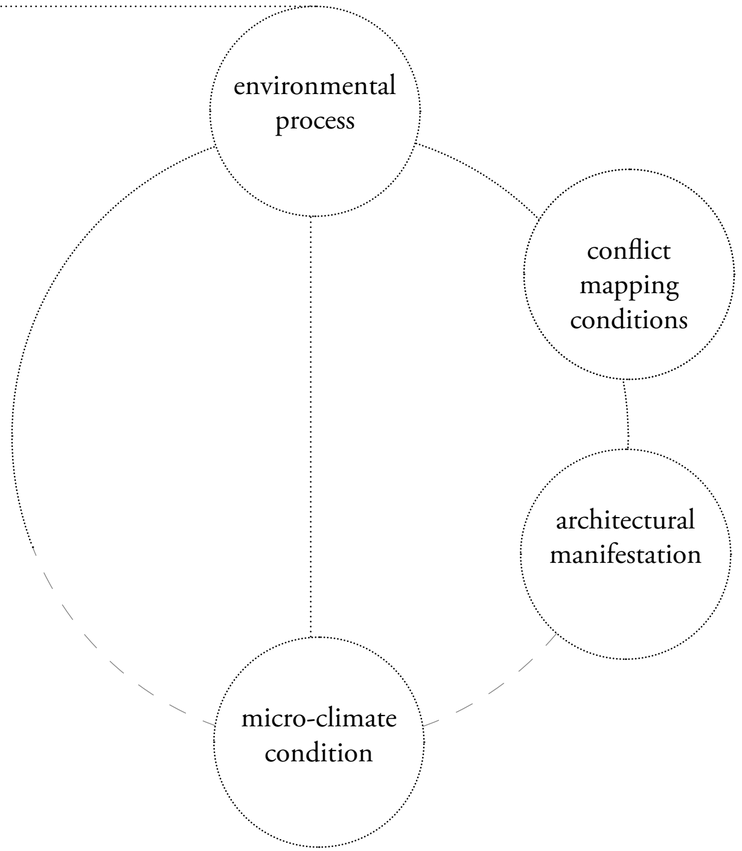


TOOLS OF
MEASUREMENT

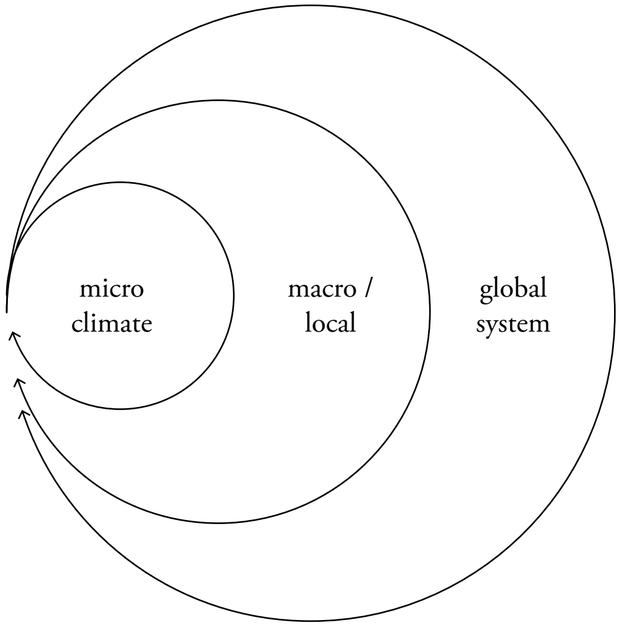
PROCESS

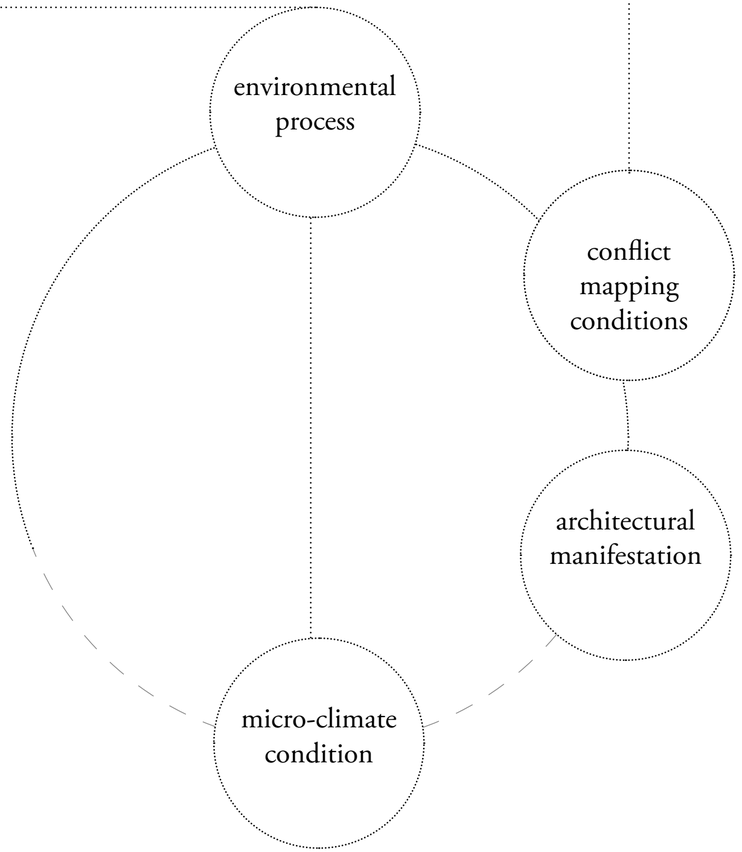

micro
climate
macro /
local
global
system

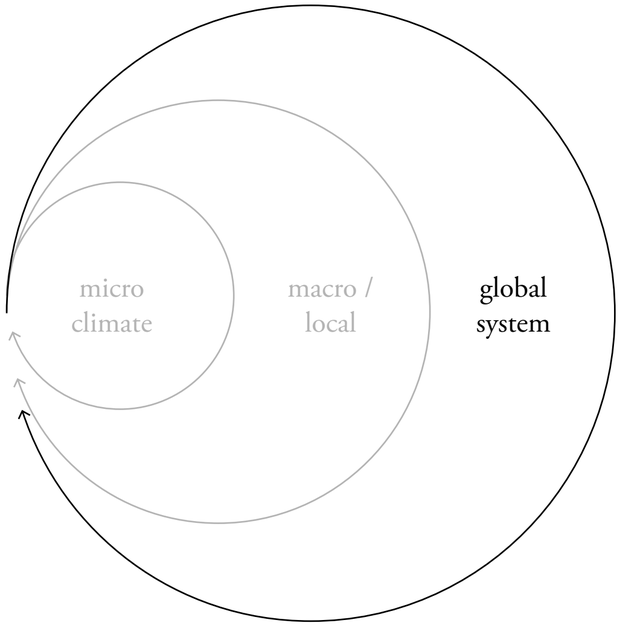
3 SCALES

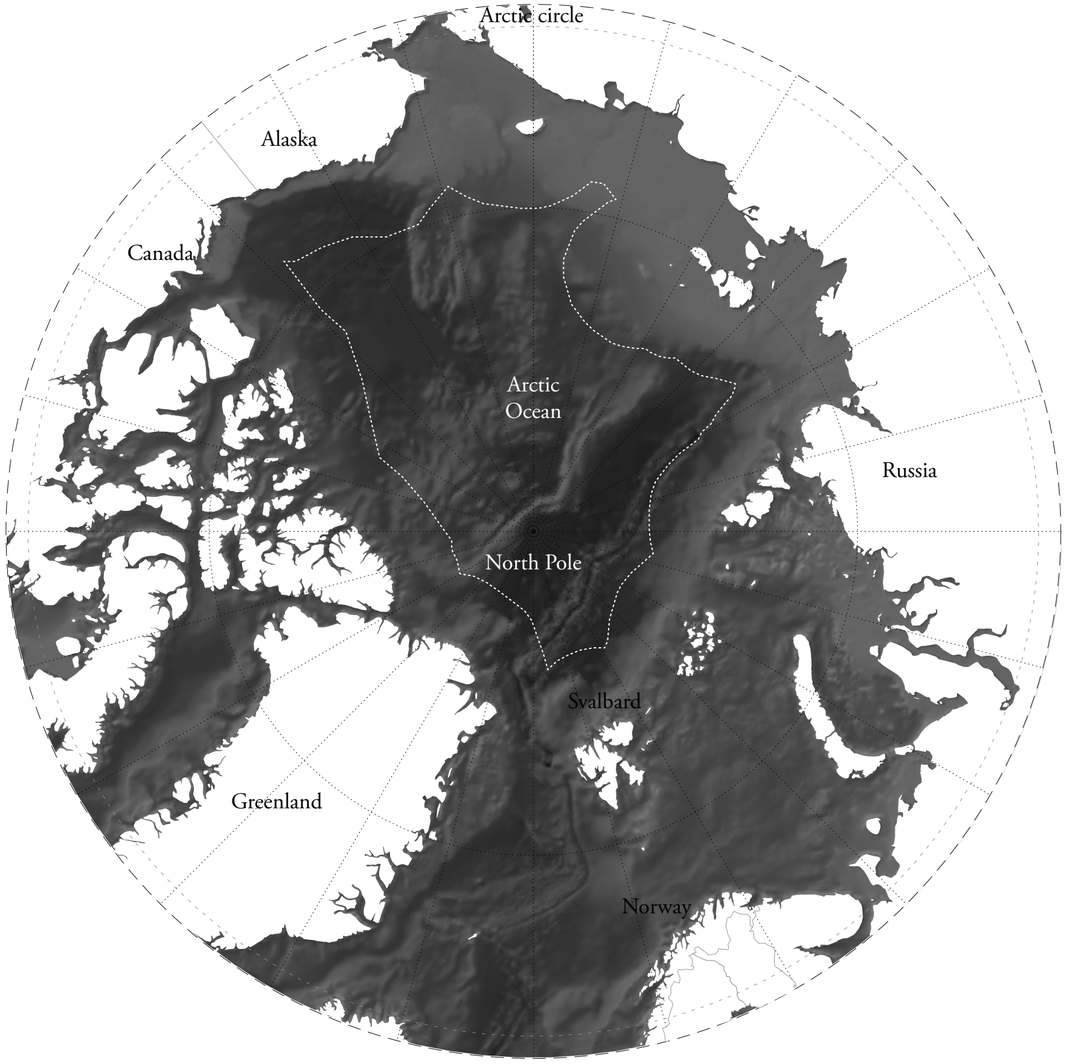

environmental
process
conflict
mapping
conditions
architectural
manifestation
micro-climate
condition

'conflict' mapping -
analysis of disruptive forces

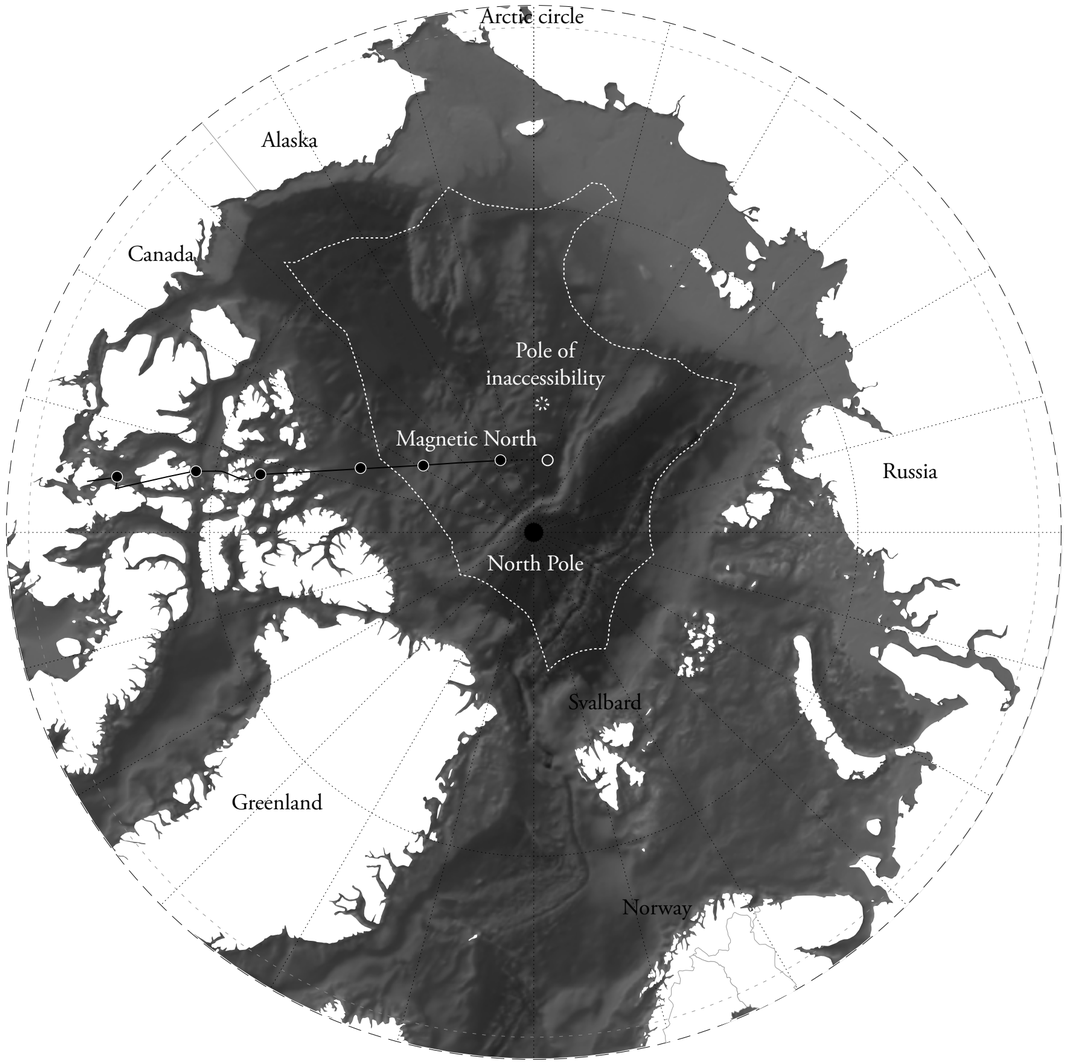





micro
climate
macro /
local
global
system

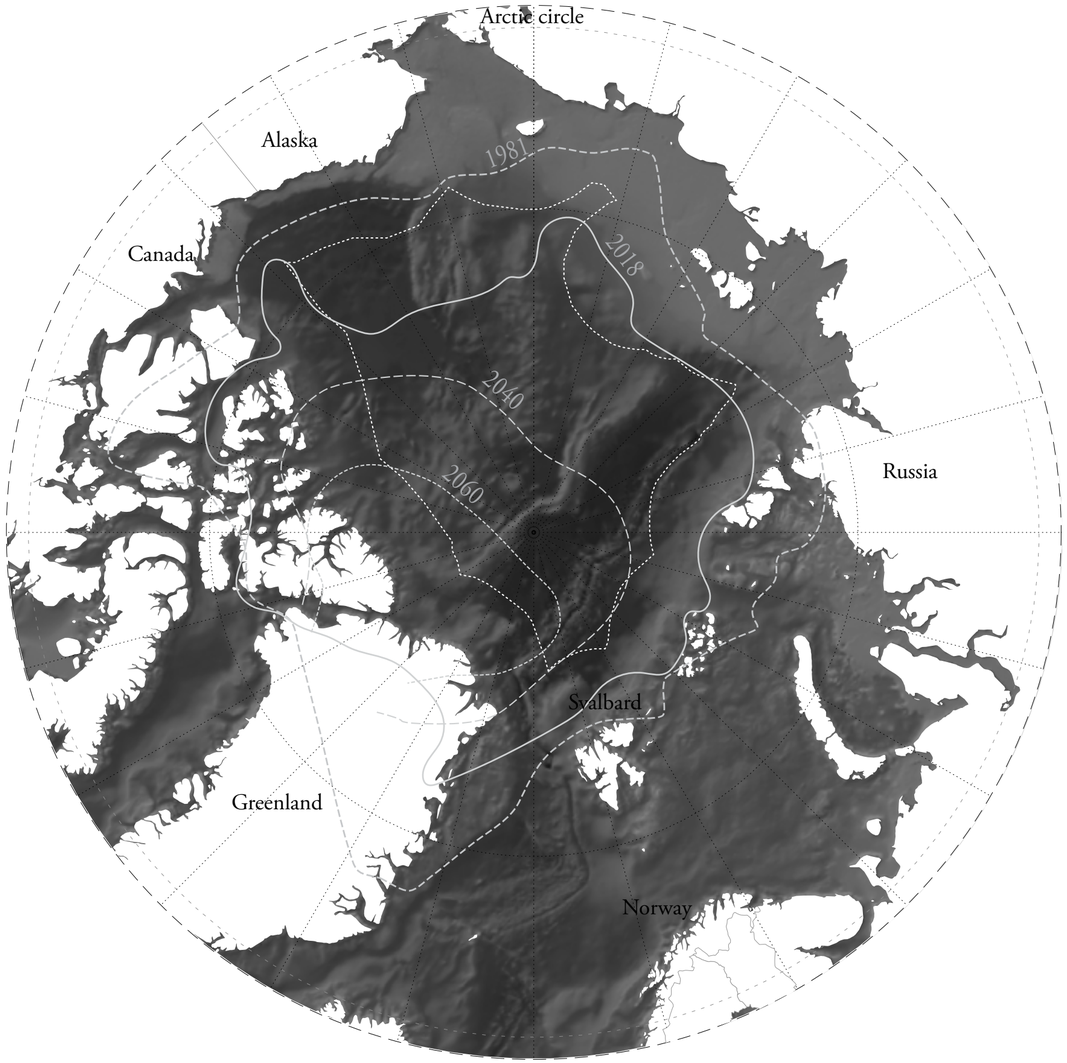

Arctic circle
Alaska
Canada
Arctic
Ocean
Russia
North Pole
Svalbard
Greenland
Norway

shifting magnetic pole



MARINE INVASION PATHWAYS

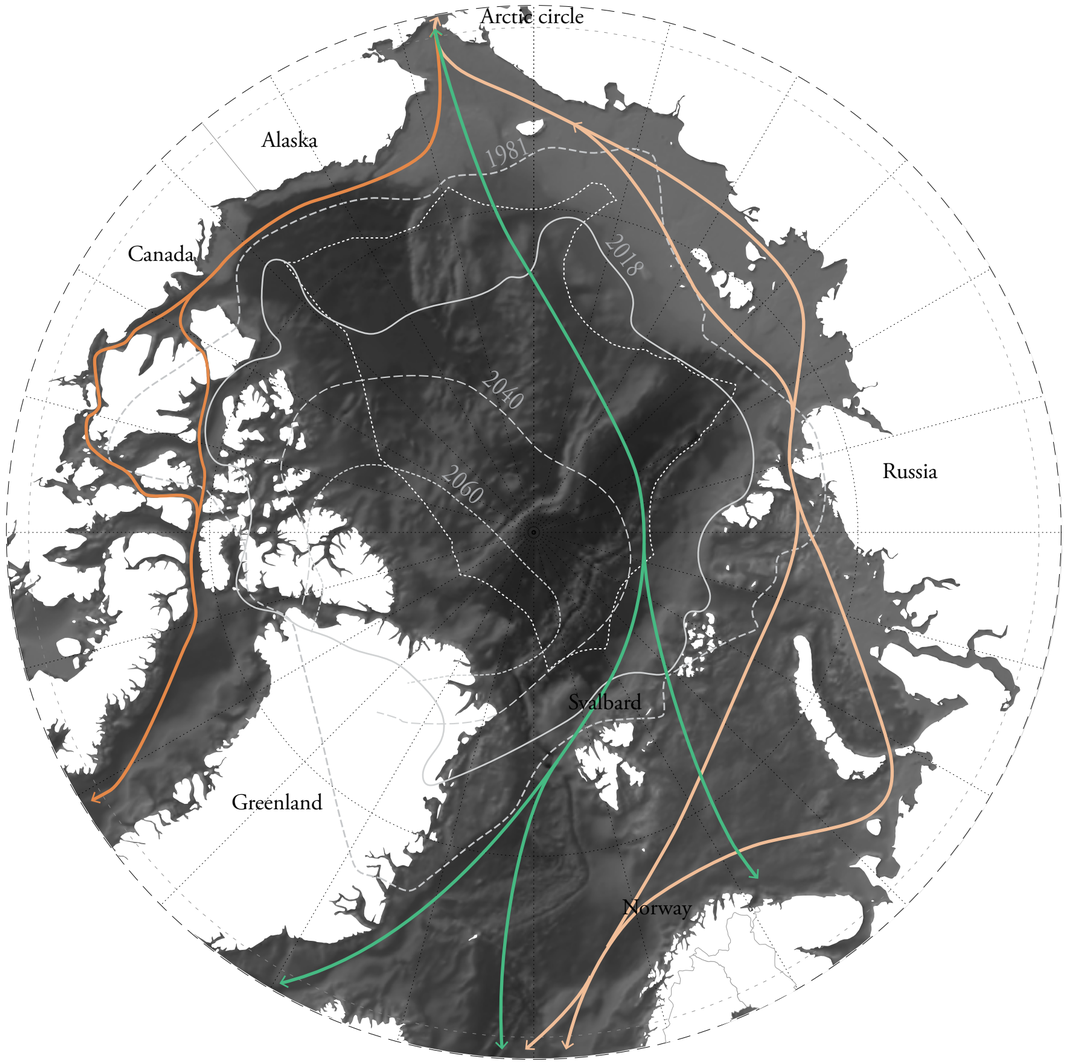
sea ice extent



MARINE INVASION PATHWAYS

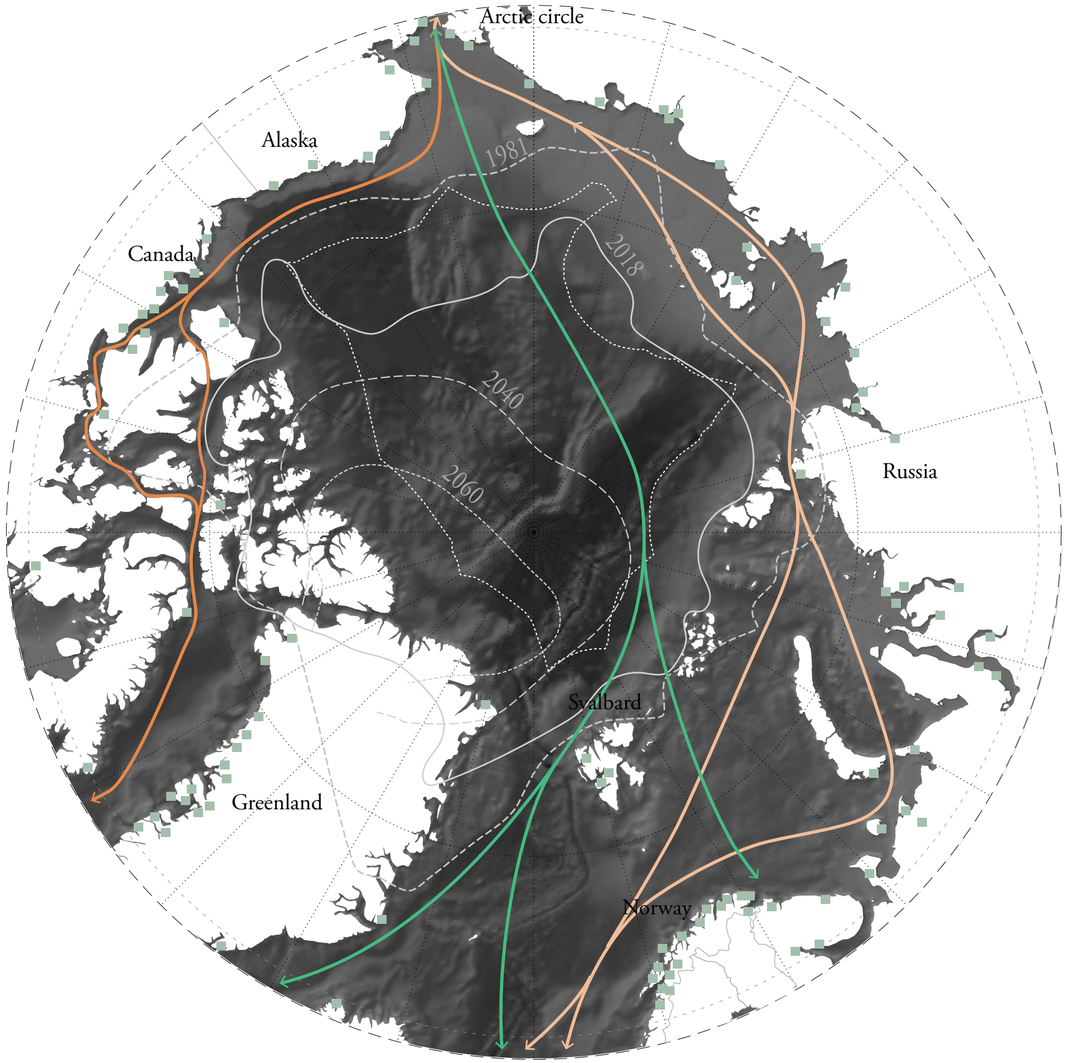
sea ice extent

shipping trade routes



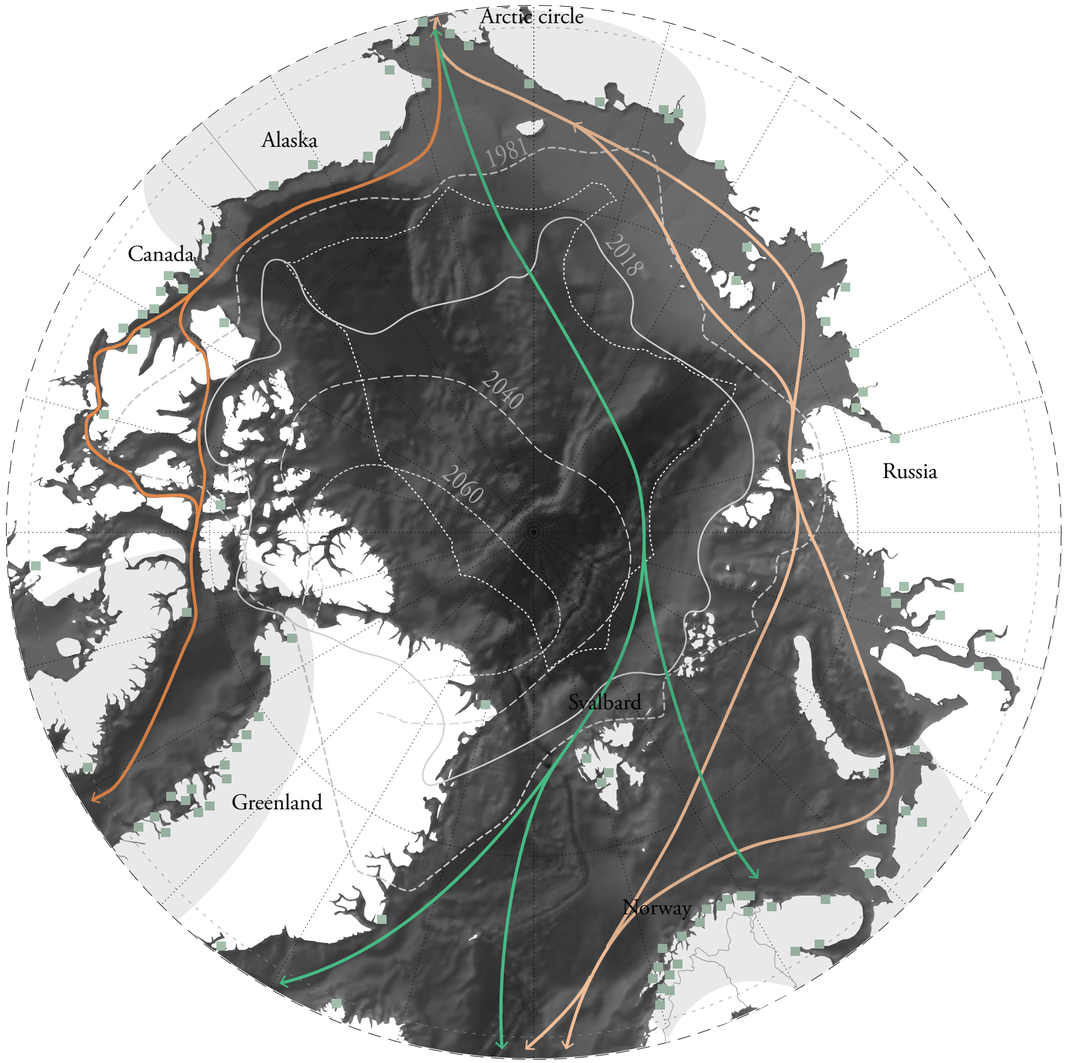
MARINE INVASION PATHWAYS

sea ice extent
shipping trade routes
main industrial harbours



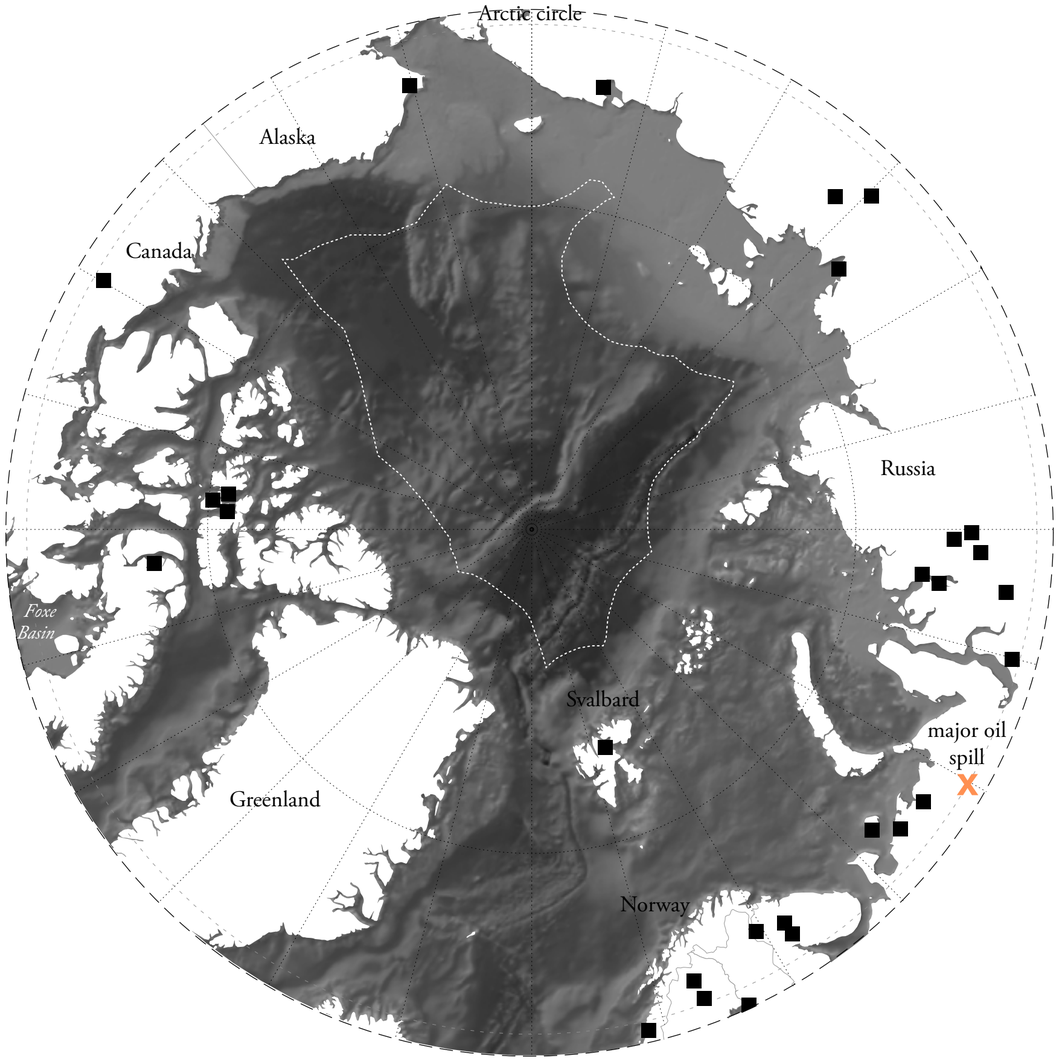
MARINE INVASION PATHWAYS

sea ice extent
shipping trade routes
main industrial harbours
human activity zone
(tourism, extraction, fisheries)



INDUSTRIAL ACTIVITY

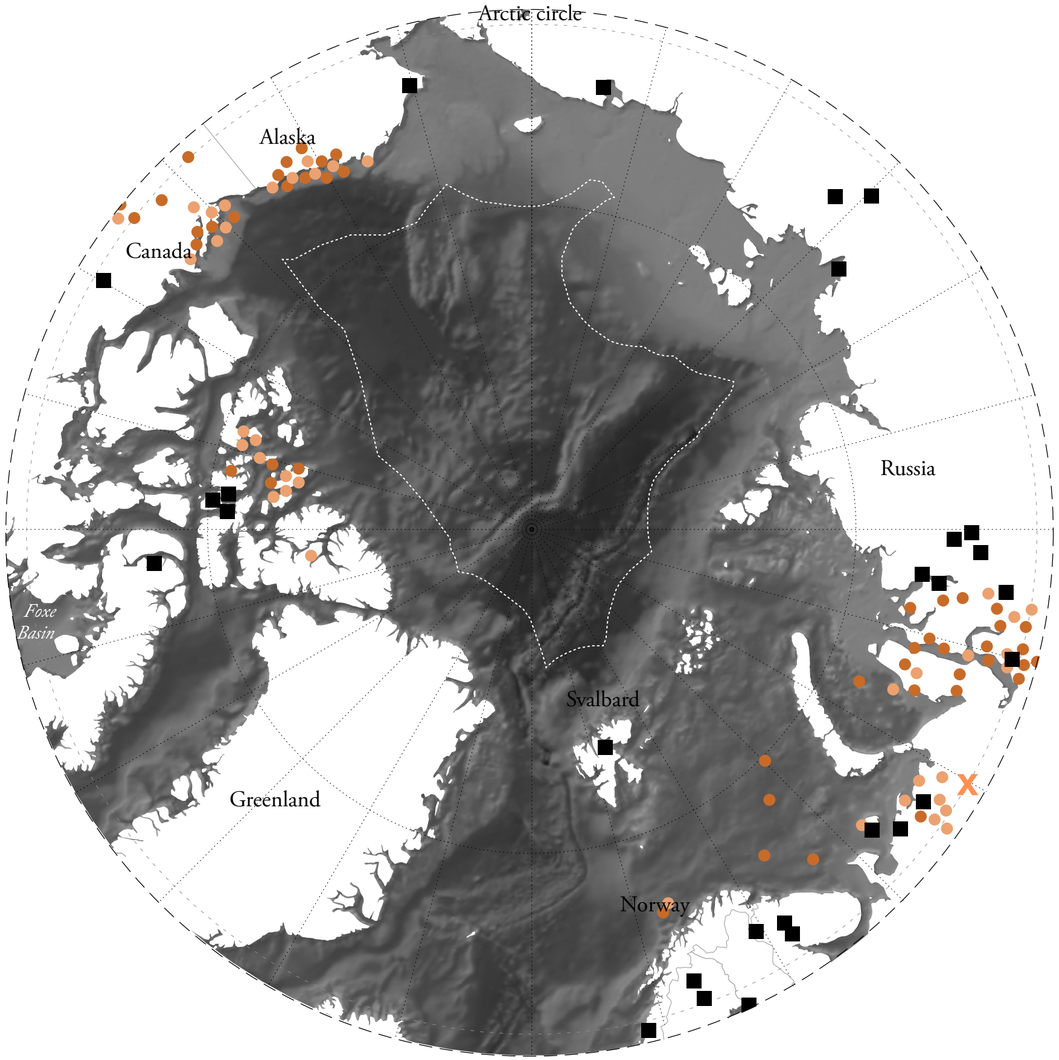
mining sites



INDUSTRIAL ACTIVITY

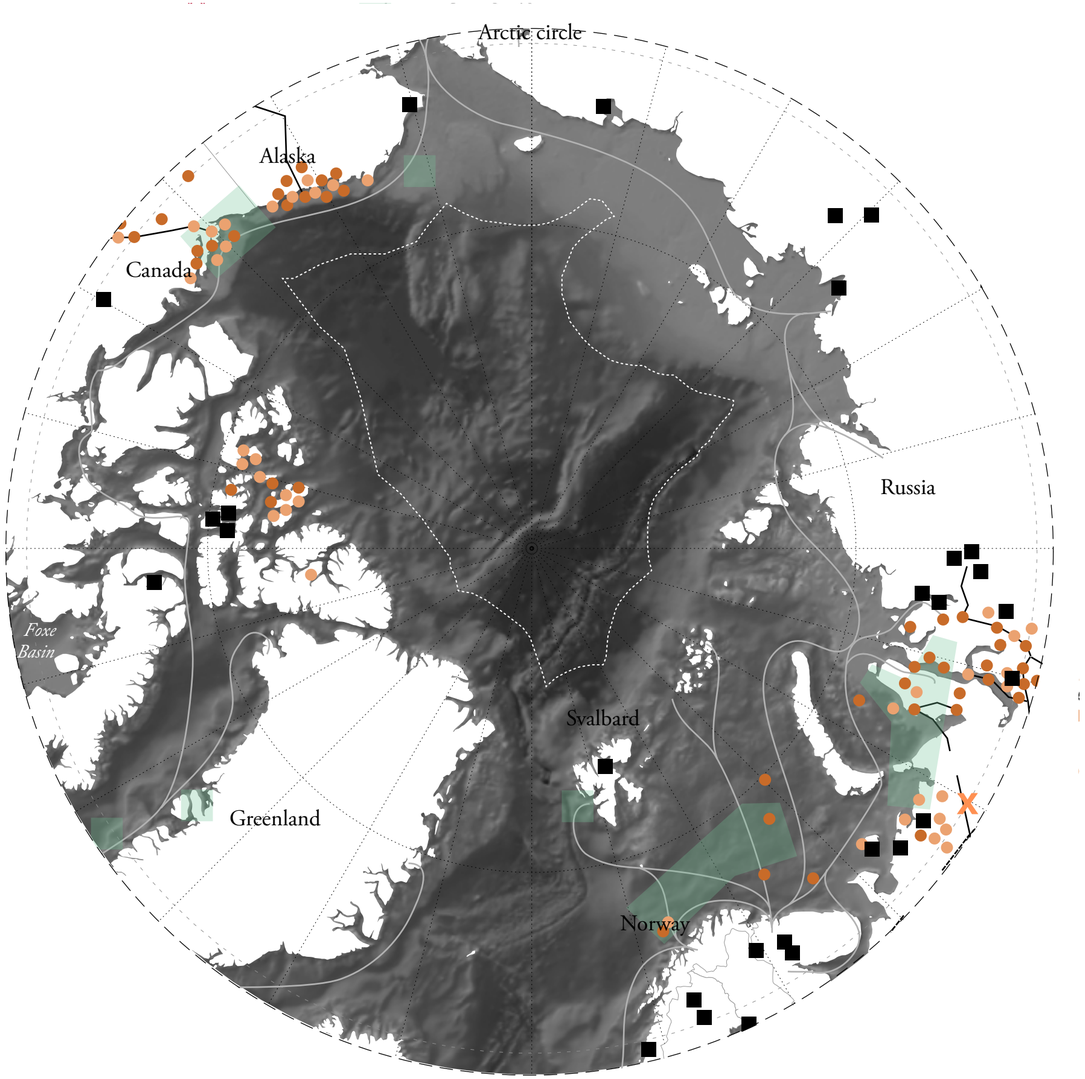
mining sites

gas and oil production



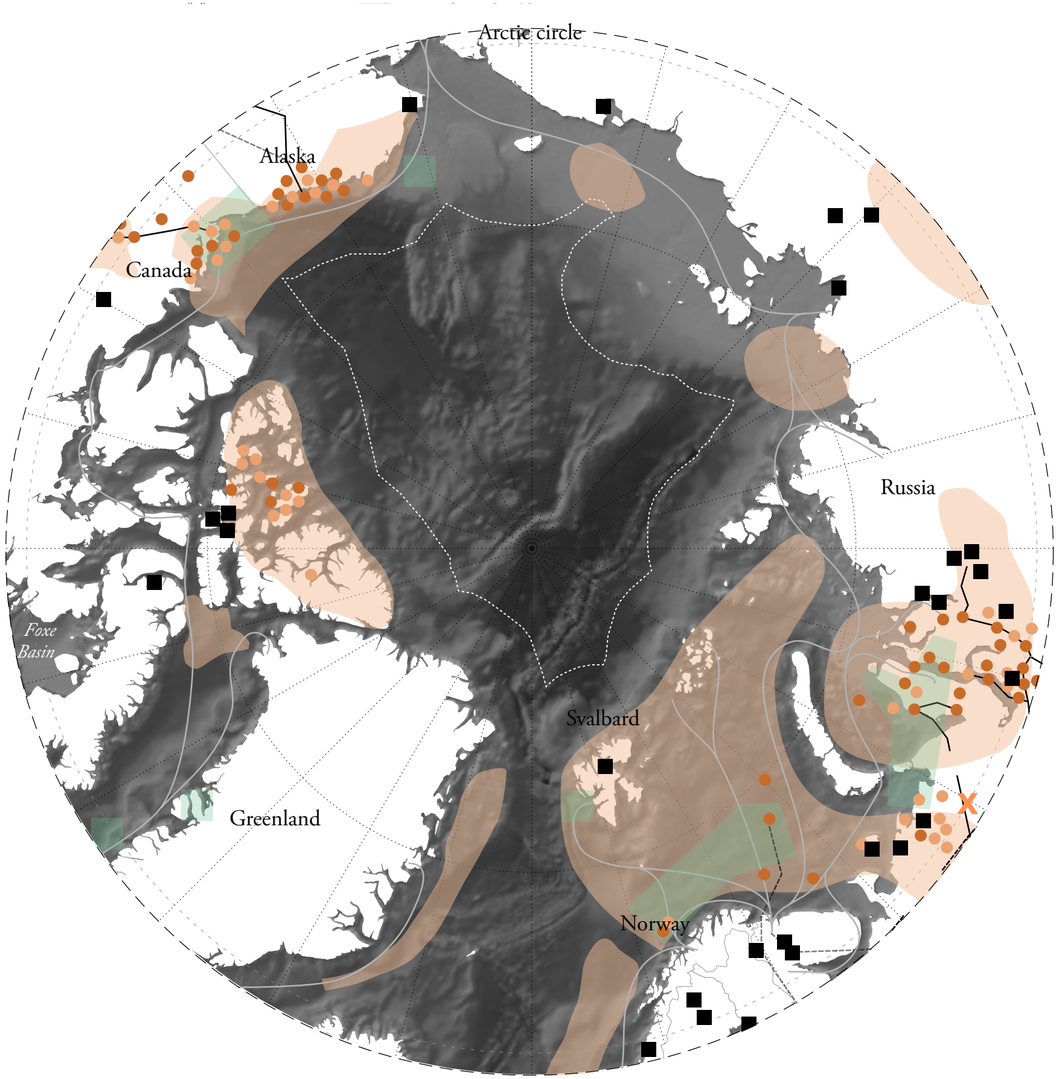
INDUSTRIAL ACTIVITY

mining sites
gas and oil production
exploration drilling and routes
main pipeline



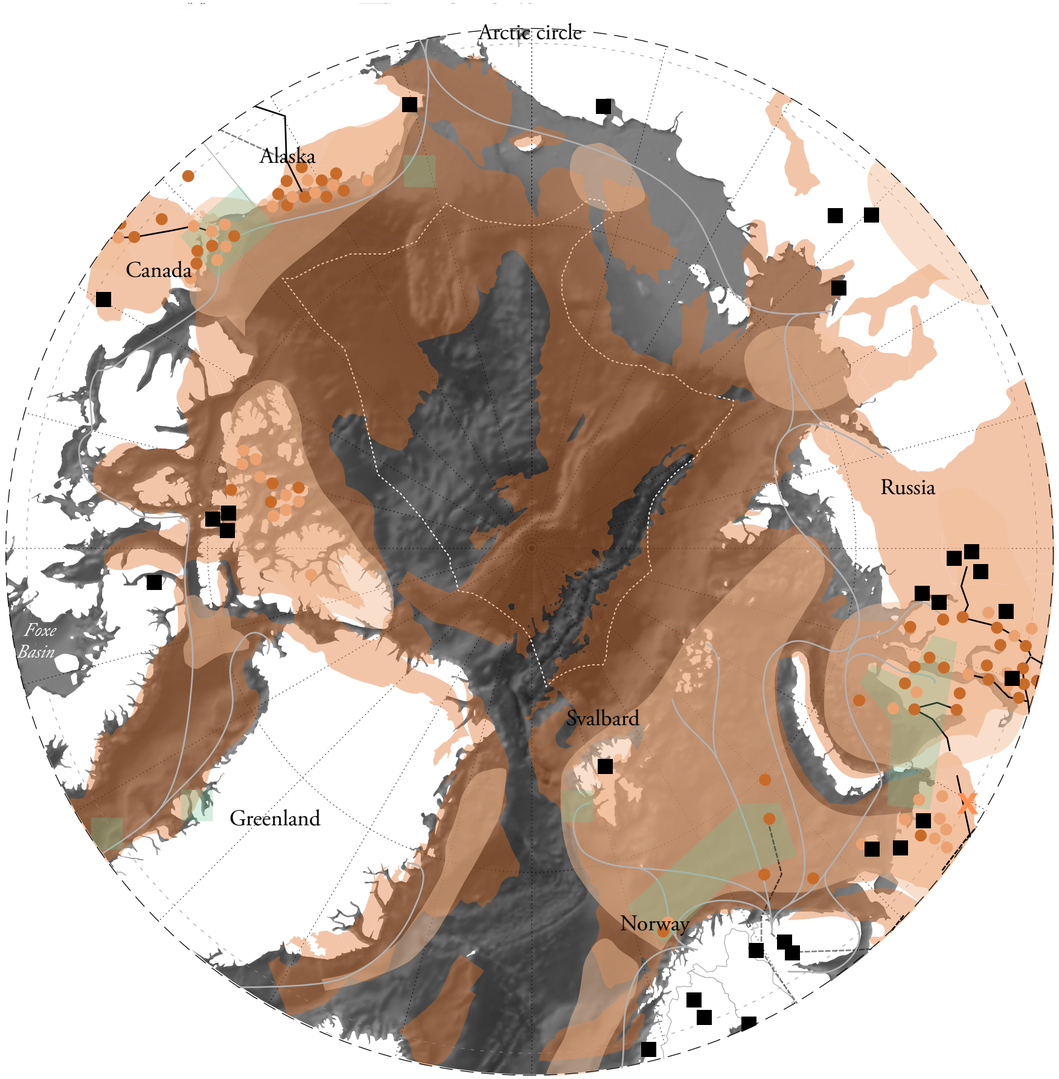
INDUSTRIAL ACTIVITY

main industrial activity
gas and oil production
exploration drilling and routes
main pipeline
prospective drilling
prospective pipeline



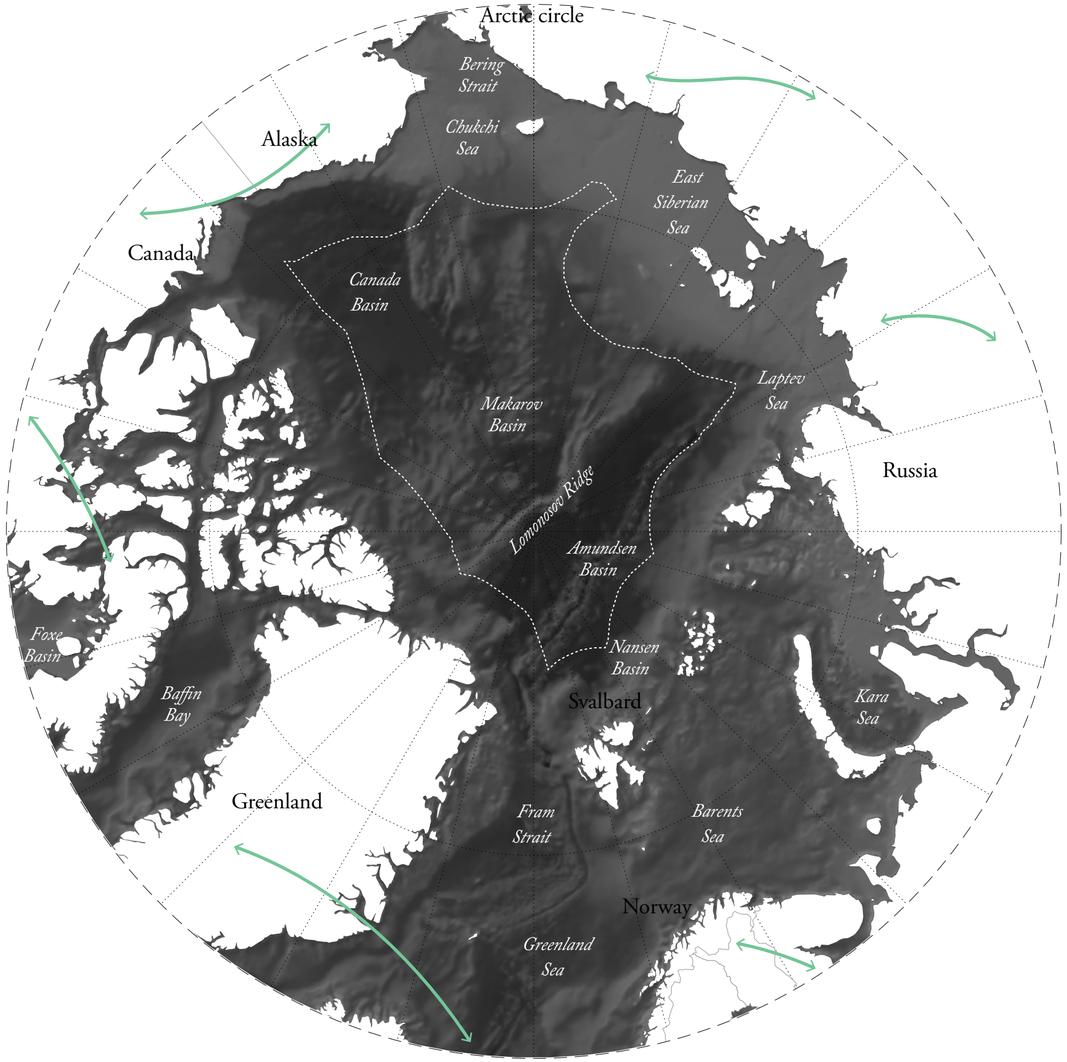
INDUSTRIAL ACTIVITY

main industrial activity
gas and oil production
exploration drilling and routes
main pipeline
prospective drilling
prospective pipeline
probability of undiscovered gas and oil



MIGATORY PATHS

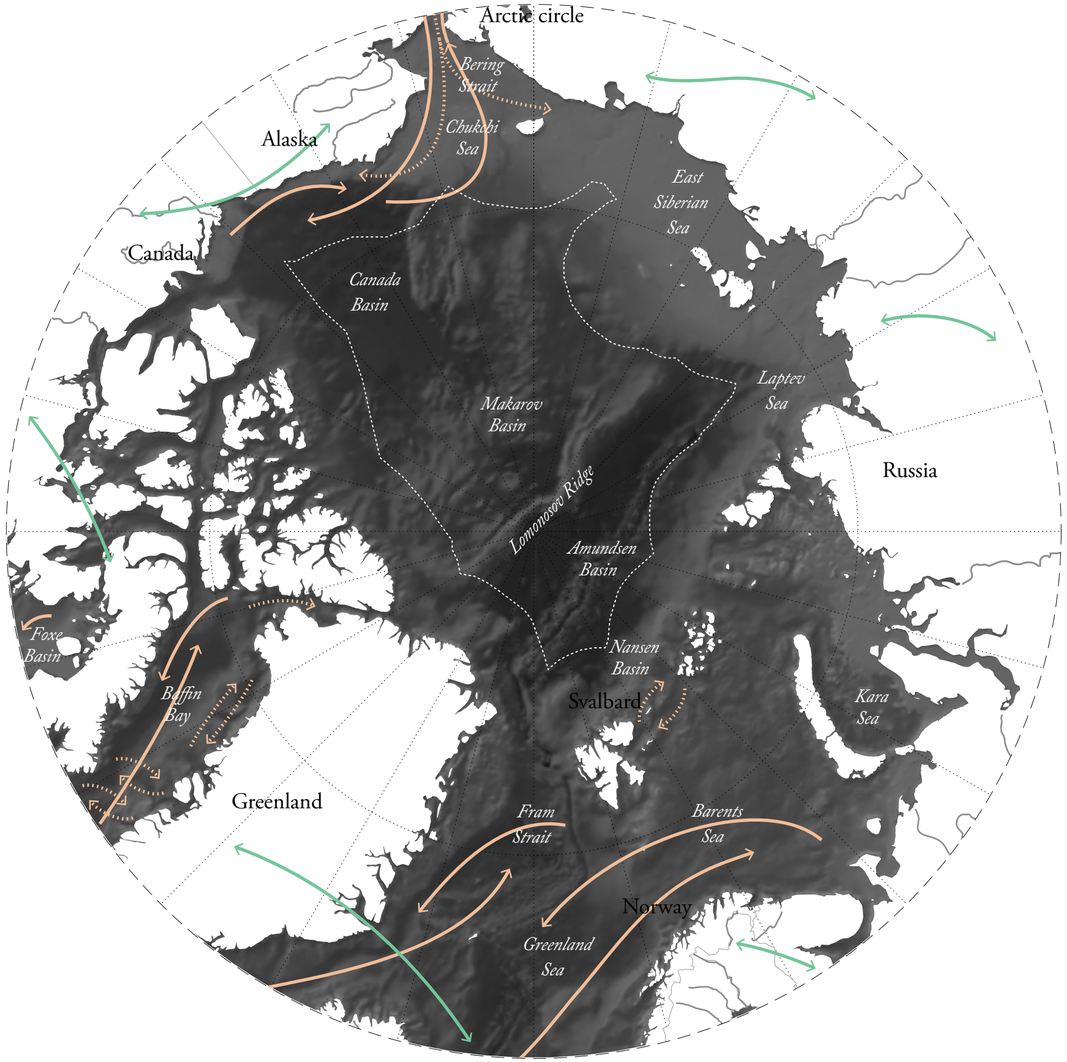
bird migration



MIGATORY PATHS

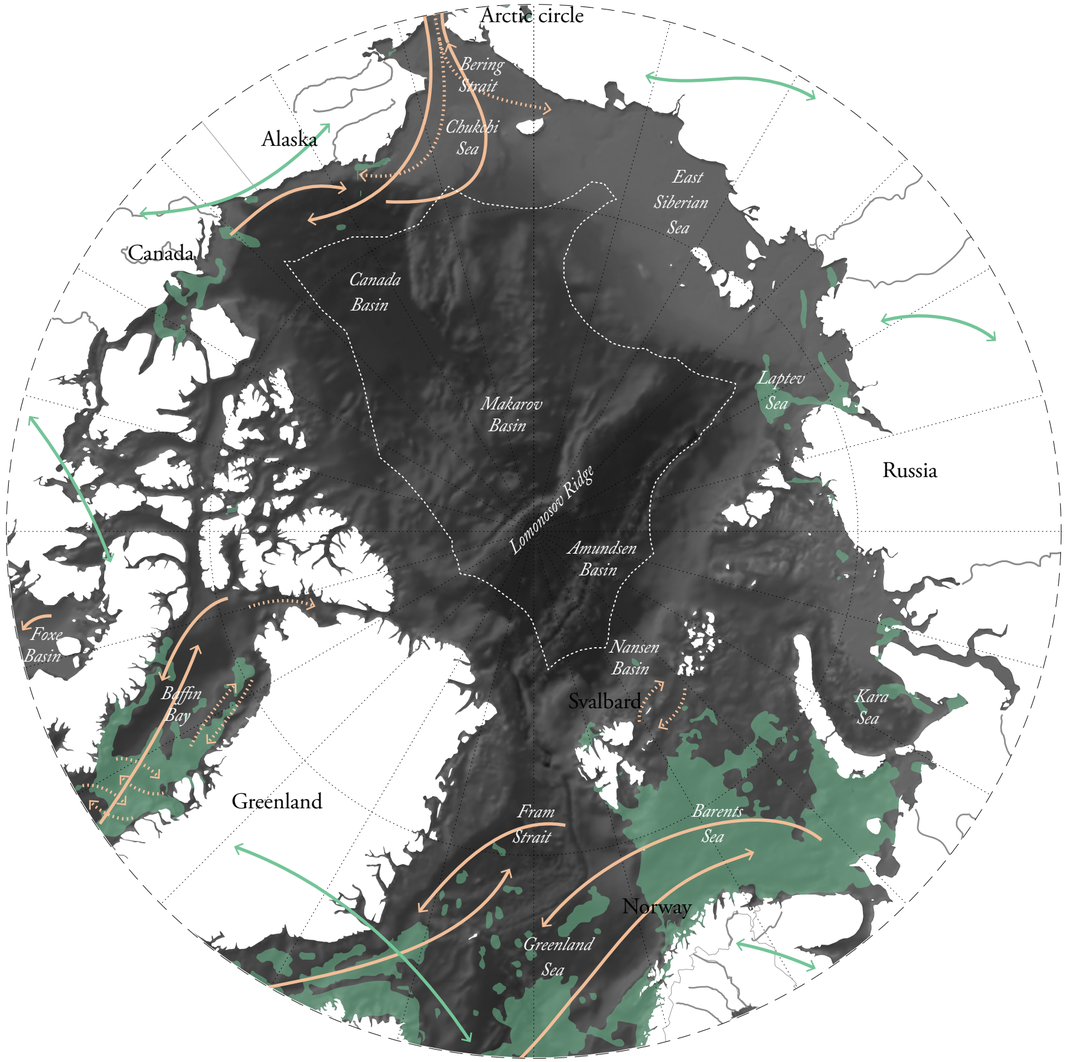
bird migration

fish and sea mammals



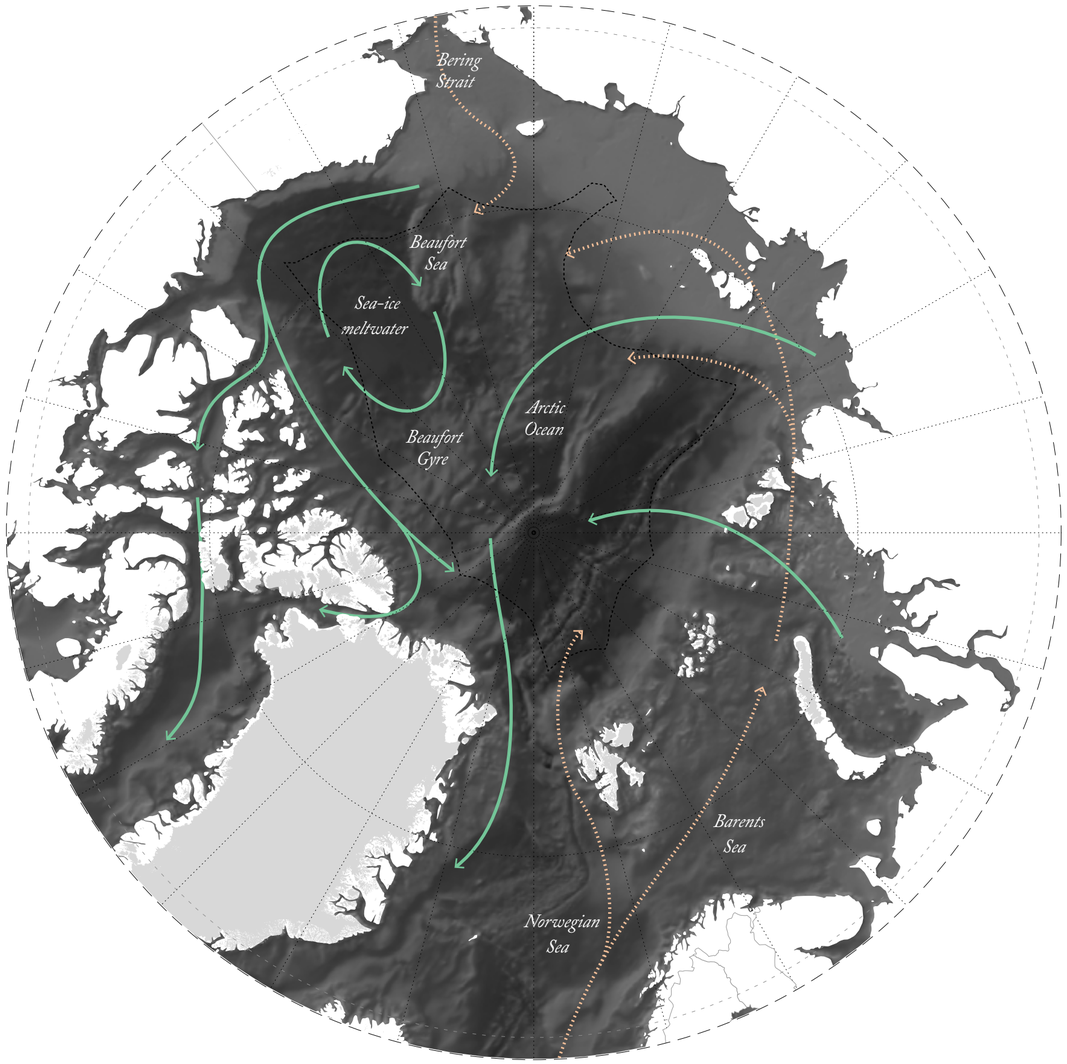
MIGATORY PATHS

bird migration
fish and sea mammals
seasonal commercial fishing



OCEAN ACIDIFICATION MAPPING

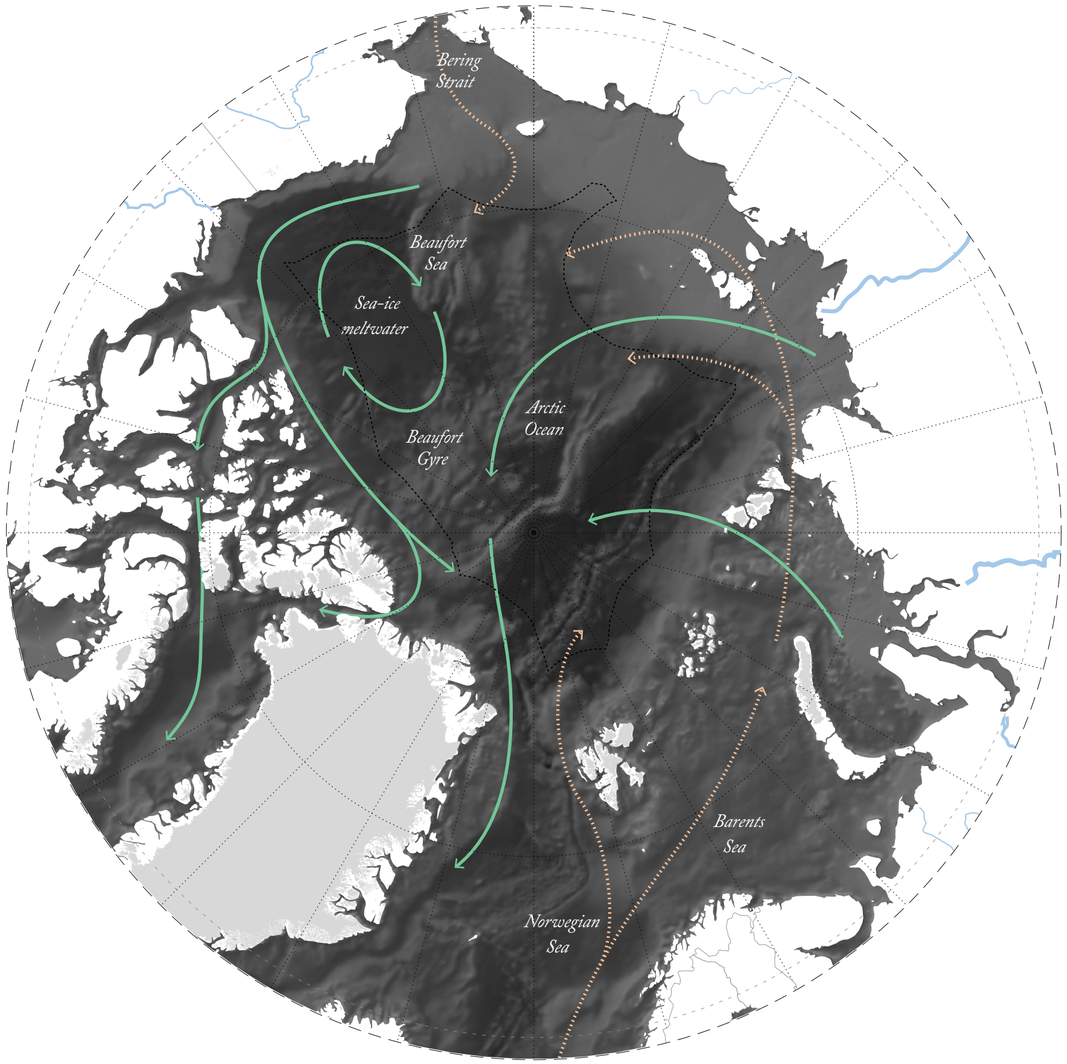
sea currents



OCEAN ACIDIFICATION MAPPING

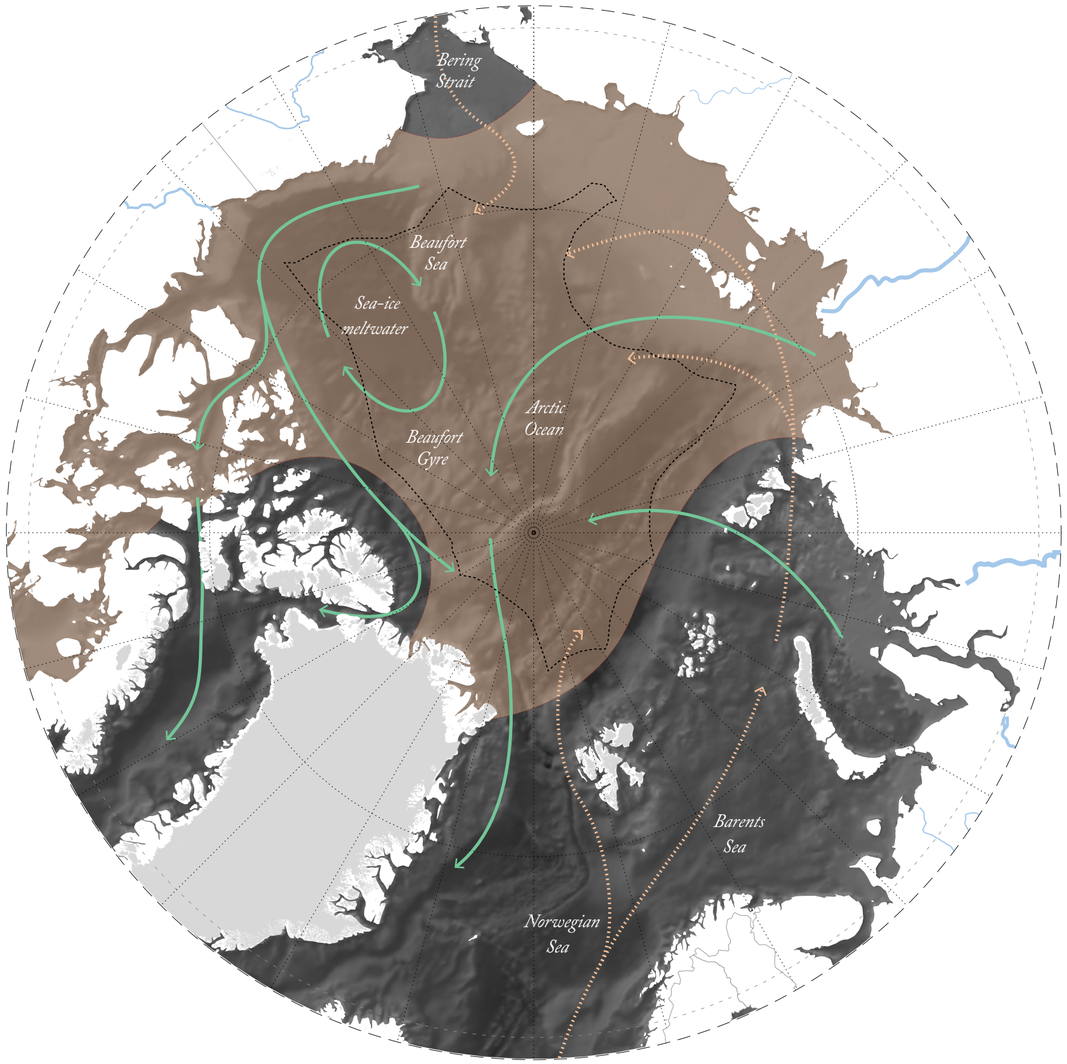
sea currents

fresh water input



OCEAN ACIDIFICATION MAPPING

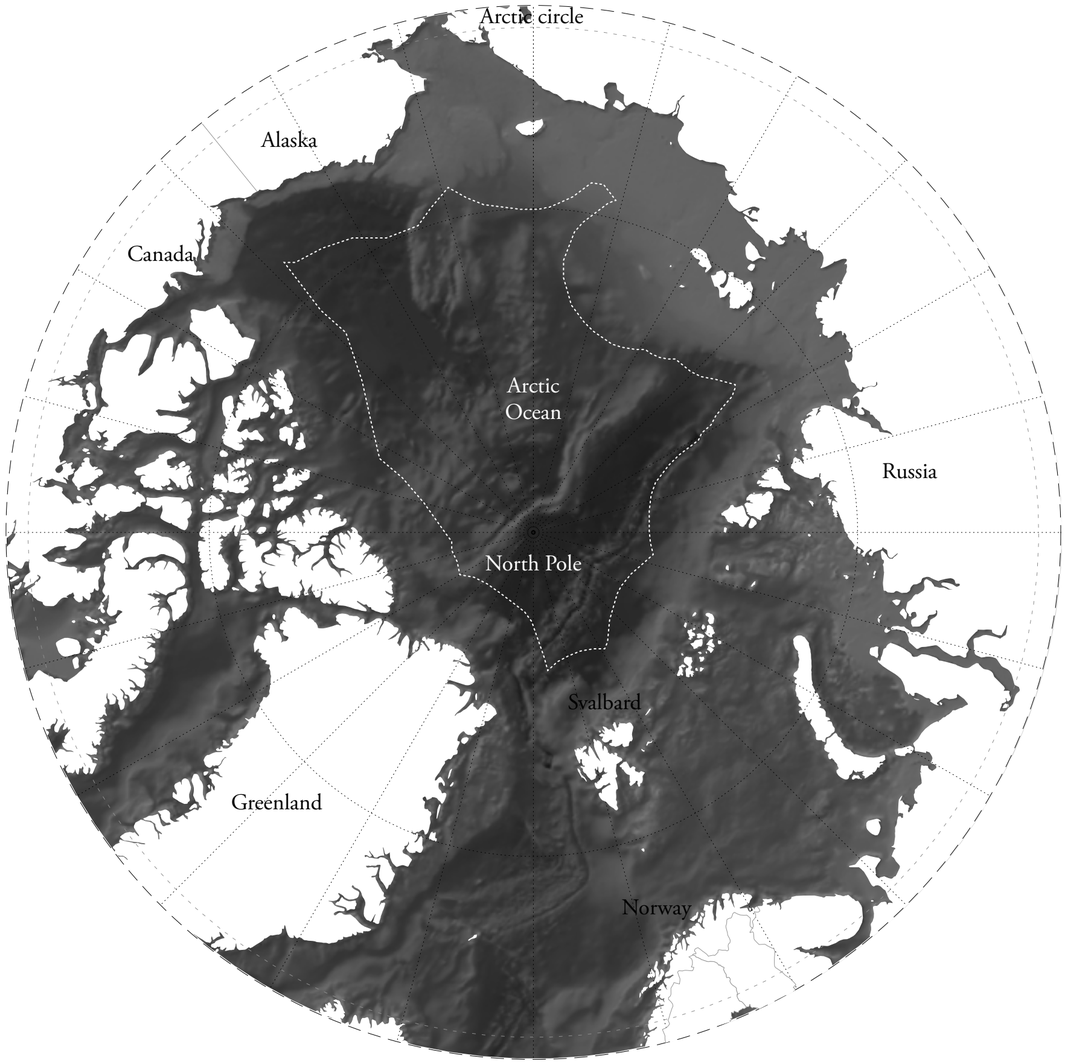
sea currents
fresh water input
pH decrease

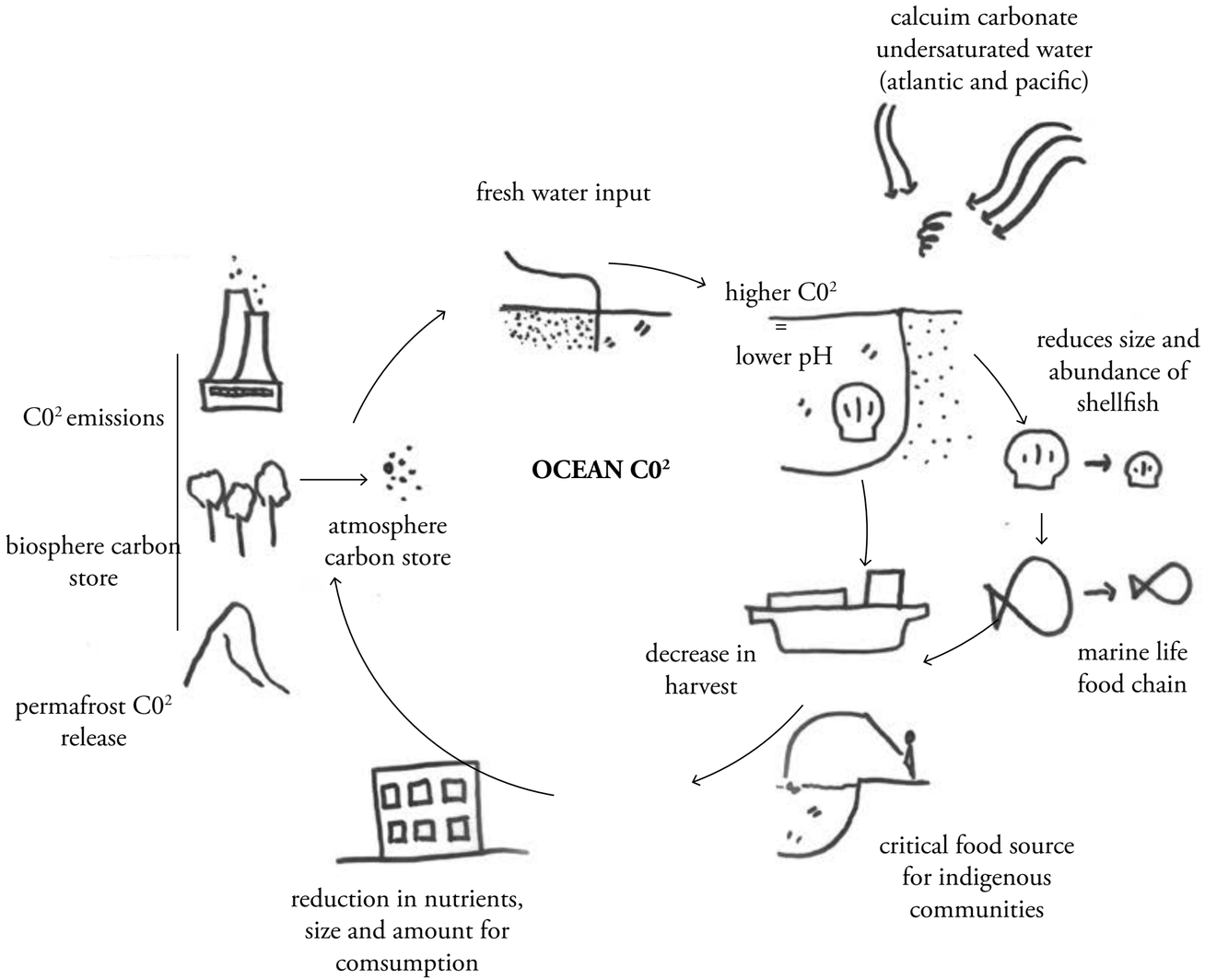


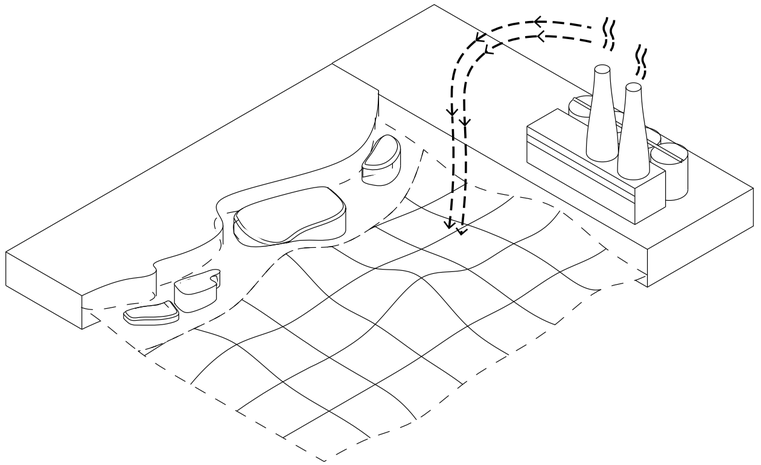
FEEDBACK LOOPS AND GLOBAL SYSTEMS

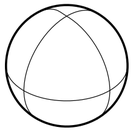
KEY CONFLICTS

ATMOSPHERIC $C0^2$
OCEAN ACIDIFICATION
ALBEDO EFFECT
SHIFTING MAGNETIC POLE
MIGATORY PATHWAYS
INDUSTRIAL ACTIVITY



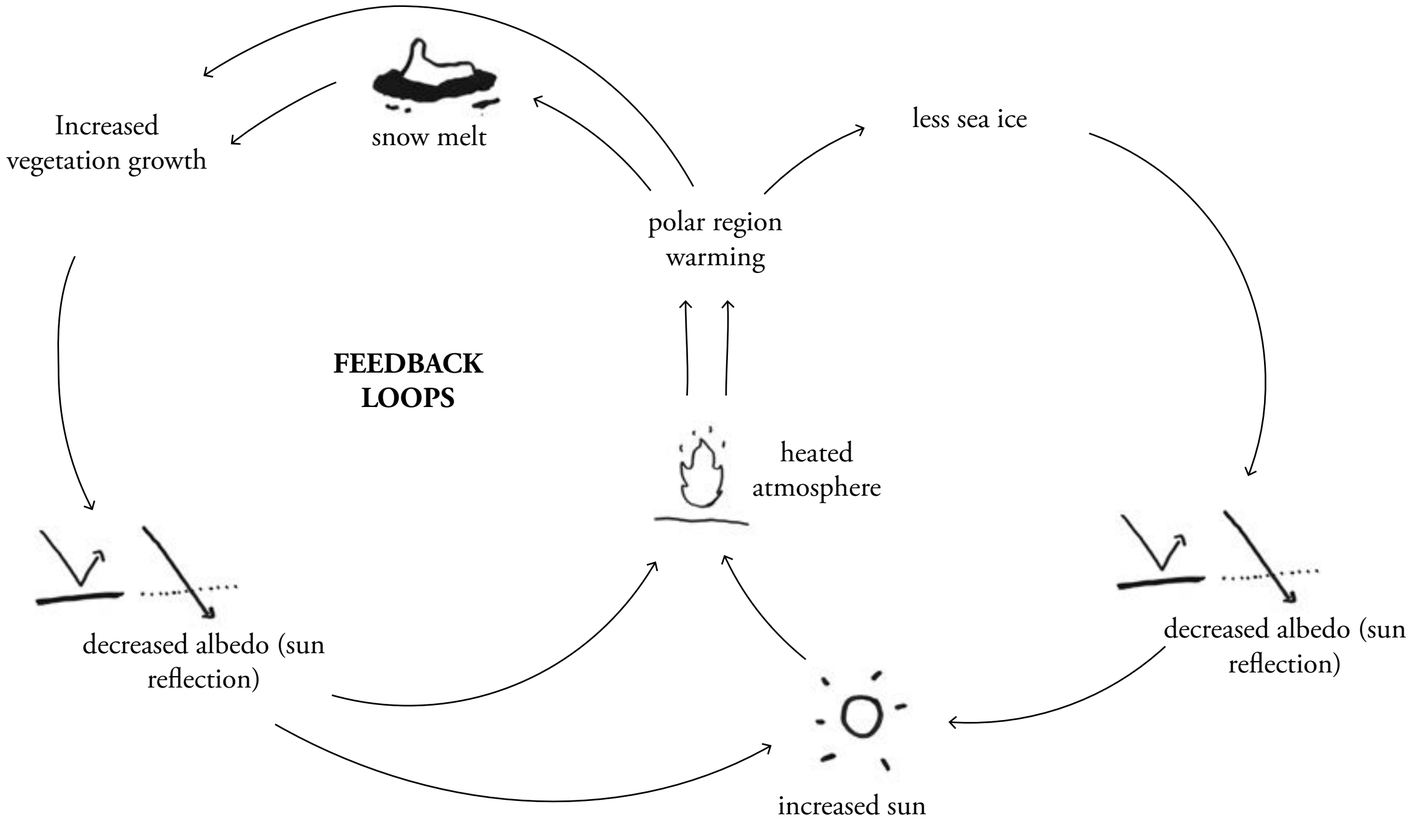

calcuim carbonate
undersaturated water
(atlantic and pacific)
fresh water input
higher C0²
=
lower pH
reduces size and
abundance of
shellfish
C0² emissions
biosphere carbon
store
permafrost C0²
release
atmosphere
carbon store
OCEAN C0²
decrease in
harvest
marine life
food chain
critical food source
for indigenous
communities
reduction in nutrients,
size and amount for
comsumption

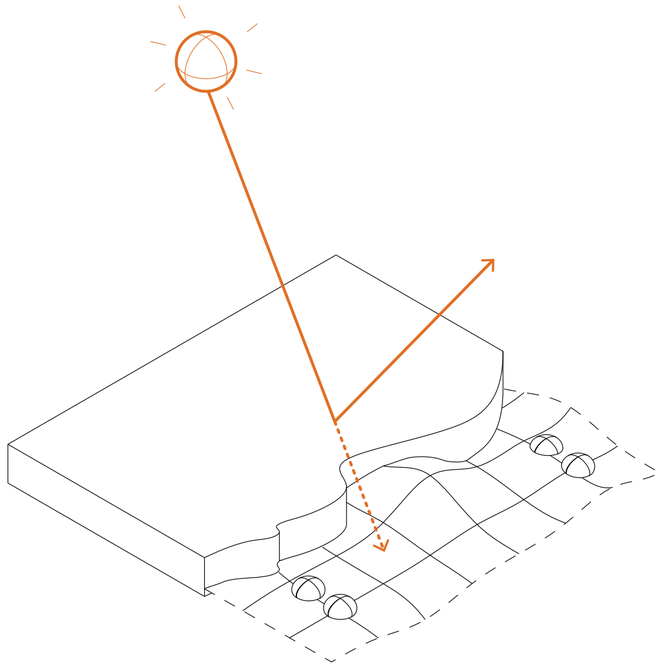


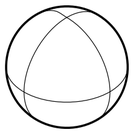


INDUSTRIAL ACTIVITY
OCEAN ACIDIFICATION

WHAT

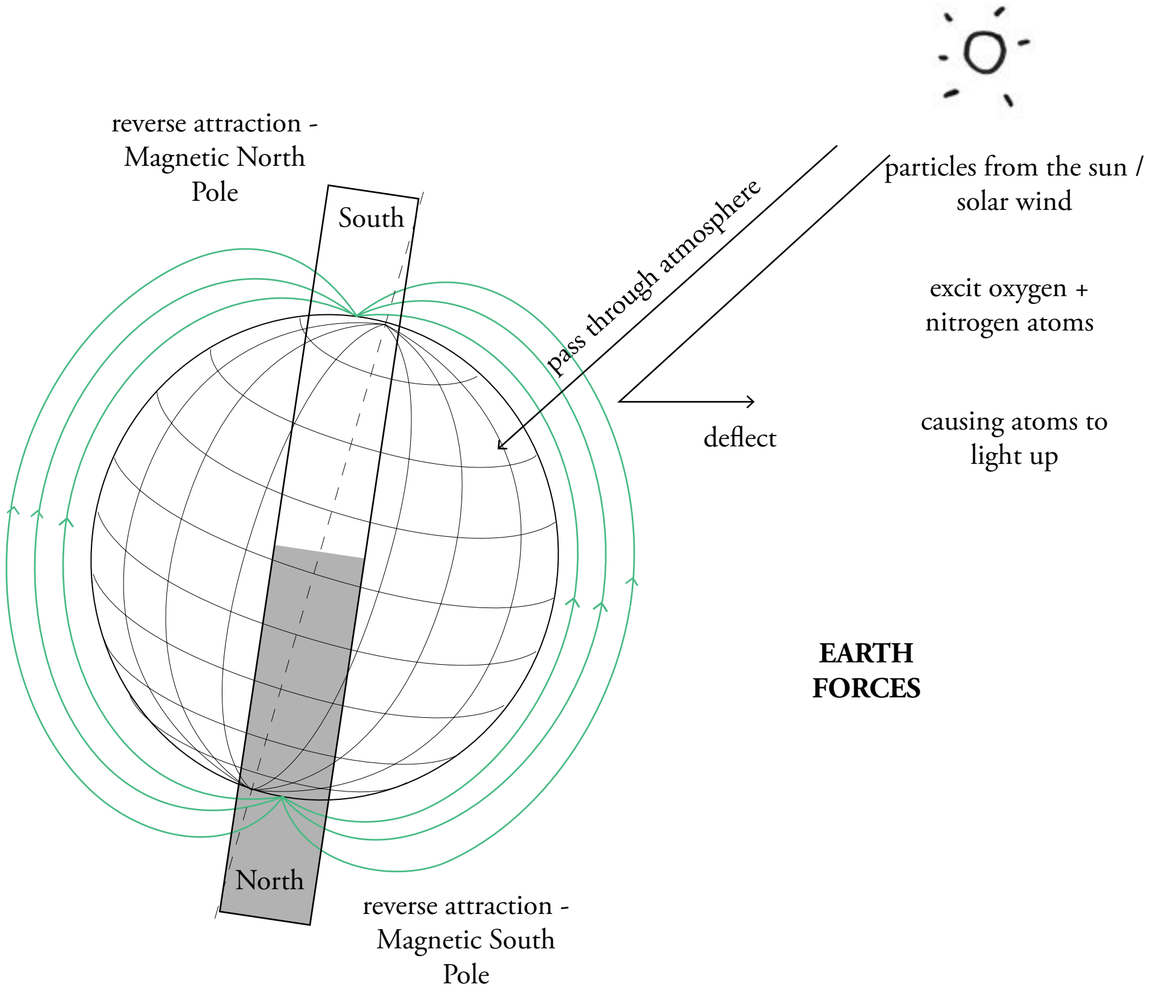

Increased vegetation growth
snow melt
polar region warming
less sea ice
FEEDBACK LOOPS
heated atmosphere
decreased albedo (sun reflection)
decreased albedo (sun reflection)
increased sun

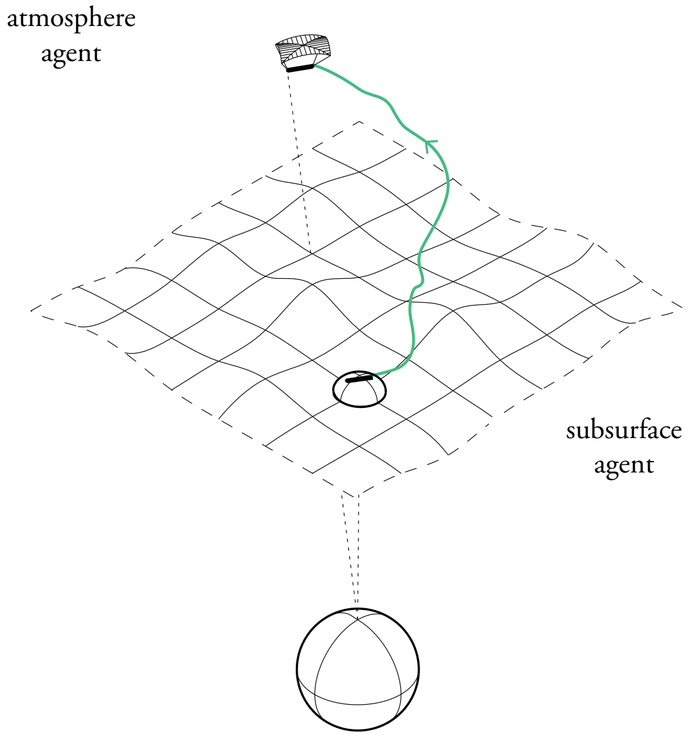




ATMOSPHERIC $C0^2$
ALBEDO EFFECT

HOW


reverse attraction -
Magnetic North
Pole
South
pass through atmosphere
particles from the sun /
solar wind
excit oxygen +
nitrogen atoms
deflect
causing atoms to
light up
EARTH
FORCES
North
reverse attraction -
Magnetic South
Pole



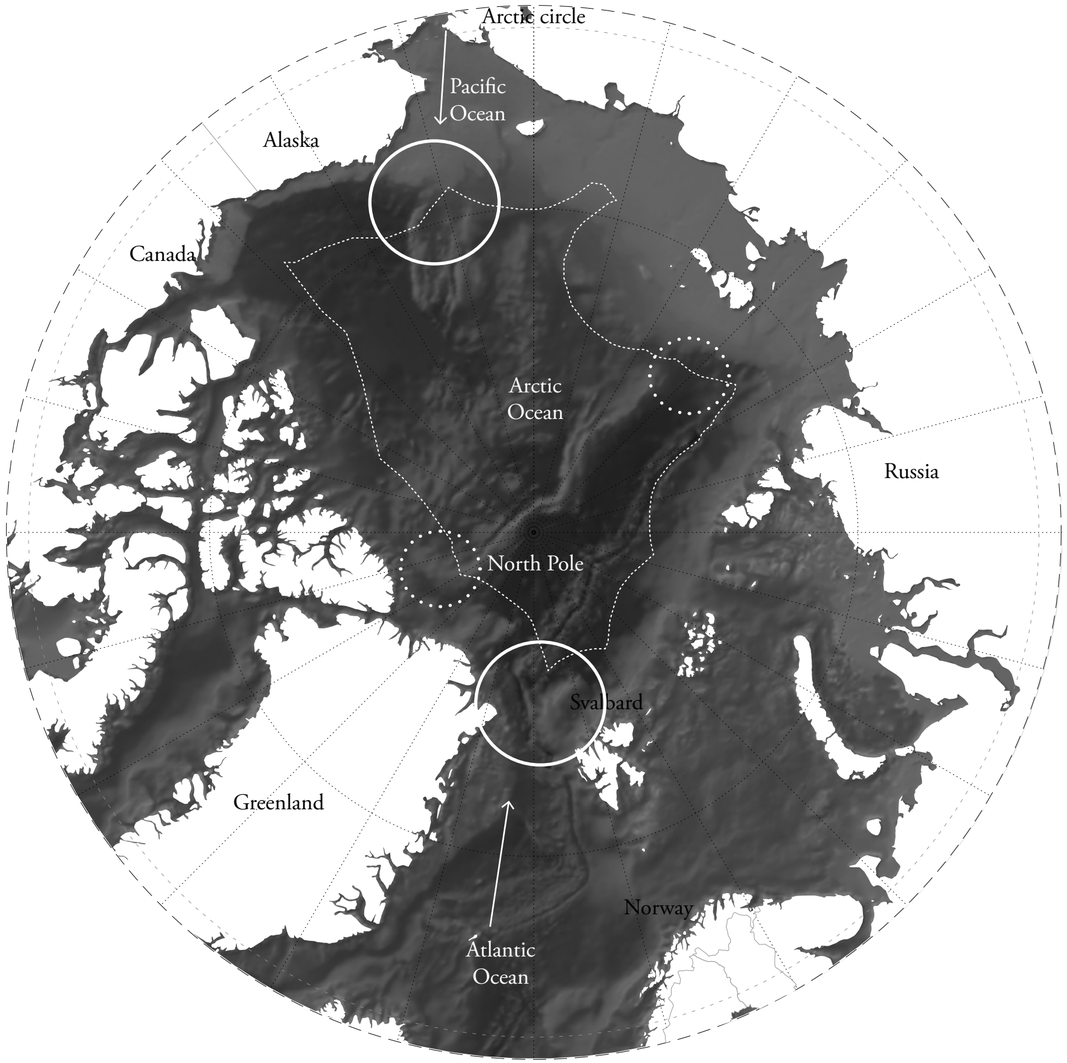
MAGNETIC FIELD
MIGRATORY PATHS

AGENTS

SITE

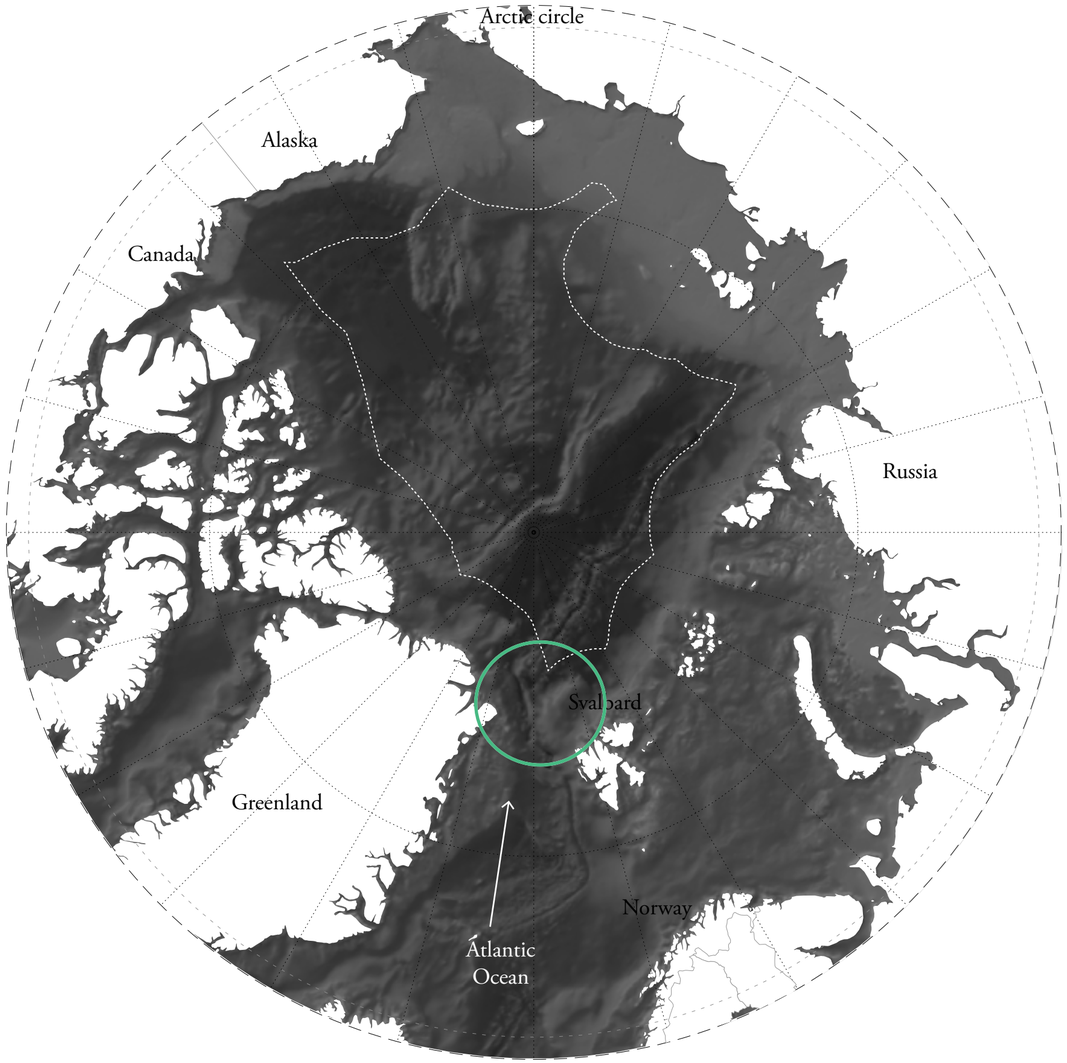
POTENTIAL SITES

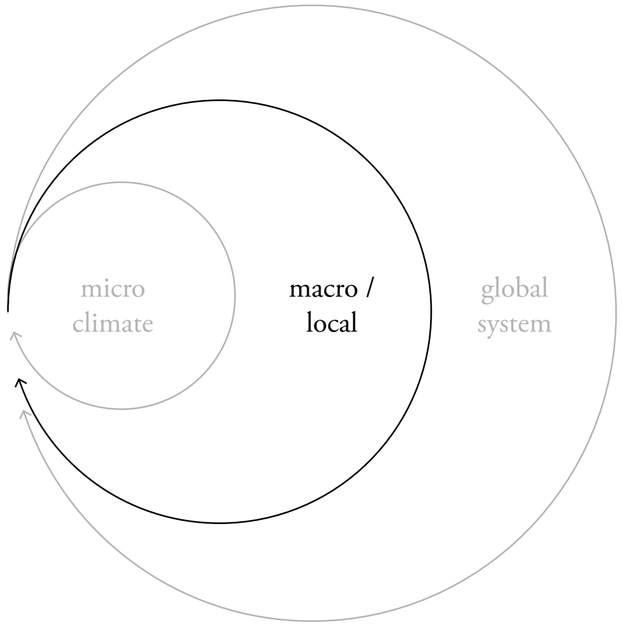
OVERLAY OF CONFLICT MAPPING CONDITIONS



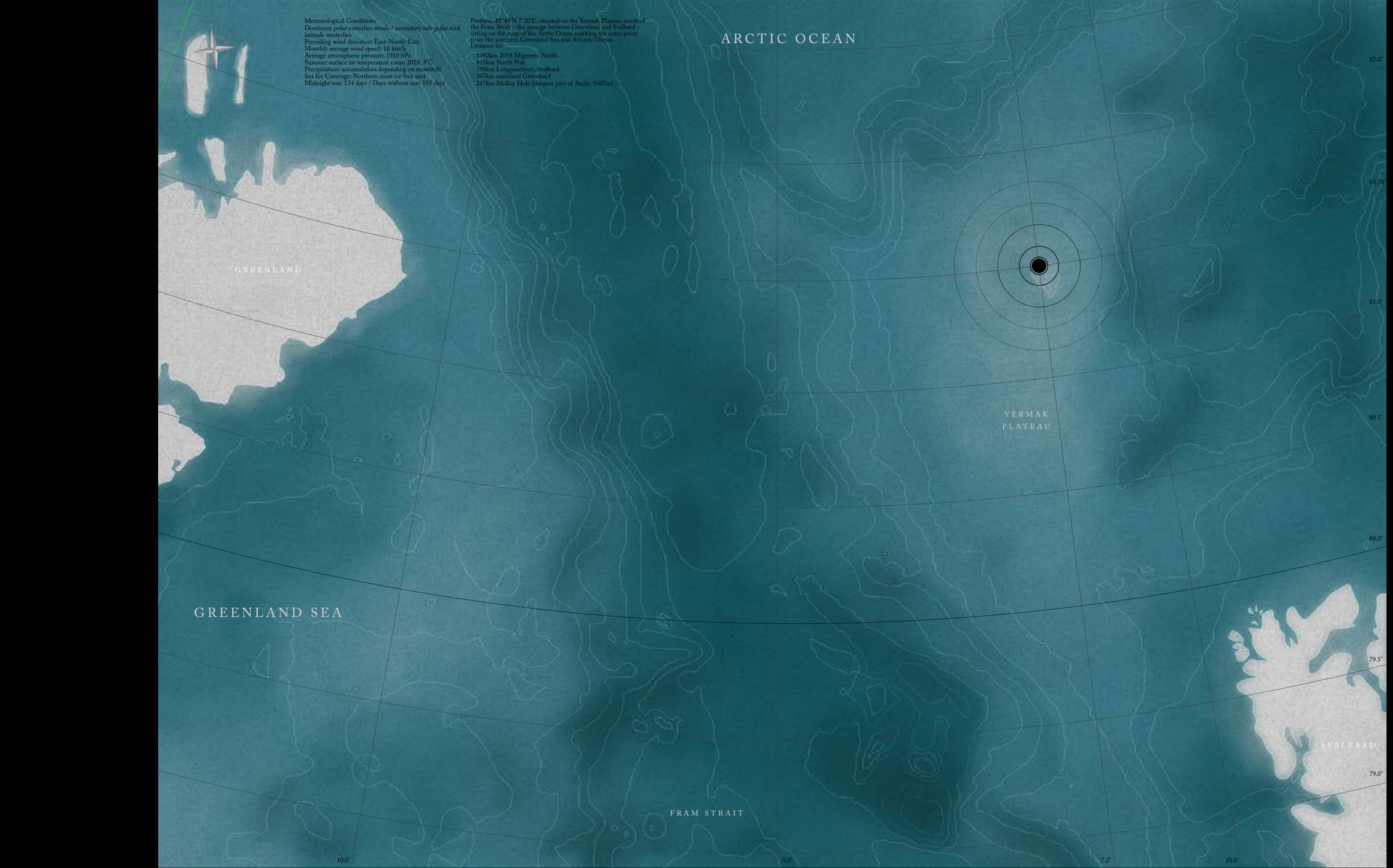
GATEWAY TO THE ARCTIC
FLOWS
MOVEMENT

RESEARCH/SITE VISIT





the arctic and its shifting, dynamic,
environment


Meteorological Conditions
Dominant polar easterlies winds / secondary sub-polar mid latitude westerlies
Prevailing wind direction: East-North-East
Monthly average wind speed: 18 km/h
Average atmospheric pressure: 1010 hPa
Summer surface air temperature mean 2018: 3°C
Precipitation: accumulation depending on snowdrift
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Midnight sun: 134 days / Days without sun: 155 days
Position: 81°49'N 7°20'E, situated on the Yermak Plateau, north of the Fram Strait - the passage between Greenland and Svalbard - sitting on the cusp of the Arctic Ocean marking the entry point from the southern Greenland Sea and Atlantic Ocean.
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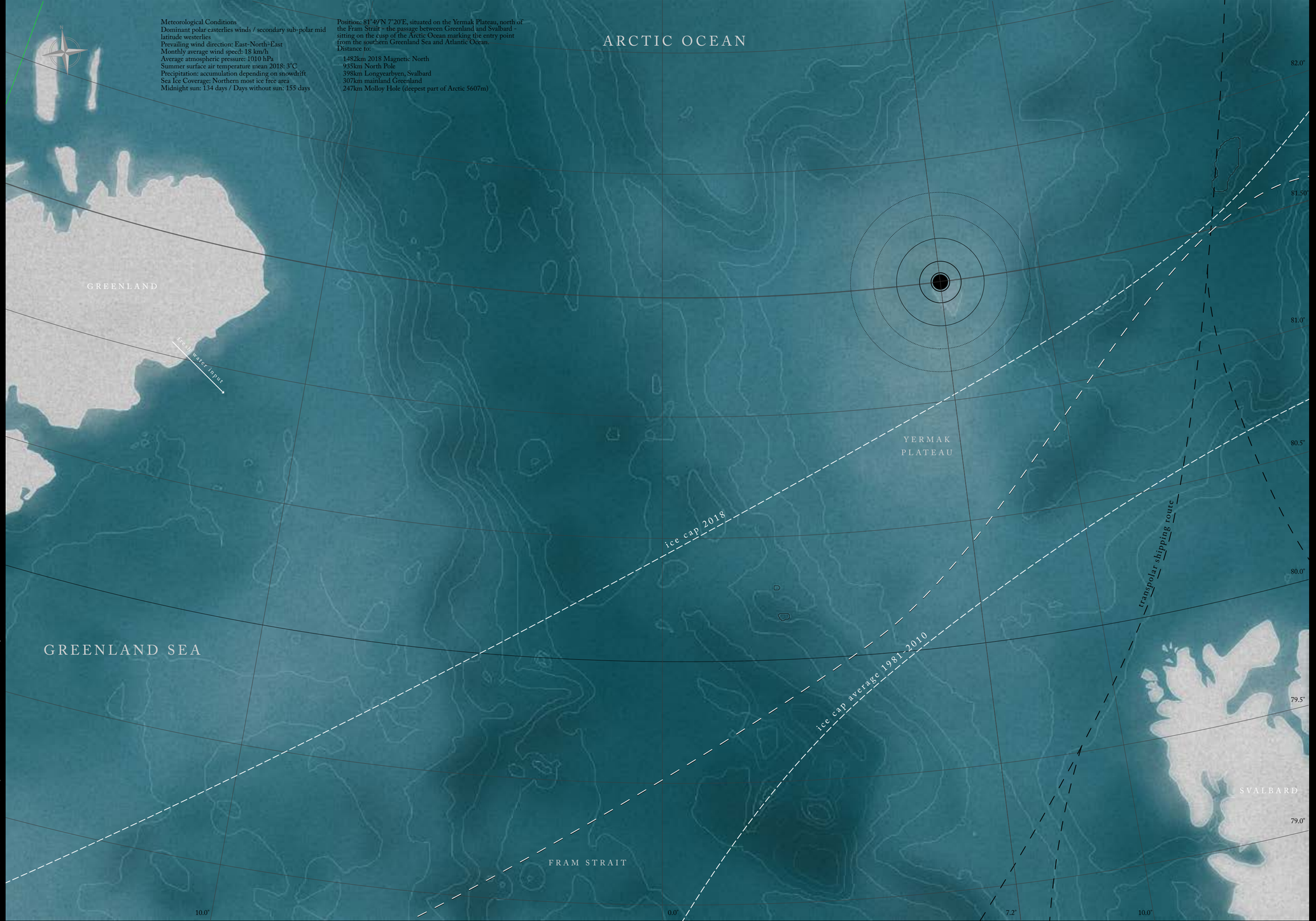
1482km 2018 Magnetic North
935km North Pole
398km Longyearbyen, Svalbard
307km mainland Greenland
247km Molloy Hole (deepest part of Arctic 5607m)
ARCTIC OCEAN
GREENLAND
YERMAK PLATEAU
GREENLAND SEA
SVALBARD
FRAM STRAIT
82.0°
81.50°
81.0°
80.5°
80.0°
79.5°
79.0°
10.0°
0.0°
7.2°
10.0°

TRANSPOLAR ROUTE

ICE CAP 1981-2010

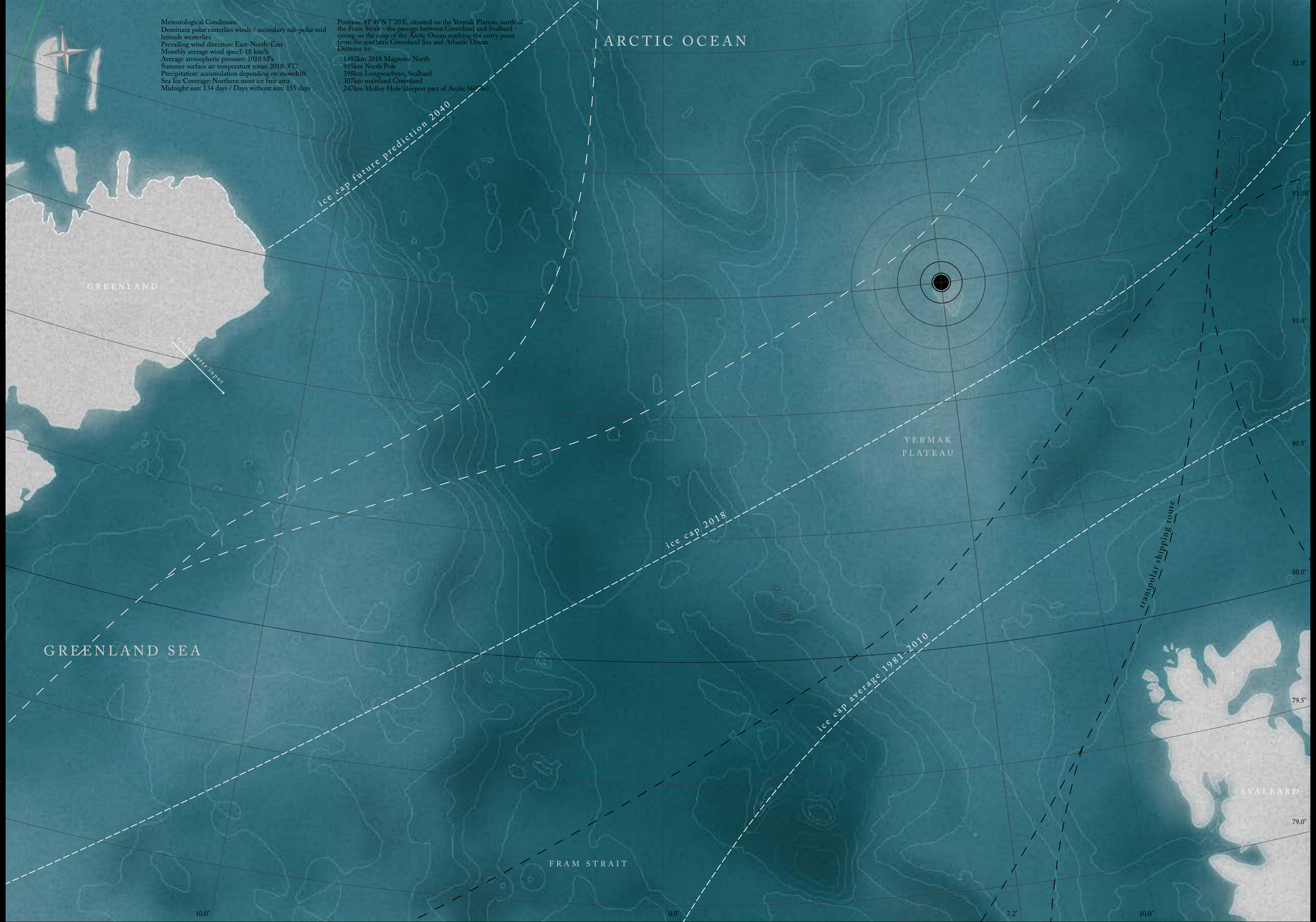


NORTHERN SEA ROUTE

ICE CAP 2018

TRANSPOLAR ROUTE

ICE CAP 1981-2010



FUTURE ROUTE

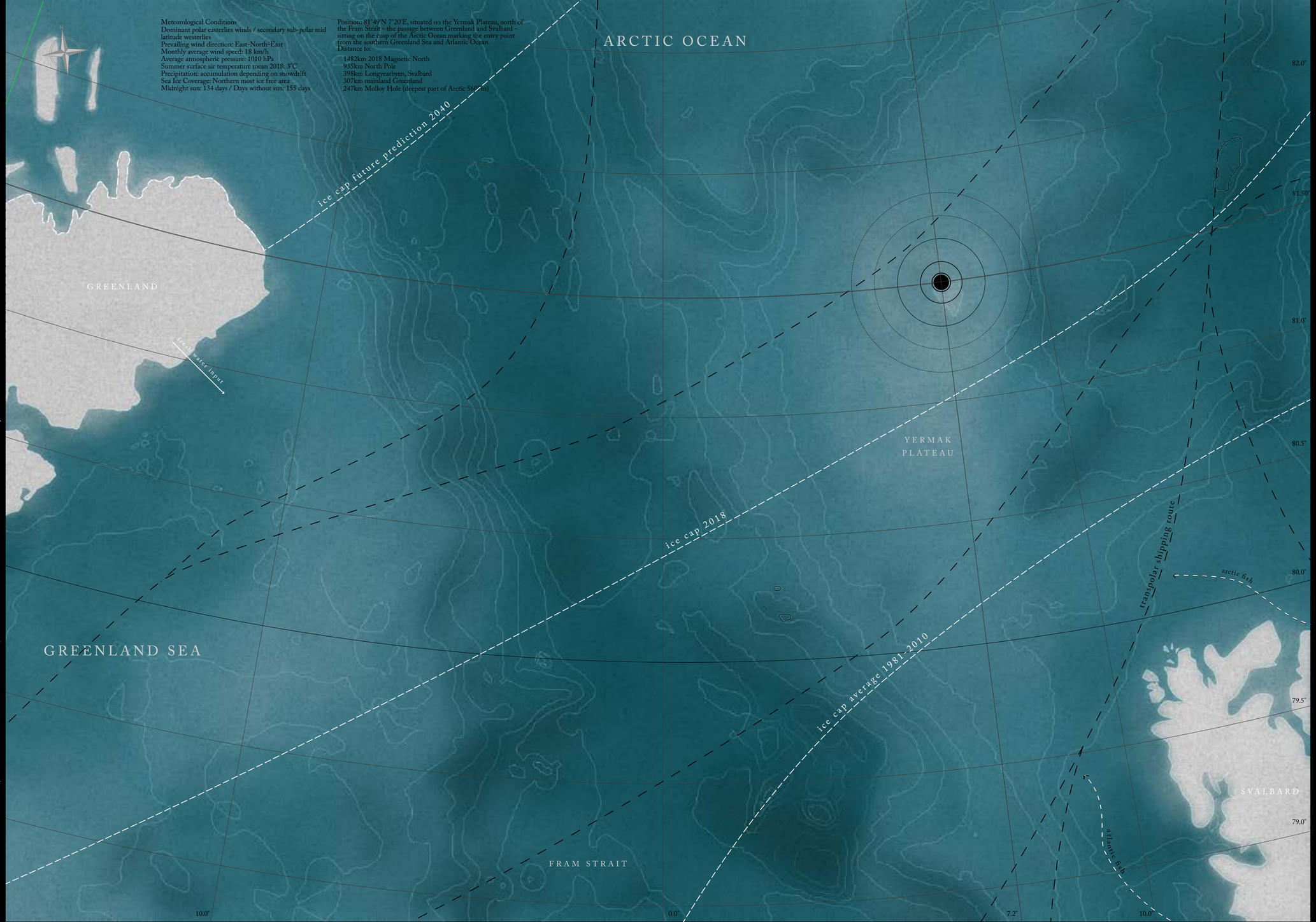
ICE CAP 2040

NORTHERN SEA ROUTE

ICE CAP 2018

TRANSPOLAR PASSAGE

ICE CAP 1981-2010



MIGRATORY FISH PATH

FUTURE ROUTE

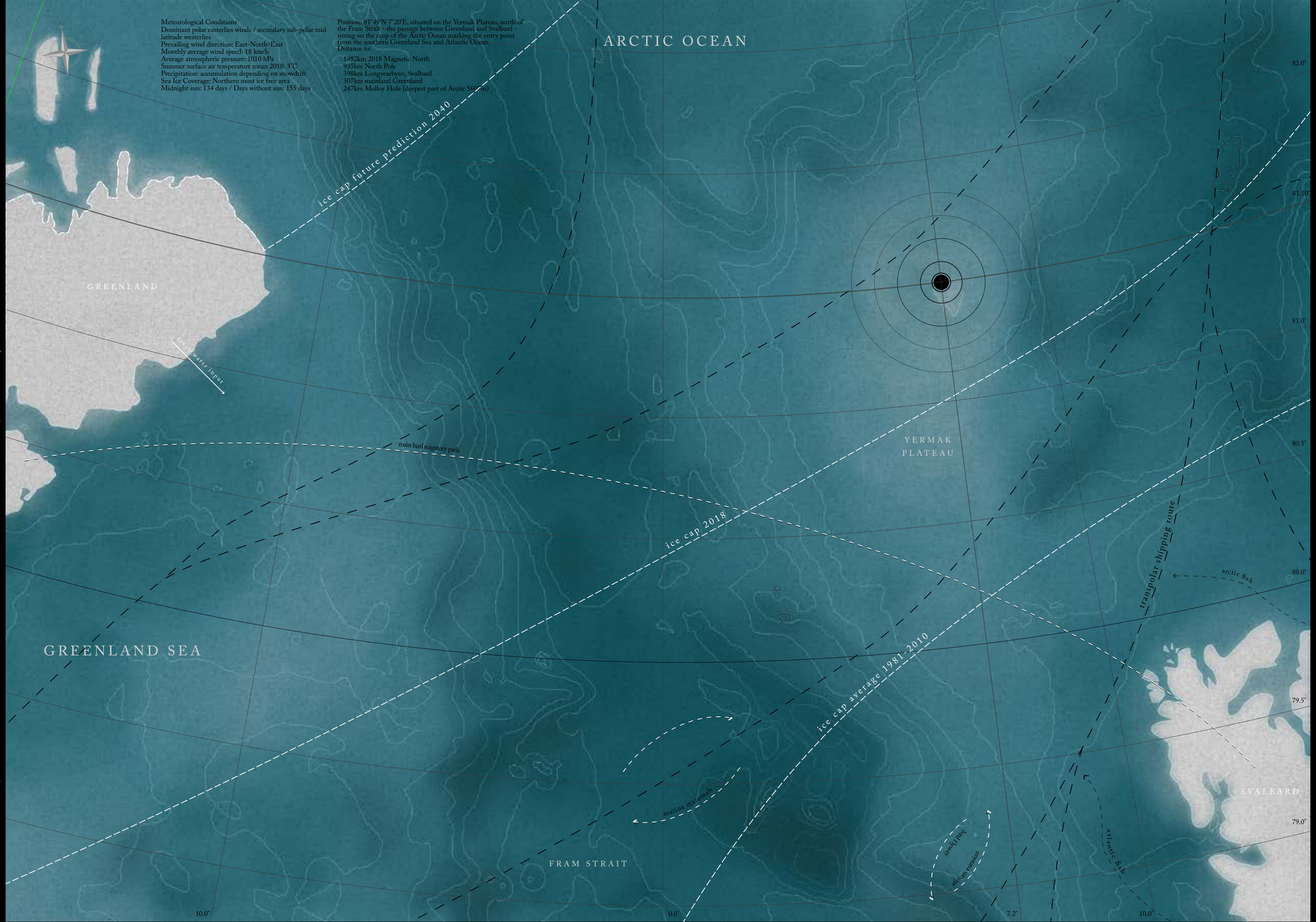
ICE CAP 2040

NORTHERN SEA ROUTE

ICE CAP 2018

TRANSPOLAR PASSAGE

ICE CAP 1981-2010



MIGRATORY BIRD PATH

MIGRATORY FISH PATH

FUTURE ROUTE

ICE CAP 2040

NORTHERN SEA ROUTE

ICE CAP 2018

TRANSPOLAR PASSAGE

ICE CAP 1981-2010

WATER CURRENTS

MIGRATORY BIRD PATH

MIGRATORY FISH PATH

FUTURE ROUTE

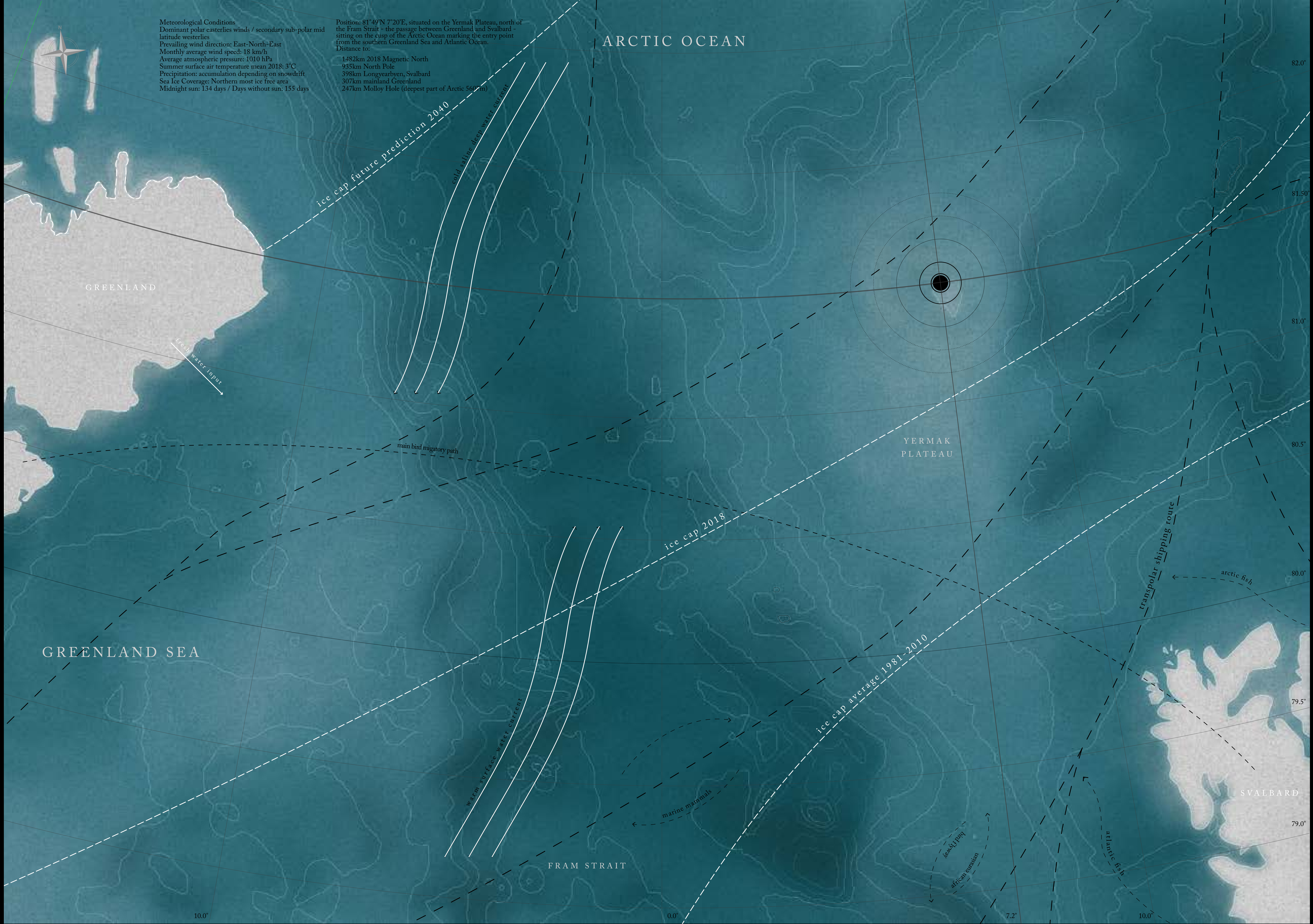
ICE CAP 2040

NORTHERN SEA ROUTE

ICE CAP 2018

TRANSPOLAR PASSAGE

ICE CAP 1981-2010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GREENLAND
ice cap future prediction 2040
fresh water input
main bird migatory path
YERMAK PLATEAU
ice cap 2018
transpolar shipping route
arctic fish
GREENLAND SEA
ice cap average 1981-2010
warm surface water current
marine mammals
FRAM STRAIT
SVALBARD
atlantic fish
82.0°
81.50°
81.0°
80.5°
80.0°
79.5°
79.0°
10.0°
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7.2°

PREVAILING WINDS

WATER CURRENTS

MIGRATORY BIRD PATH

MIGRATORY FISH PATH

FUTURE ROUTE

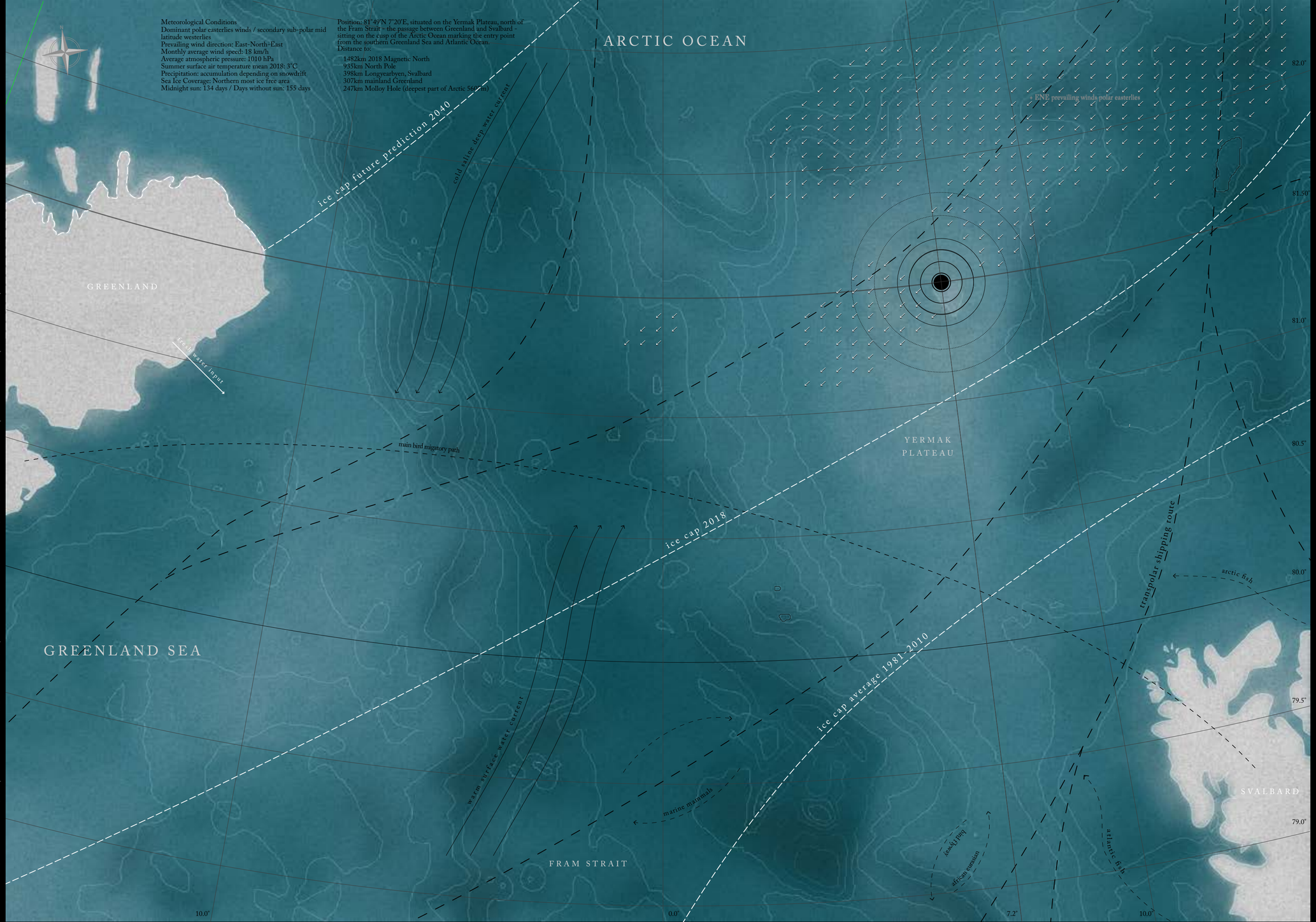
ICE CAP 2040

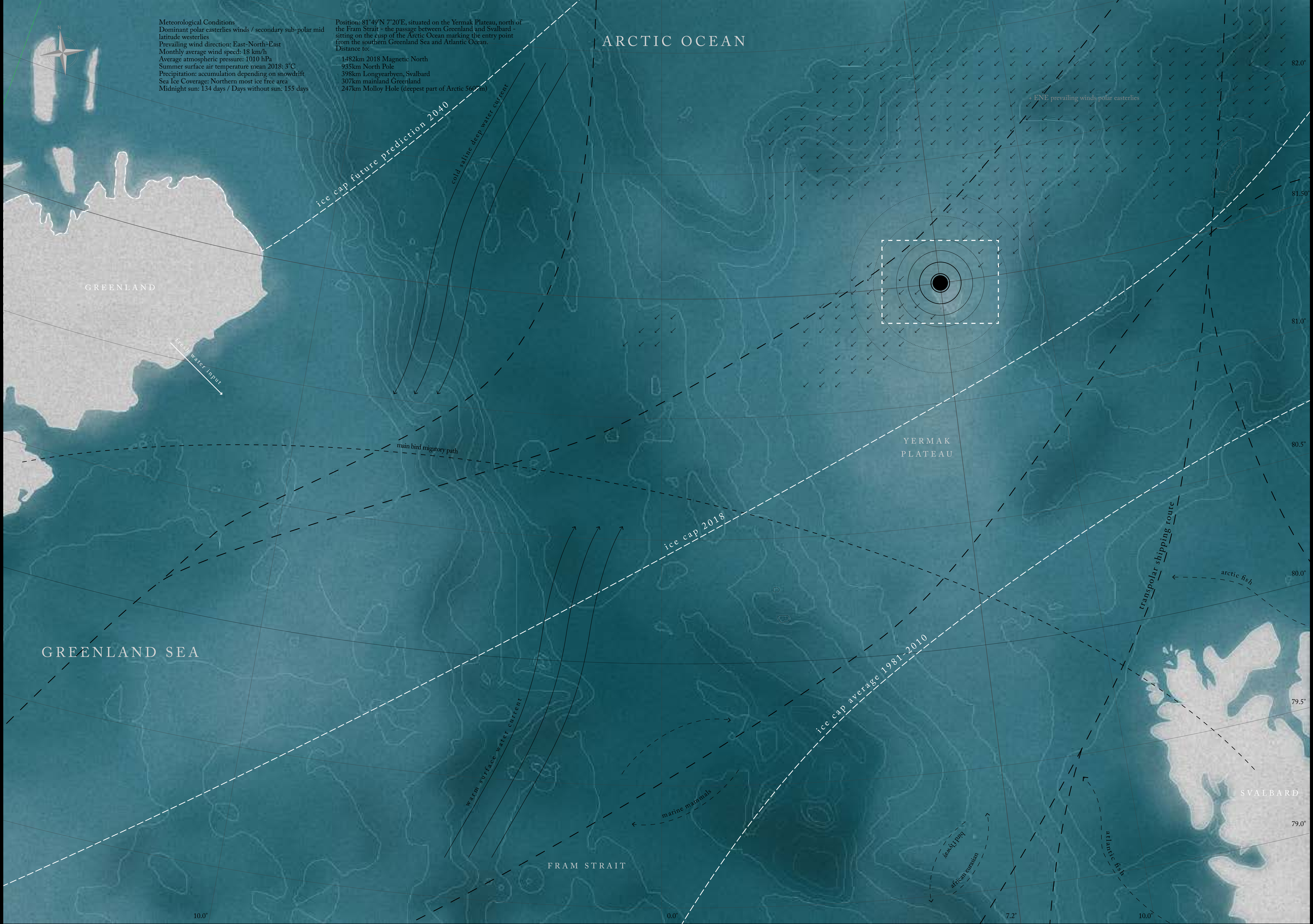
NORTHERN SEA ROUTE

ICE CAP 2018

TRANSPOLAR PASSAGE

ICE CAP 1981-2010





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ENE prevailing winds polar easterlies
ice cap future prediction 2040
cold saline deep water current
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fresh water input
main bird migratory path
YERMAK
PLATEAU
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SVALBARD
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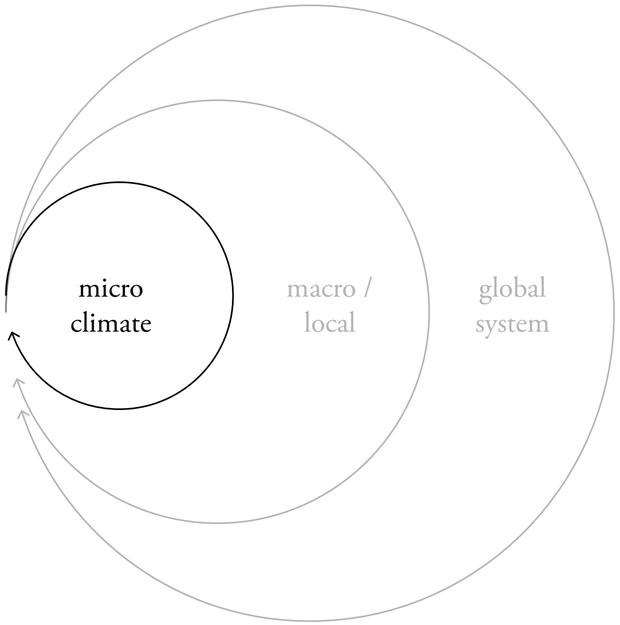
7.2°
10.0°



materialisation of ecological processes

ALTERNATIVE FORMS OF CONSTRUCTING ENVIRONMENTS
AN ARCHITECTURAL MANIFESTATION

FOUR FORCES

ECOLOGY

PROTEIN

ENERGY

HUMAN

ALTERNATIVE FORMS OF CONSTRUCTING ENVIRONMENTS
AN ARCHITECTURAL MANIFESTATION

ECOLOGY

↓

BIRD SANCTUARY

PROTEIN

↓

MARINE PERMACULTURE

ENERGY

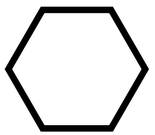
↓

ENERGY HARVEST

HUMAN

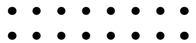
↓

RESEARCH CENTRE



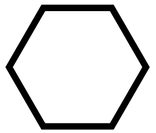
RELATIONS

ENERGY //
ENERGY HARVEST



ECOLOGY //
BIRD SANCTUARY

RELATIONS

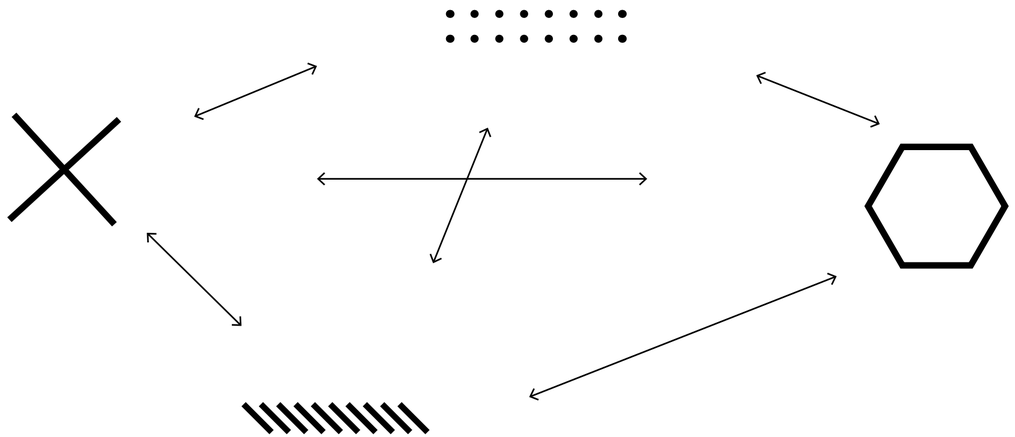


HUMAN //
RESEARCH CENTRE

PROTEIN //
MARINE PERMACULTURE

ENERGY //
VIBRATION HARVEST

ECOLOGY //
BIRD SANCTUARY



HUMAN //
RESEARCH CENTRE

PROTEIN //
MARINE PERMACULTURE

ECOLOGY

BIRD SANCTUARY

PROTEIN

MARINE PERMACULTURE

ENERGY

ENERGY HARVEST

HUMAN

RESEARCH CENTRE

1A. BIRD SANCTUARY

1B. WATER FLOW

1A. BIRD SANCTUARY

ECOLOGY

BIRD SANCTUARY

PROTEIN

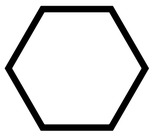
MARINE PERMACULTURE

ENERGY

ENERGY HARVEST

HUMAN

RESEARCH CENTRE



2B. OBSERVATION TOWER

2A. RESEARCH CENTRE

1B. WATER FLOW

1A. BIRD SANCTUARY

ECOLOGY

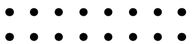
BIRD SANCTUARY

PROTEIN

MARINE PERMACULTURE

ENERGY

ENERGY HARVEST



HUMAN

RESEARCH CENTRE

3A. WAVE ENERGY HARVEST

2B. OBSERVATION TOWER

2. RESEARCH CENTRE

1B. WATER FLOW

1A. BIRD SANCTUARY

3B. WIND ENERGY HARVEST

3A. WAVE ENERGY HARVEST

2B. OBSERVATION TOWER

2. RESEARCH CENTRE

1B. WATER FLOW

1A. BIRD SANCTUARY

ECOLOGY

BIRD SANCTUARY

PROTEIN

MARINE PERMACULTURE

ENERGY

ENERGY HARVEST

HUMAN

RESEARCH CENTRE

4. MARINE PERMACULTURE

3B. WIND ENERGY HARVEST

3A. WAVE ENERGY HARVEST

2B. OBSERVATION TOWER

2. RESEARCH CENTRE

1B. WATER FLOW

1A. BIRD SANCTUARY

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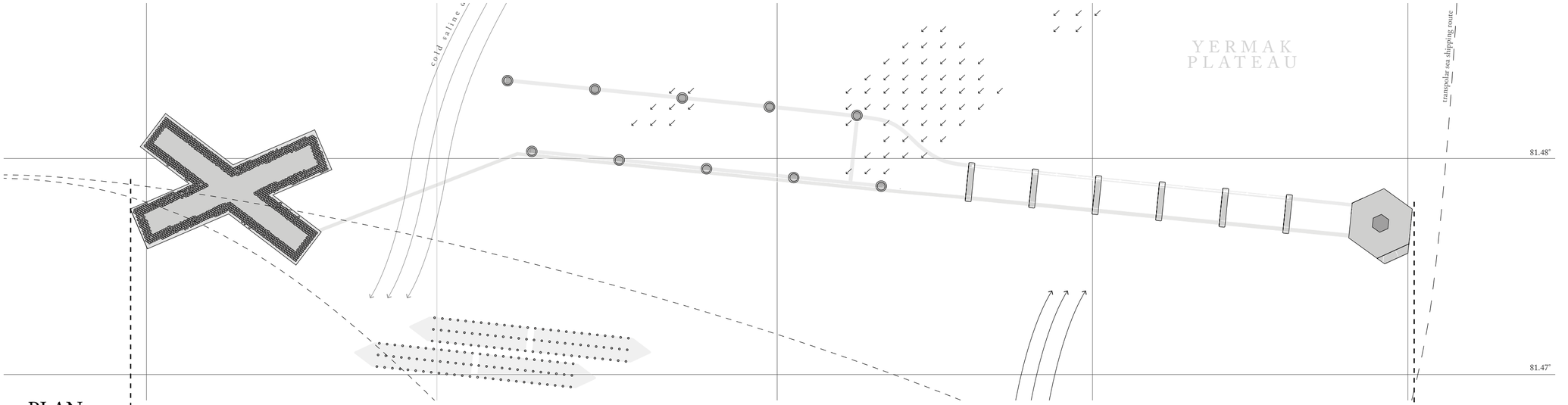
YERMAK PLATEAU
cold saline deep water current
warm surface water current
4
marine mammals
bird flyway
african eurasian
atlantic fish
arctic fish
81.50°
81.49°
81.48°
81.47°
81.46°
7.17°
7.18°
7.19°
7.20°
7.21°

4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

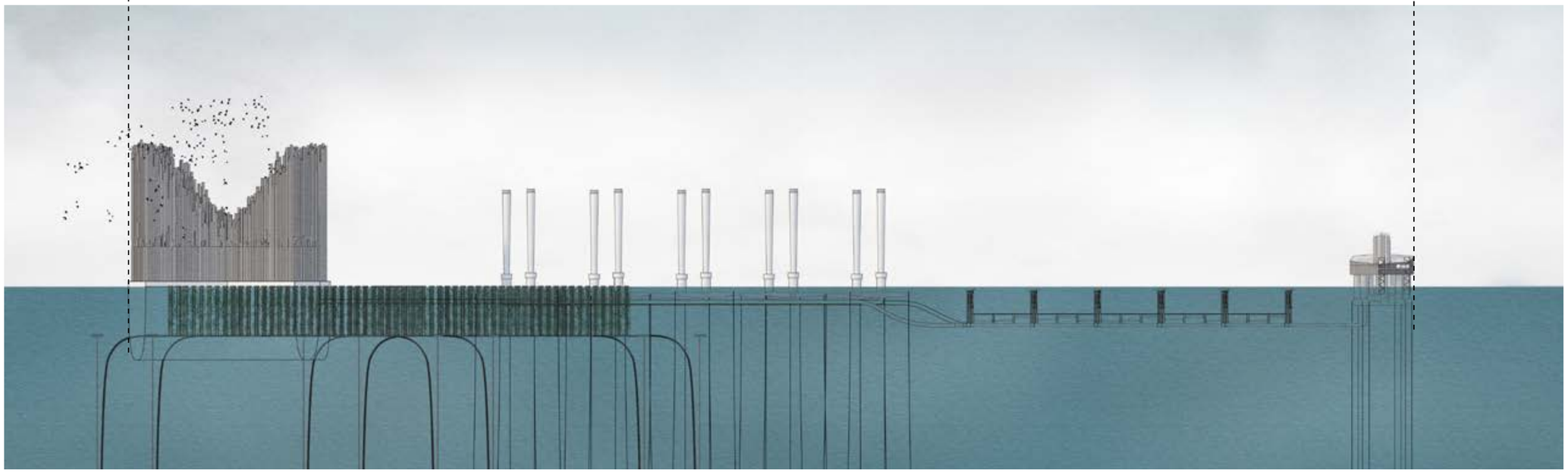


PLAN

ATMOSPHERE

SURFACE

SUBSURFACE



SECTION

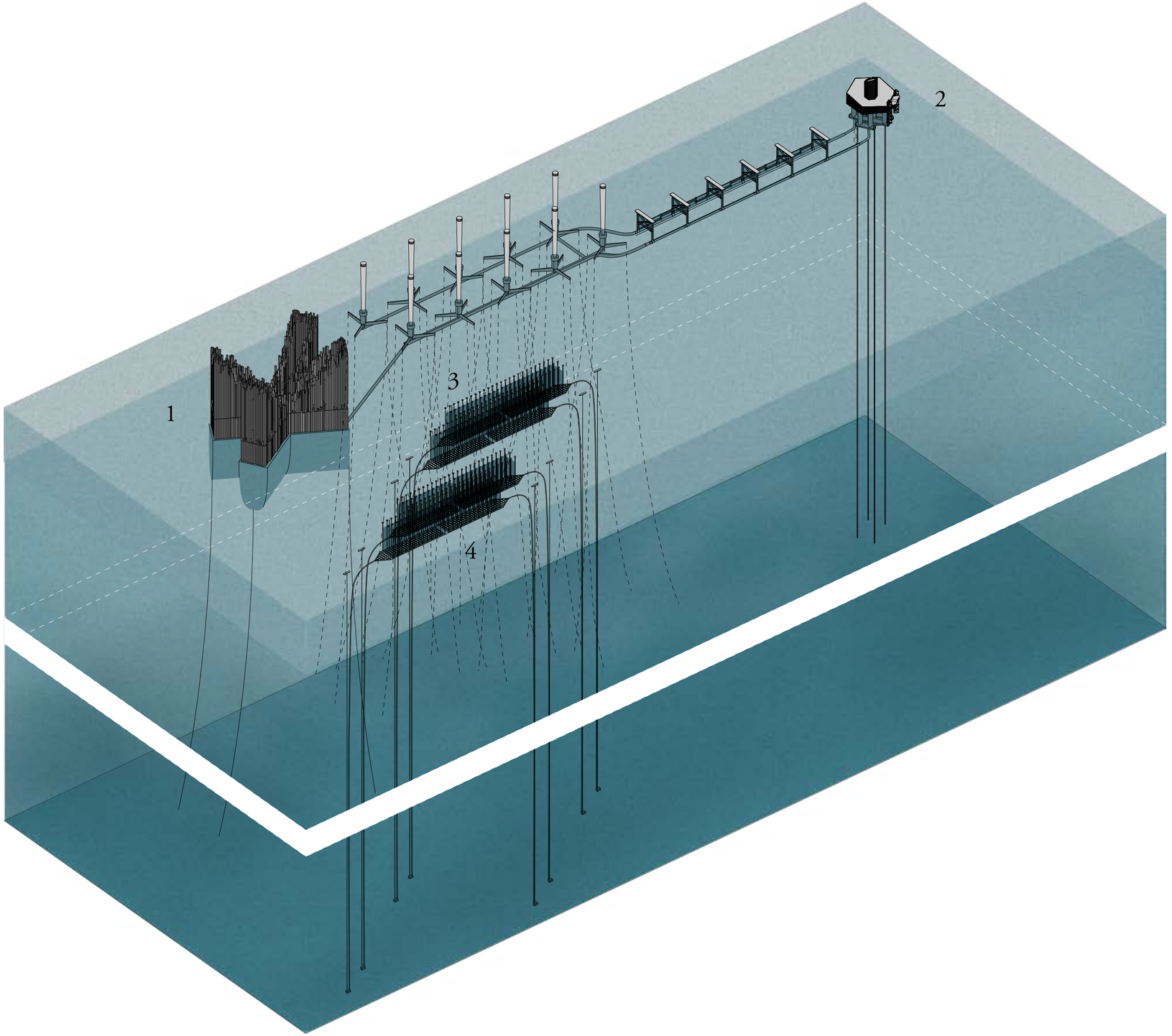
EARTH FORCES AND
TECHNOLOGY

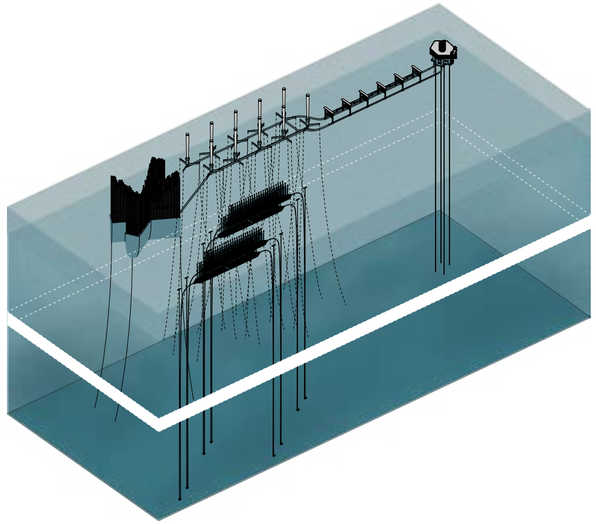
4. MARINE
PERMACULTURE

3. ENERGY
HARVEST

2. RESEARCH
CENTRE

1. BIRD
SANCTUARY



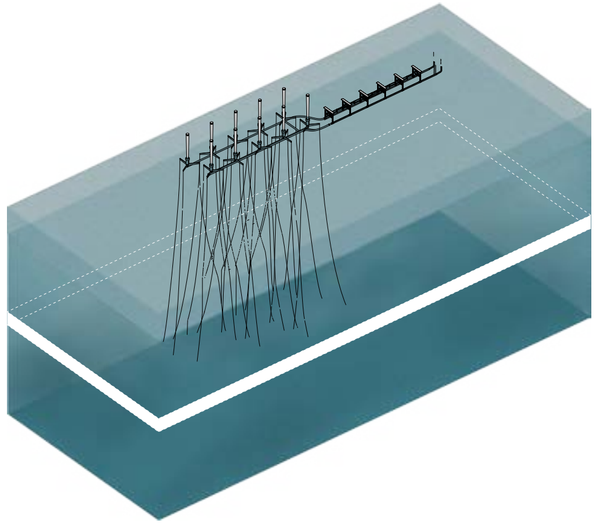


1. PRODUCTIVE

Constructing alternative modes of production, rather than extracting, can we harvest earth forces and work together with them?

2. MONUMENTAL

Can architecture be used as a tool to represent and make visible the powerful yet fragile ecosystems that are crucial for our environment?



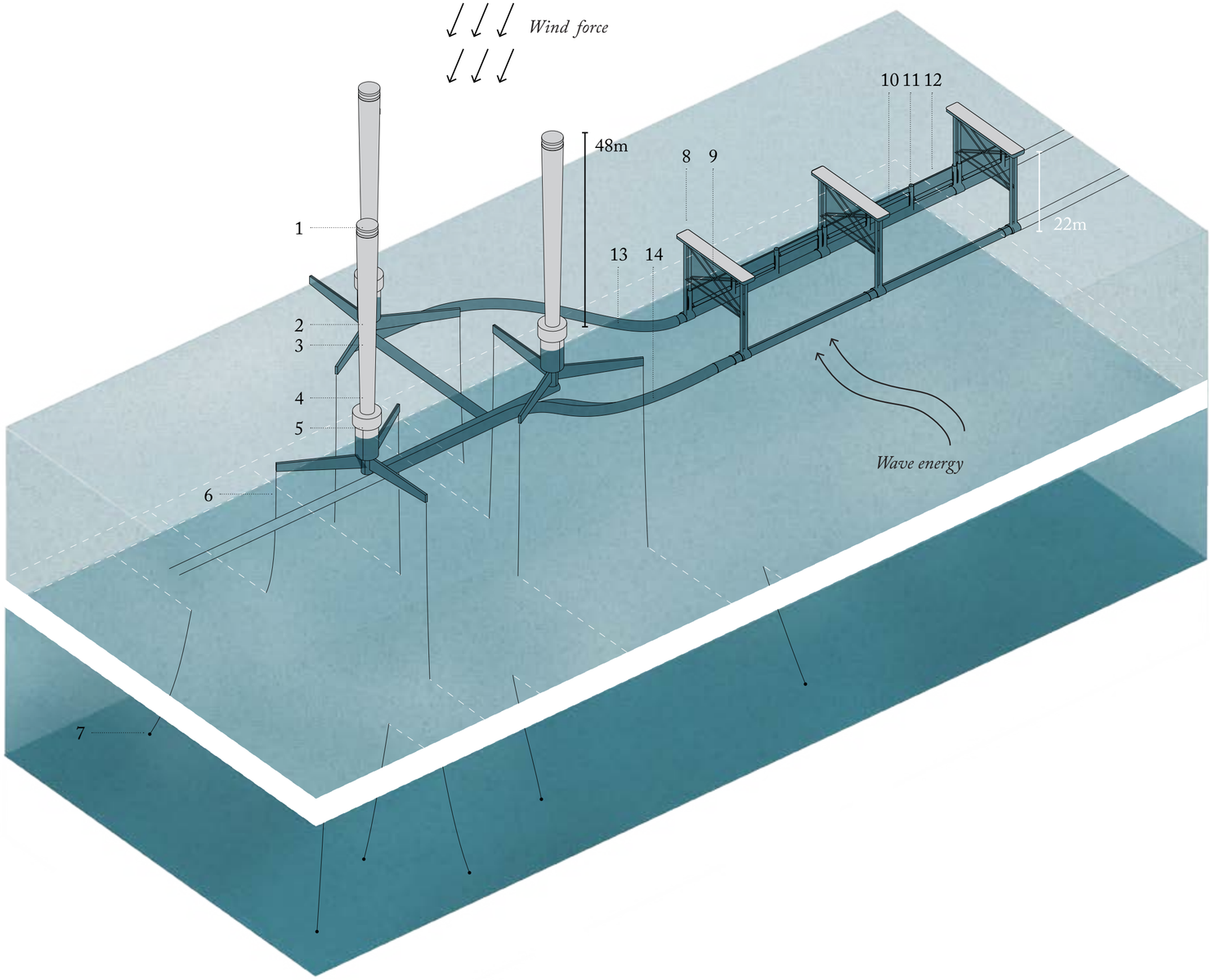
4. MARINE PERMACULTURE

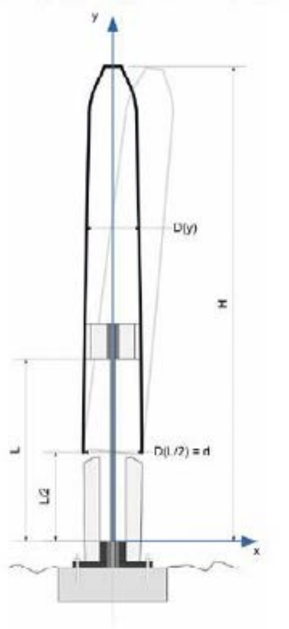
3. ENERGY HARVEST

2. RESEARCH CENTRE

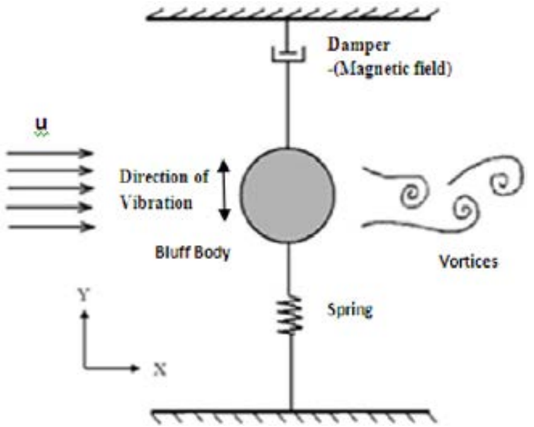
1. BIRD SANCTUARY

1 Top cover with heat ring
2 Rectifier
3 Alternator and tuning system
4 Power output
5 Anchoring platform
6 Tension leg cable
7 Seabed piles
8 Pontoon
9 Structural brace
10 VIV bluff body
11 Springs
12 Generator
13 Electricity pipe
14 Water pipe

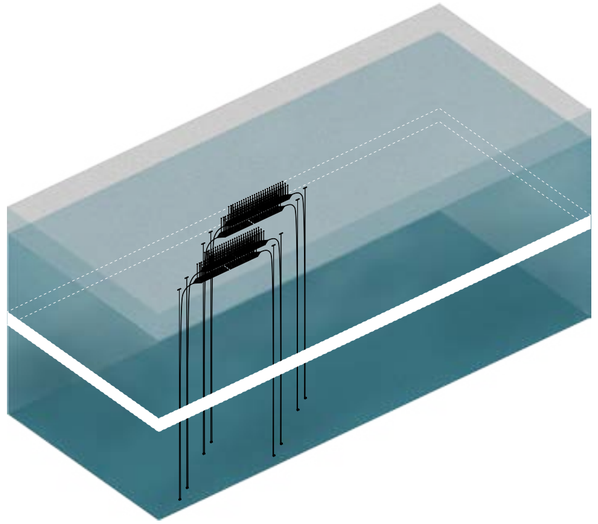




Vortex Induced Vibration (VIV) resonant wind generator
Vortex Bladeless Design



Vortex Induced Vibration (VIV) based hydro-kinetic
energy harvesting system



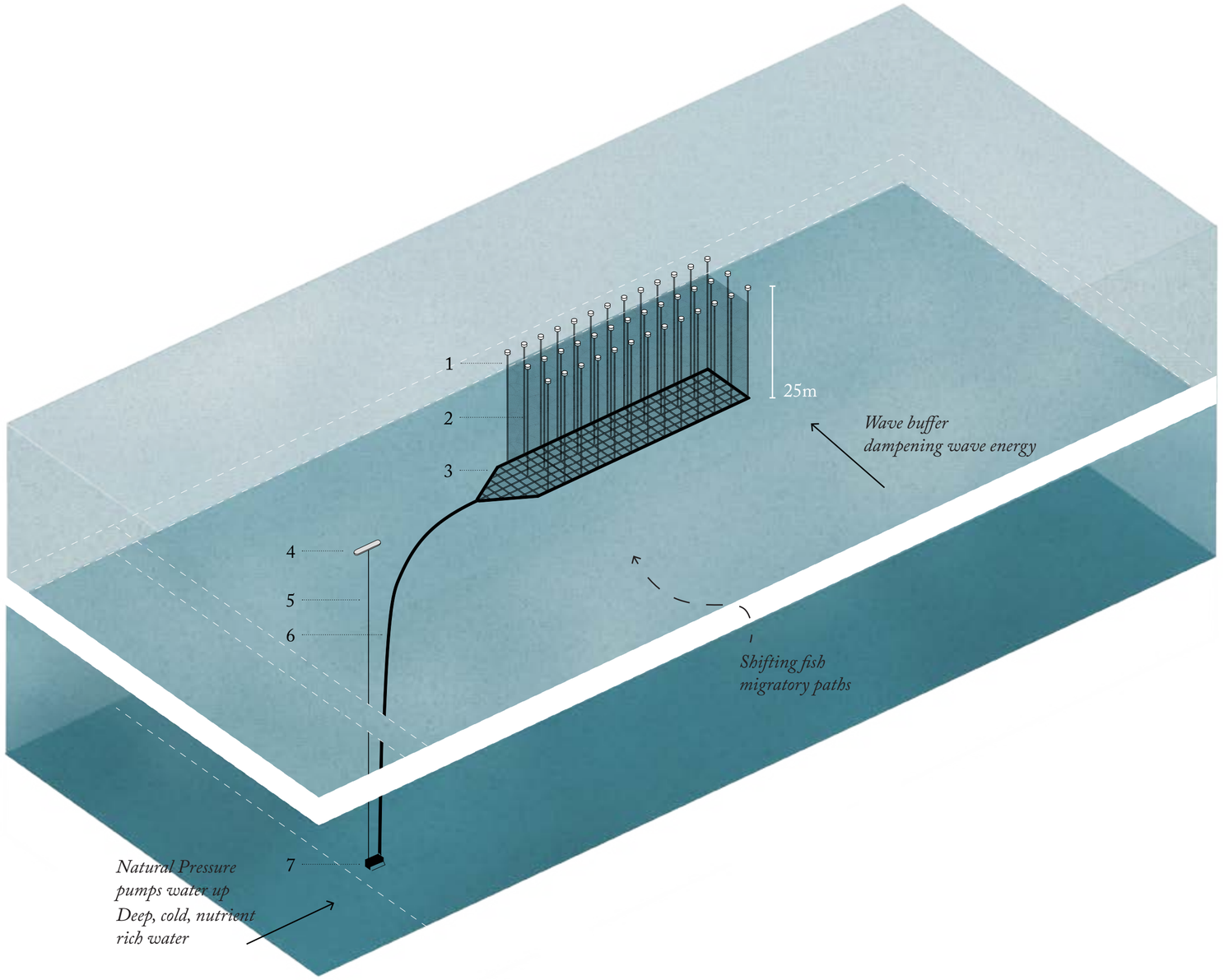
4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

1 Diffuser pipes
2 Kelp forest
3 Heat exchanger
4 Surface bouy
5 Steel cable
6 deep water pipe
7 deep pipe



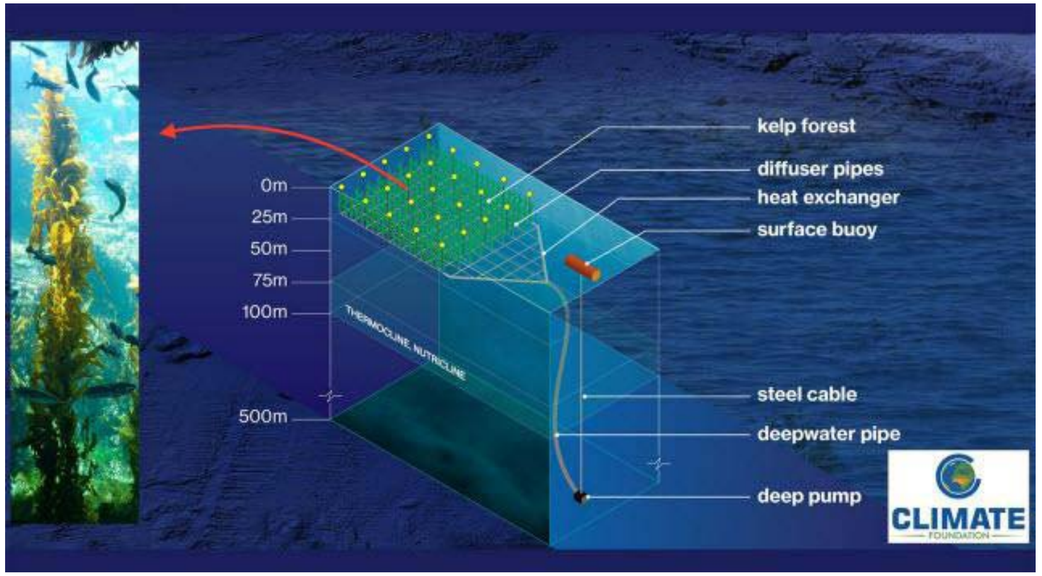
4. MARINE PERMACULTURE

3. ENERGY HARVEST

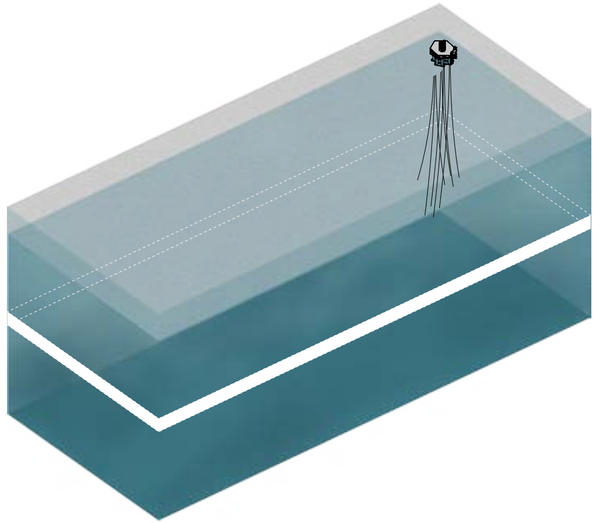
2. RESEARCH CENTRE

1. BIRD SANCTUARY

Kelp forest



Marine permaculture
The climate foundation

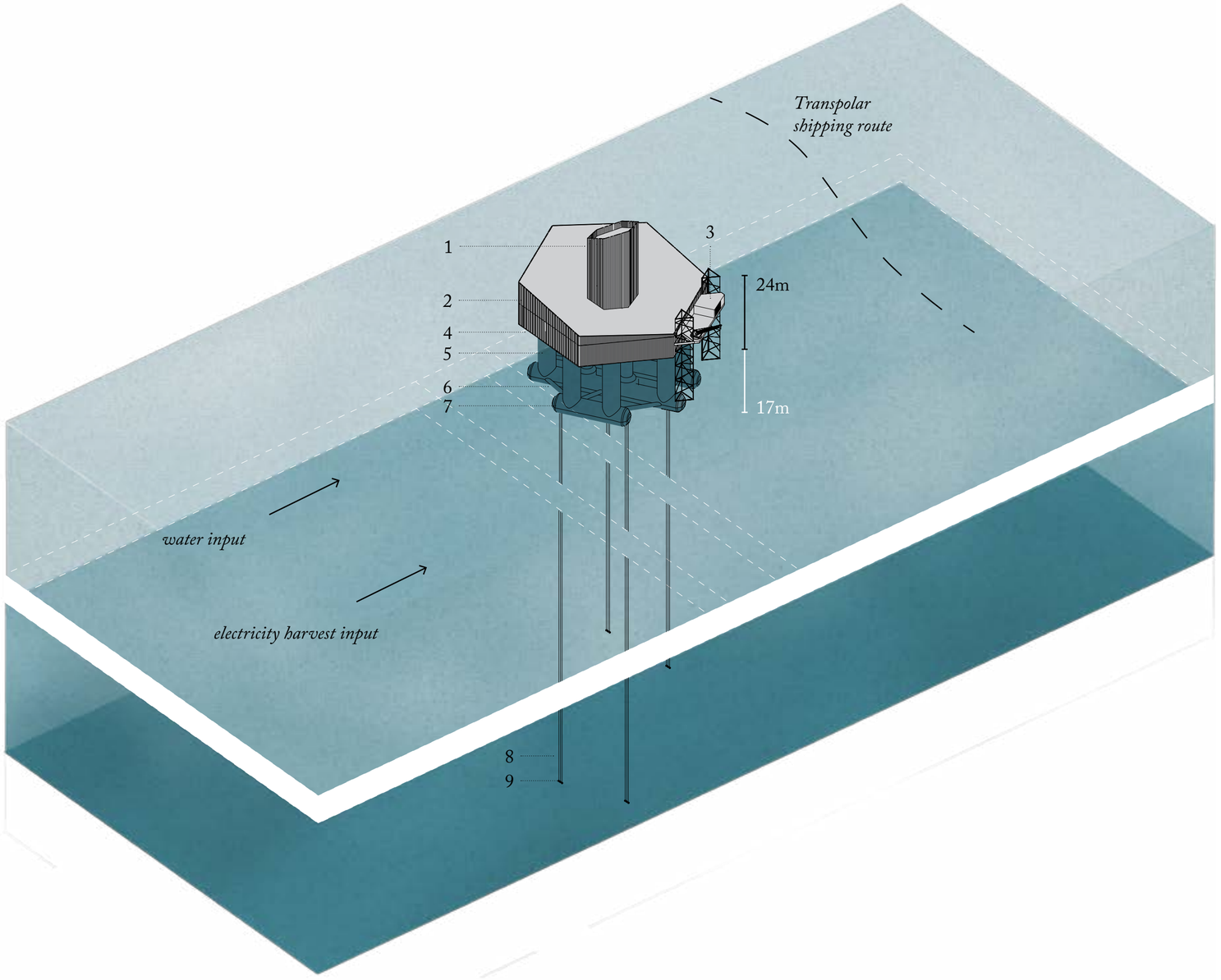


4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY



1 Observation tower
2 Research centre
3 Arrival deck
4 Single strength deck
5 Stability column
6 Transverse strength truss
7 Longitudinal pontoon
8 Tension leg steel tendon
9 Seabed piles

Princess elizabeth Antarctic research station
WBArchitectures

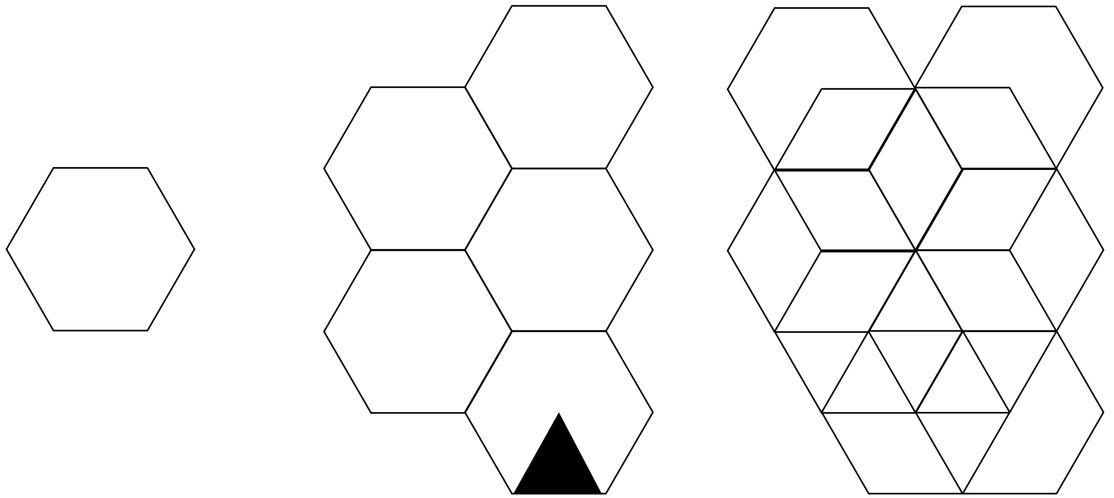
Halley VI - Antarctica research station
Hugh broughton architects

4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

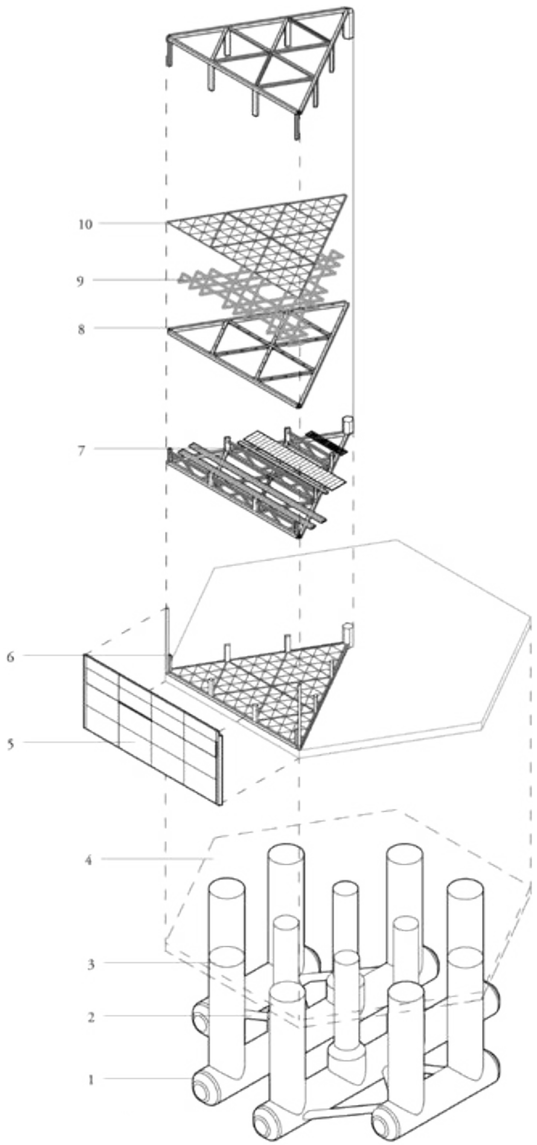


TESSELLATE
=
MODULAR CONSTRUCTION

Axonometric Structure

Research centre
Modular system

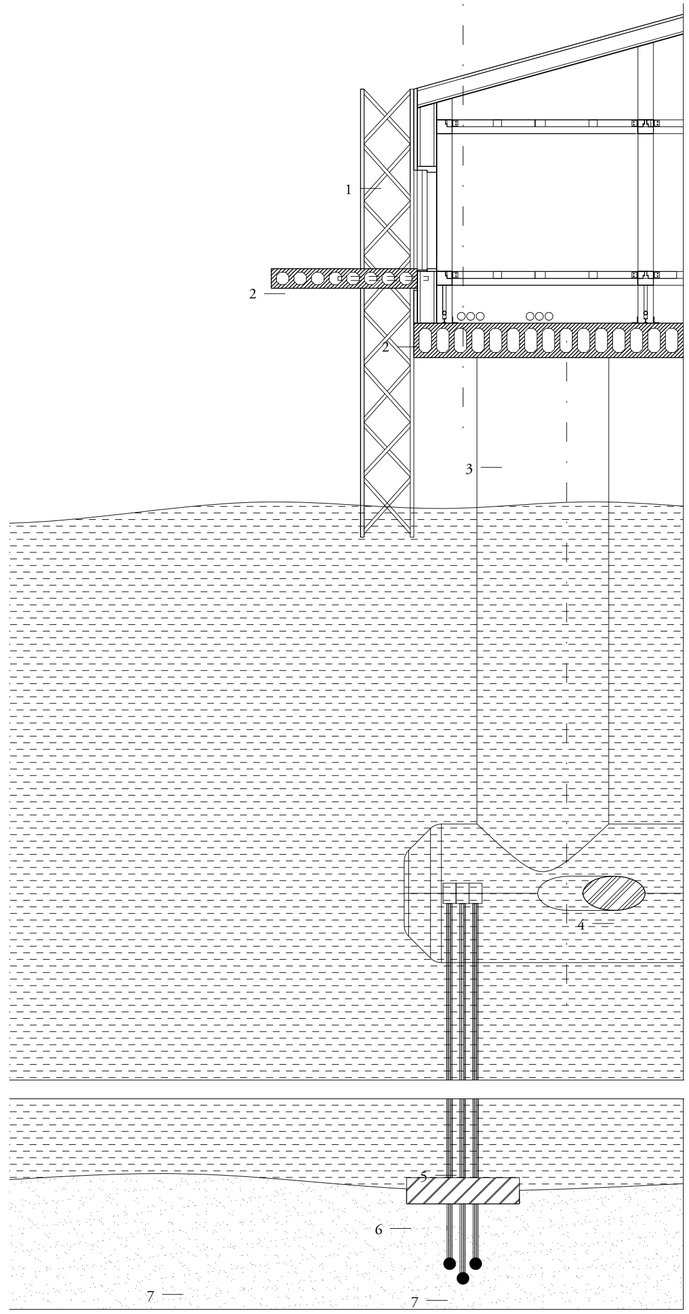
1 Longitudinal pontoon
2 Transverse strength
3a Exterior column
3b Interior Column
4 Single Strength Deck
5 Floor bracing
6 Columns
7 Utilities
8 Diamond Structure
9 Support Beams
10 Flooring Panel

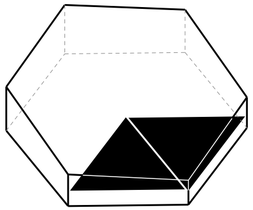


Detail 1:100

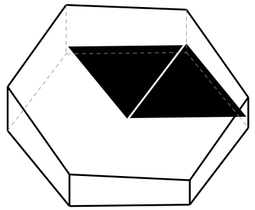
Research centre
Semi submersible structure (TLP)
Early transverse strength truss

1 steel triangular cross braced tubular column
ø 200mm
2 single strength deck; low carbon 50mm steel arctic
D: tensile strength 435-510 ; 90/10 cupronickel,
3 welded
low carbon 50mm steel stability column, 90/10
4 cupronickel, welded
low carbon 40mm steel grade D steel transverse
5 strength truss, 90/10 cupronickel, welded
tension leg platform; tendon 40mm steel porch,
6 20mm prestressed steel tendon tension cable
2000mm x 3500mm x 750mm composite
7 concrete foundation template
seabed piles

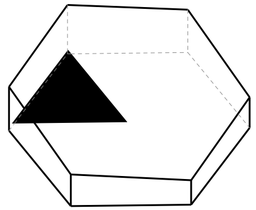




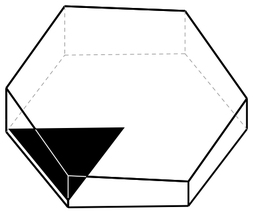
SOCIAL



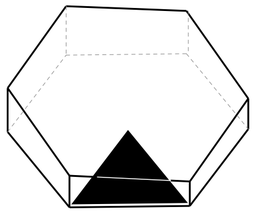
EAT/PROTEIN



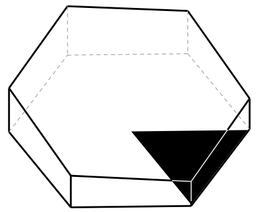
RESEARCH



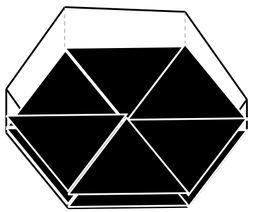
ENERGY/
CONTROL ROOM



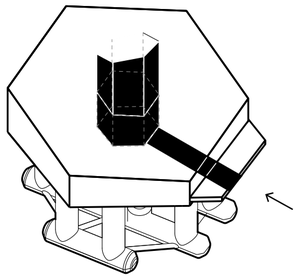
SLEEP



ECOLOGY/
WATER STORAGE



ARCTIC RESEARCH
CENTRE



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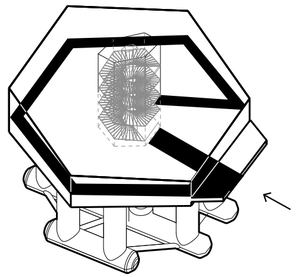


CIRCULATION

4. MARINE
PERMACULTURE

3. ENERGY
HARVEST

2. RESEARCH
CENTRE

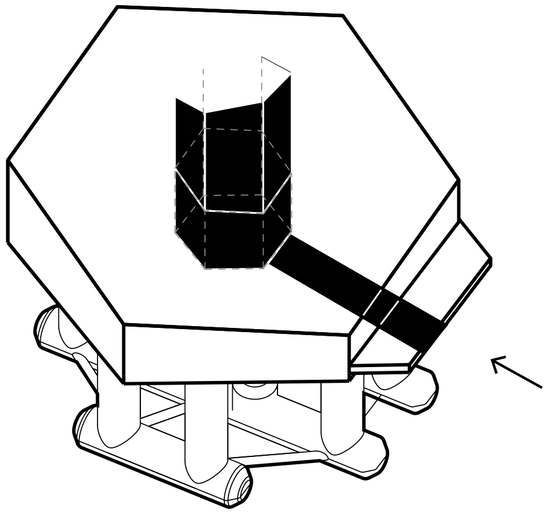
1. BIRD
SANCTUARY

4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY



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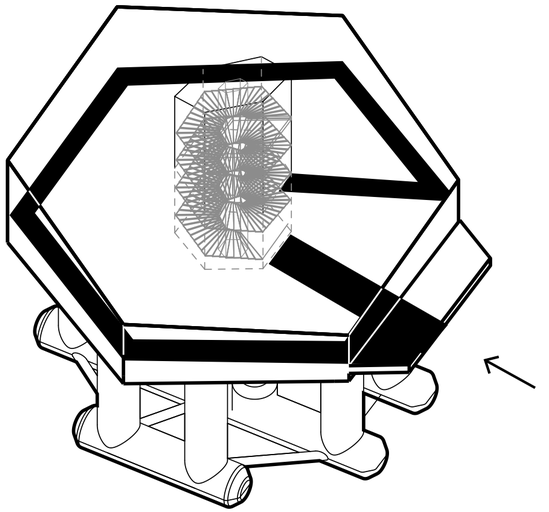
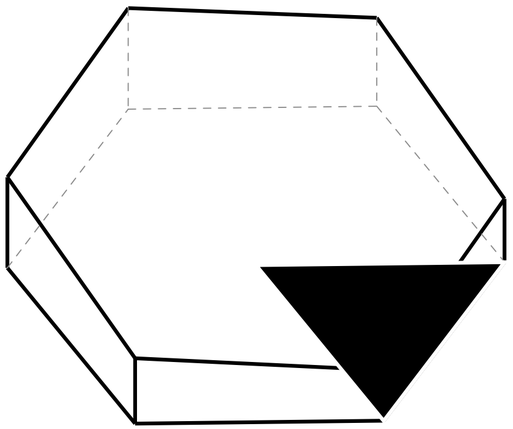


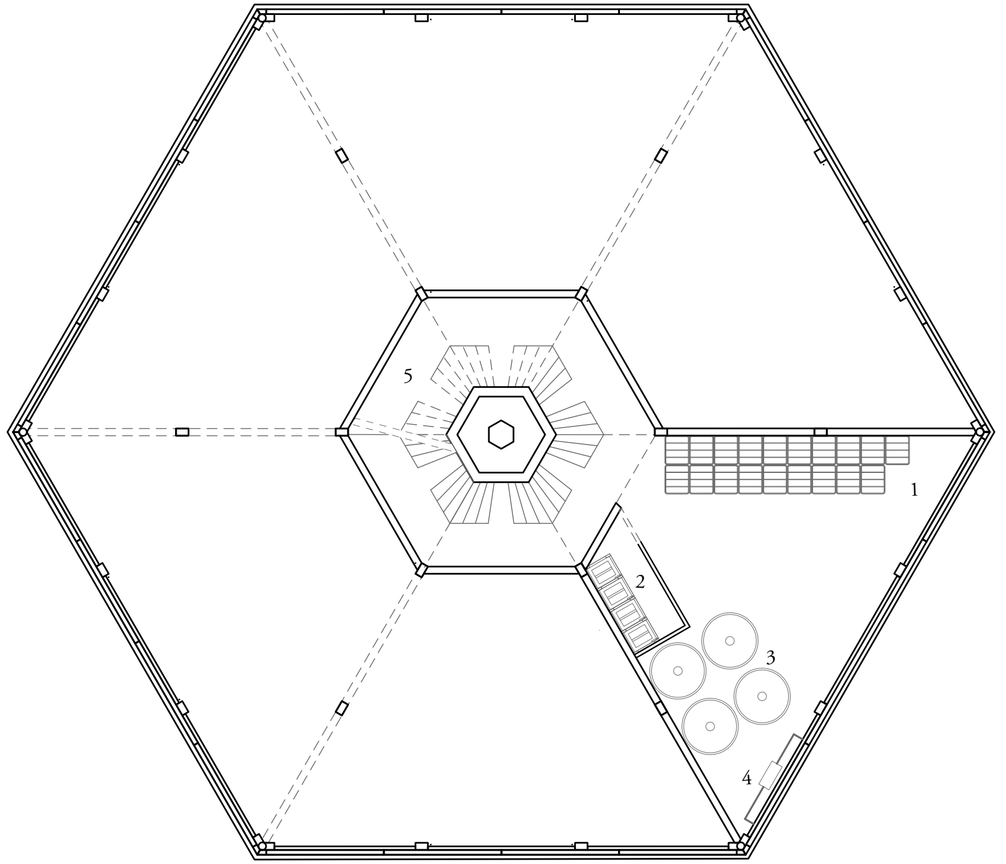
CIRCULATION

circulation - human experience of the research centre



PLANT

Gound floor plan
1a. Entry
1b. Central staircase
2. Bar
3. Water storage tank



4. MARINE PERMACULTURE

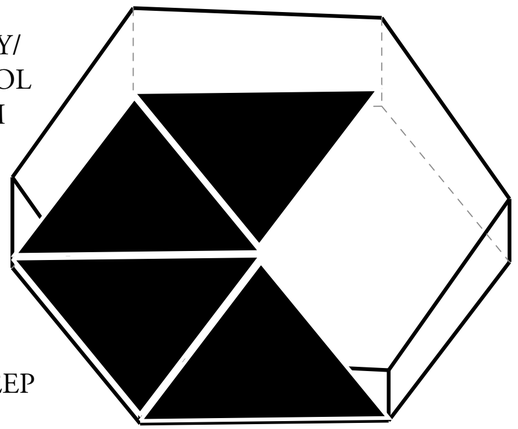
3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

RESEARCH

ENERGY/
CONTROL
ROOM



SLEEP

ECOLOGY/
WATER STORAGE

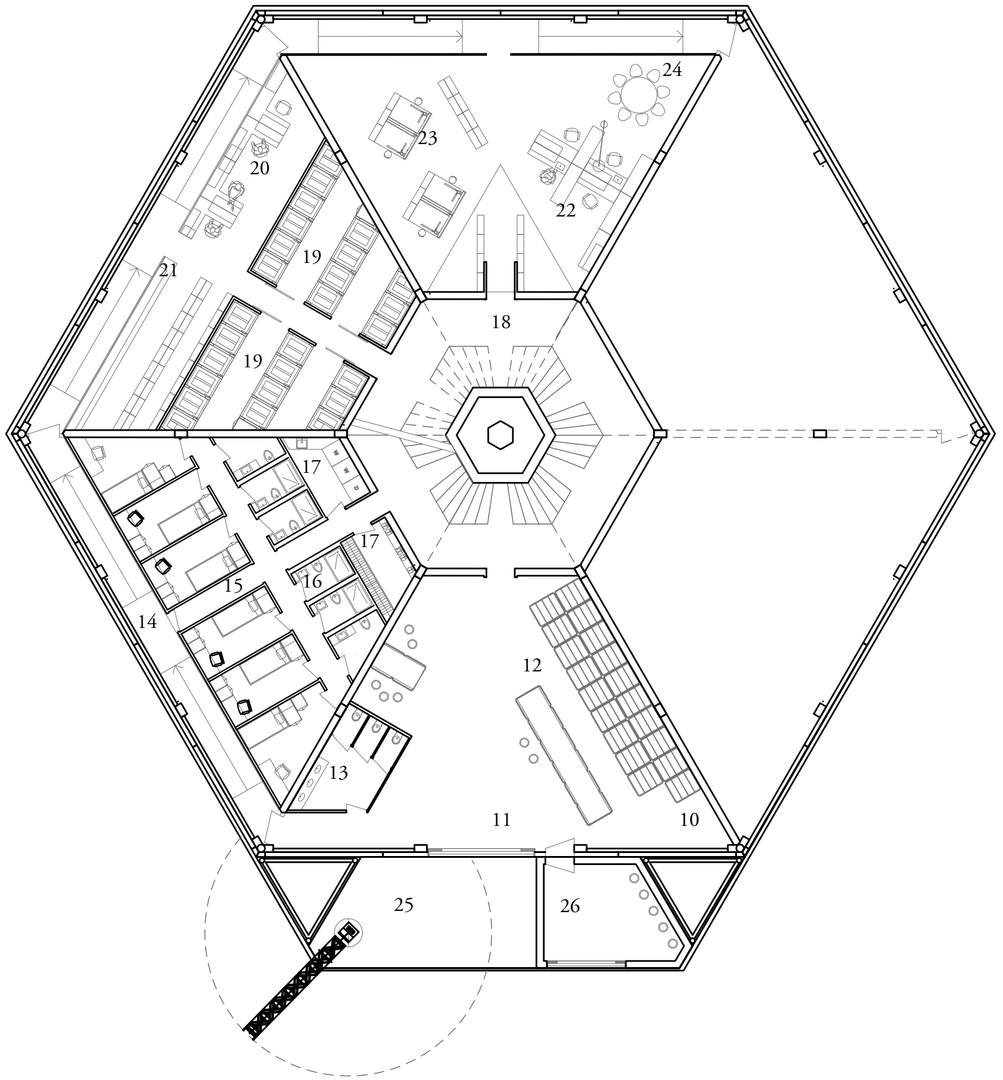
4. MARINE
PERMACULTURE

3. ENERGY
HARVEST

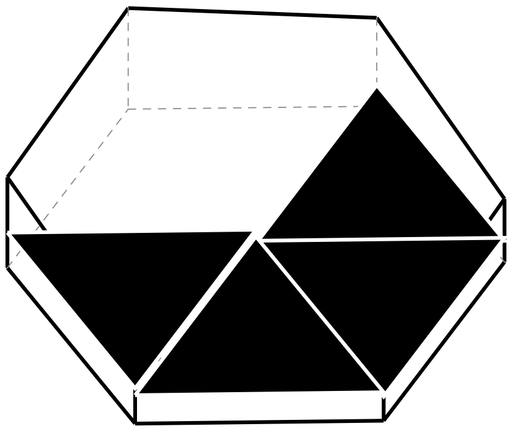
2. RESEARCH
CENTRE

1. BIRD
SANCTUARY

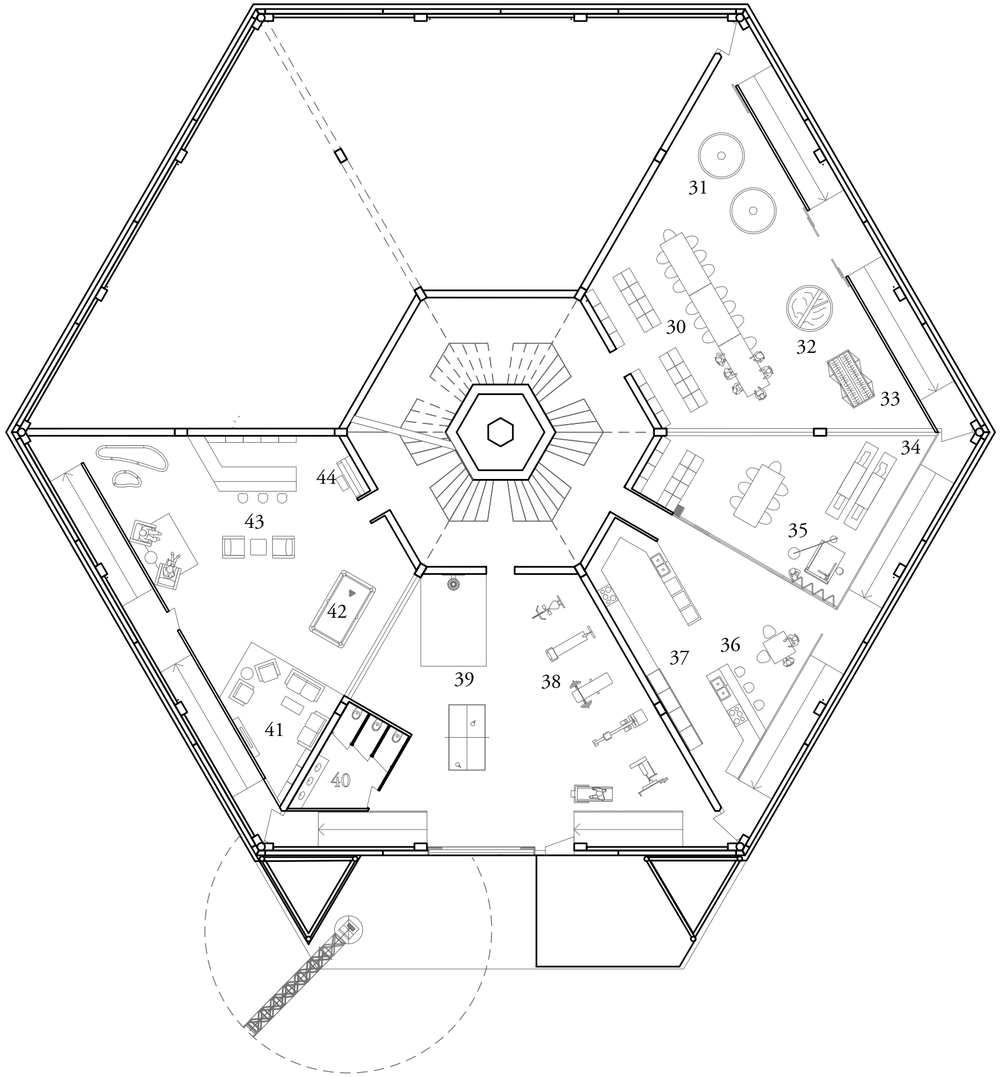
Gound floor plan
4. Energy storage room



First floor plan
5. Seaweed cultivation
6. Resturant
7. Dining



EAT



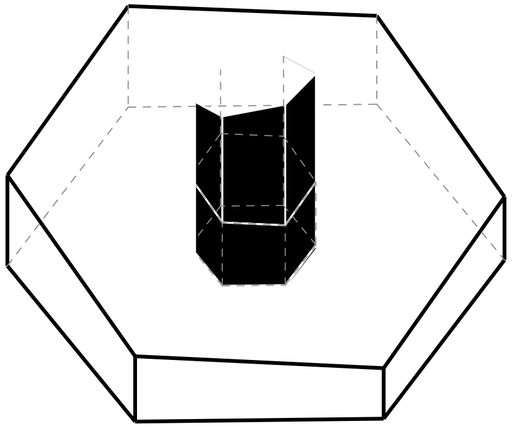
SOCIAL

4. MARINE PERMACULTURE

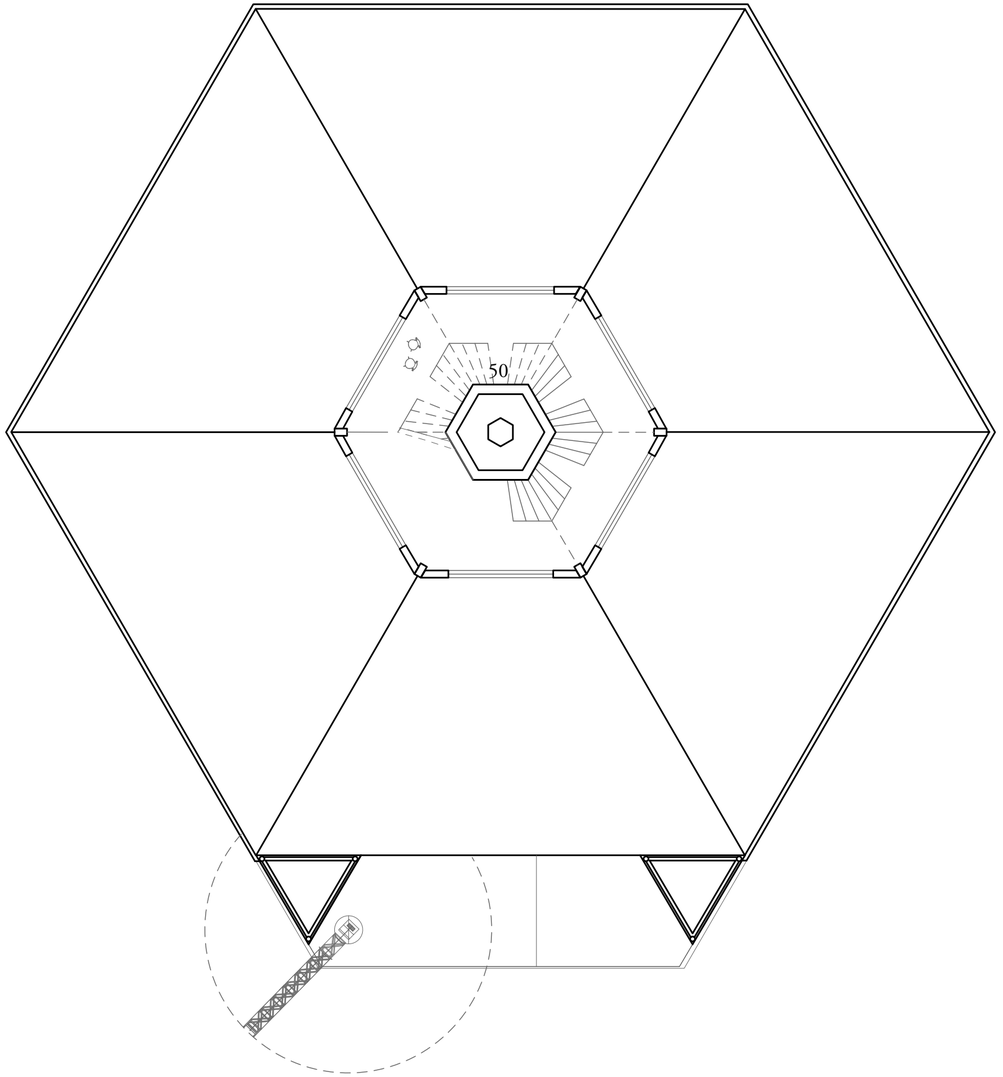
3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY



First floor plan
8. Research centre
9. Sonar hub
10. Think tank



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3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

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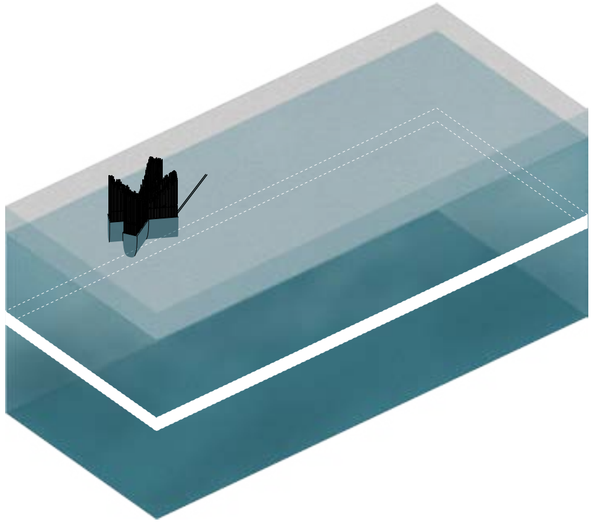


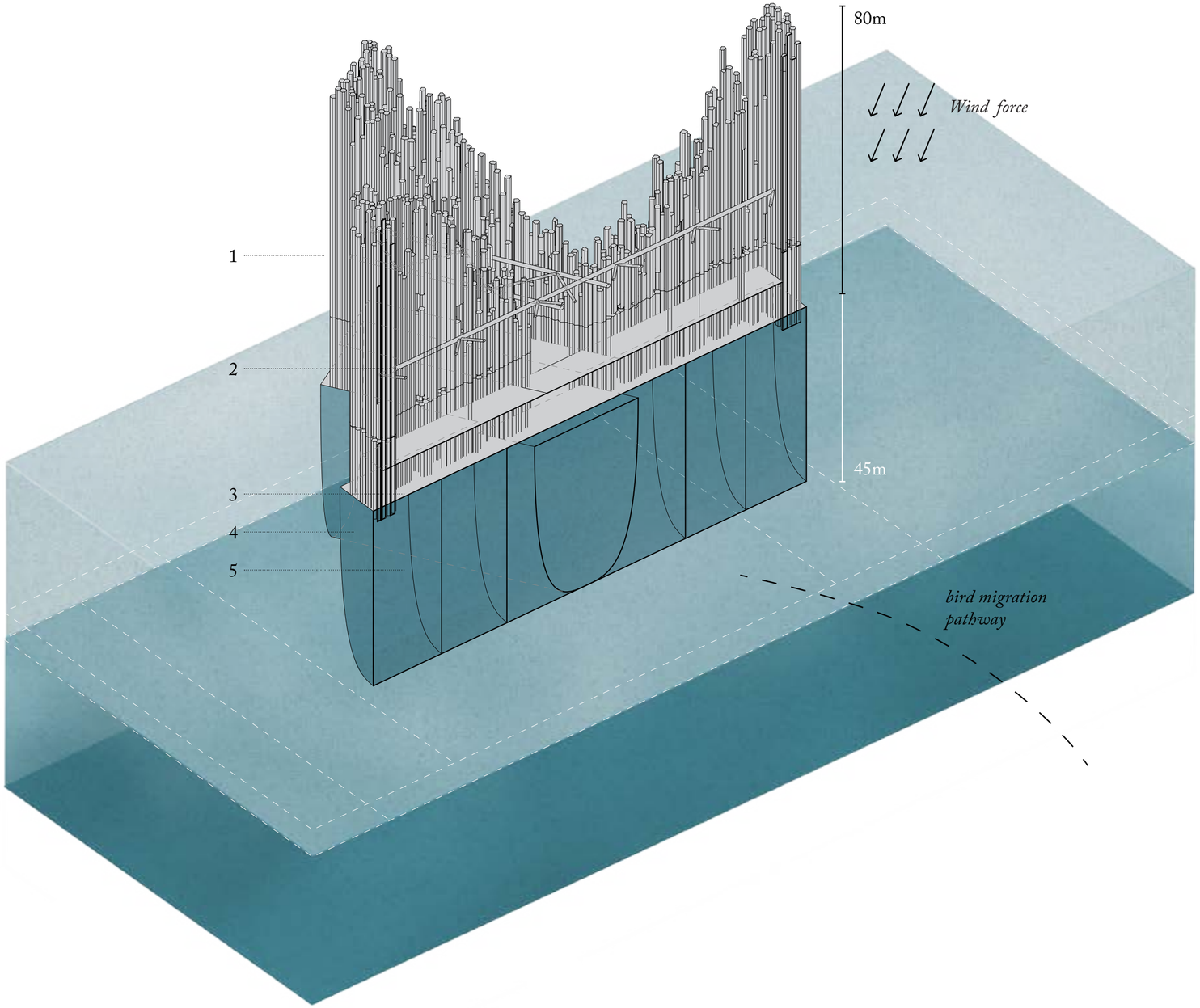
4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

1 Stability columns
2 Cross bracing
3 Drainage
4 Hull
5 Ballast



4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

Hallgrimskirkja Hallgrims Church
Iceland

Arctic bird colonies on Svalbard's bird cliff
Alkefjellet

HEIGHT

80m

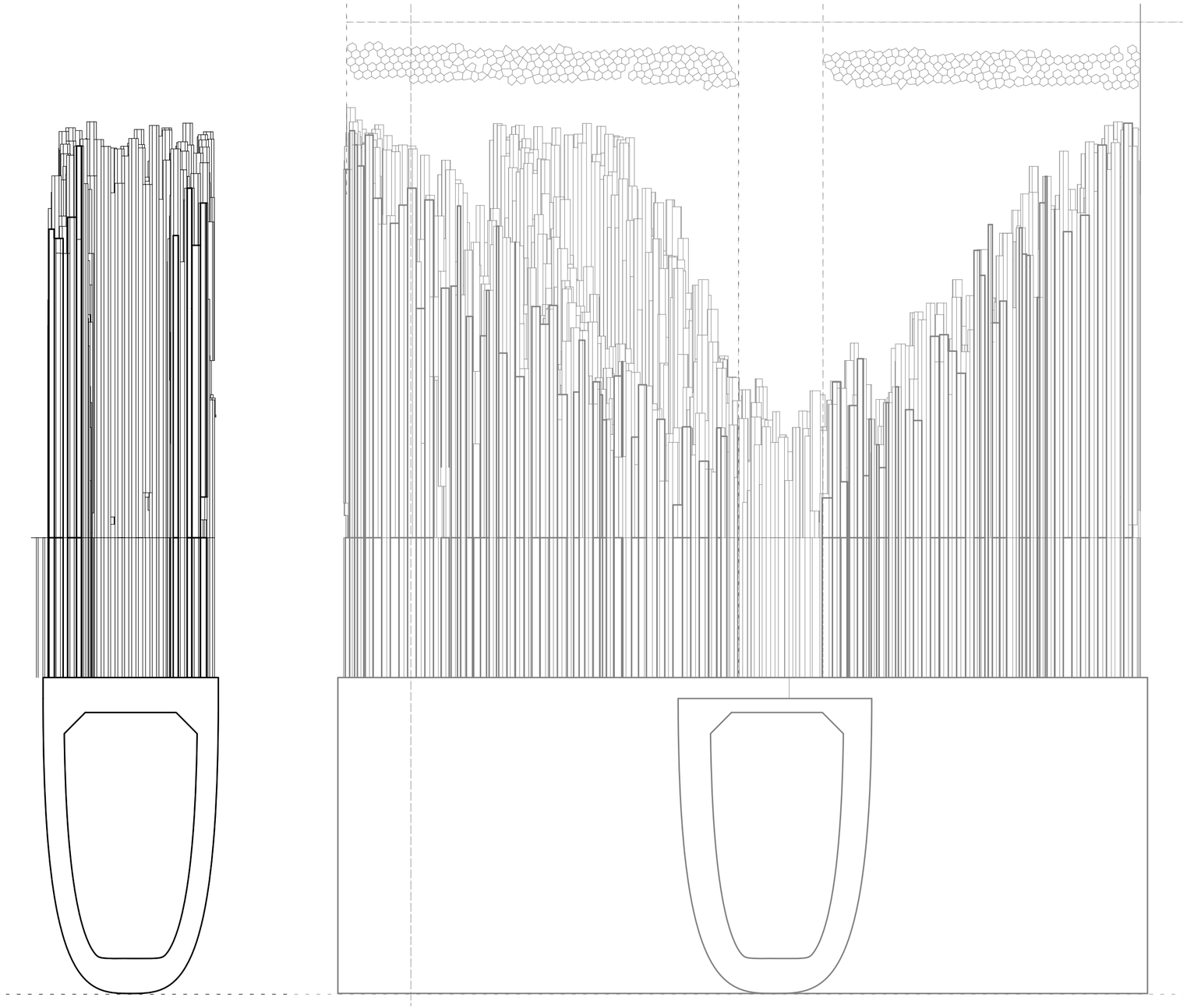
4. MARINE PERMACULTURE

3. ENERGY HARVEST

45m

2. RESEARCH CENTRE

1. BIRD SANCTUARY

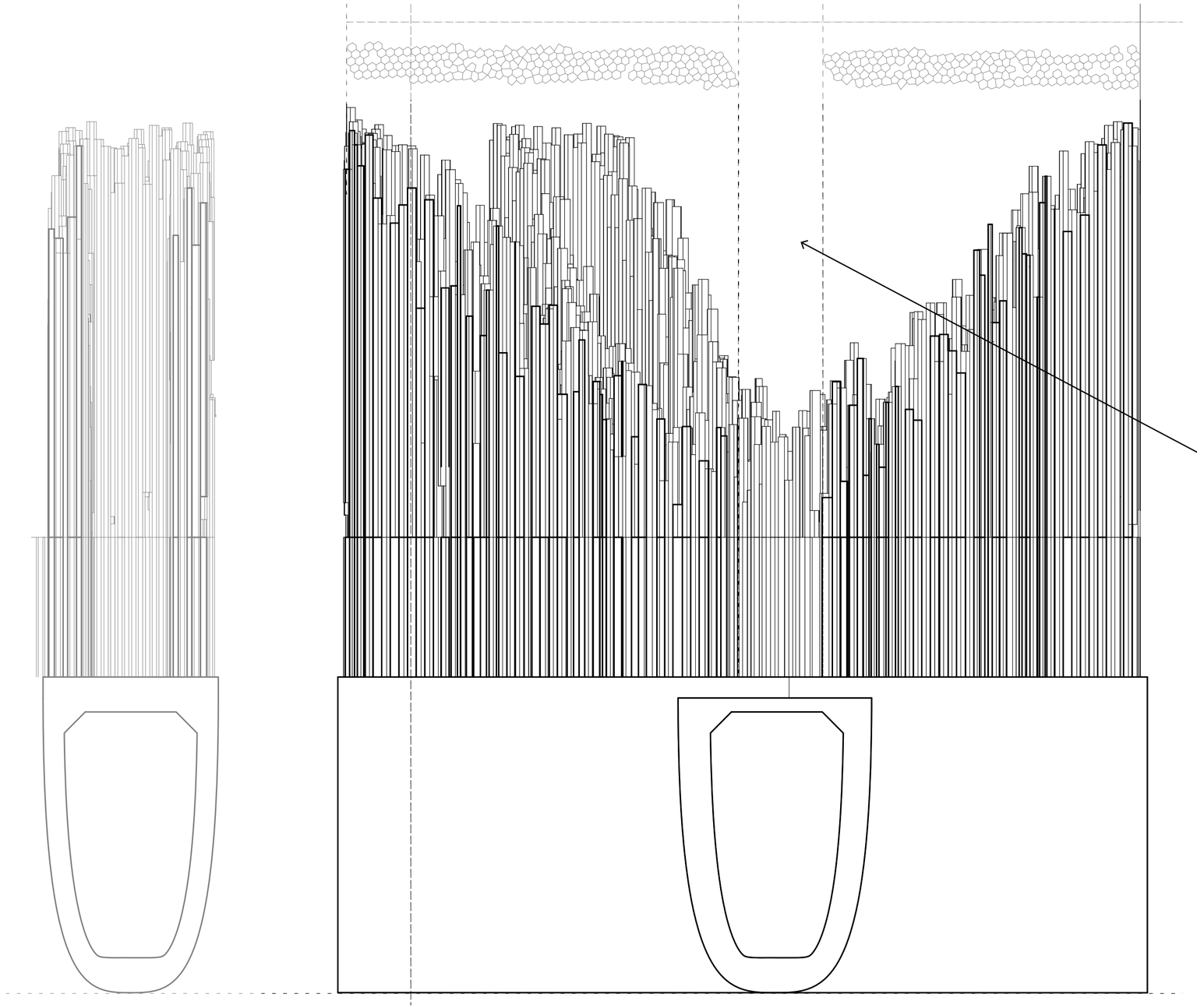


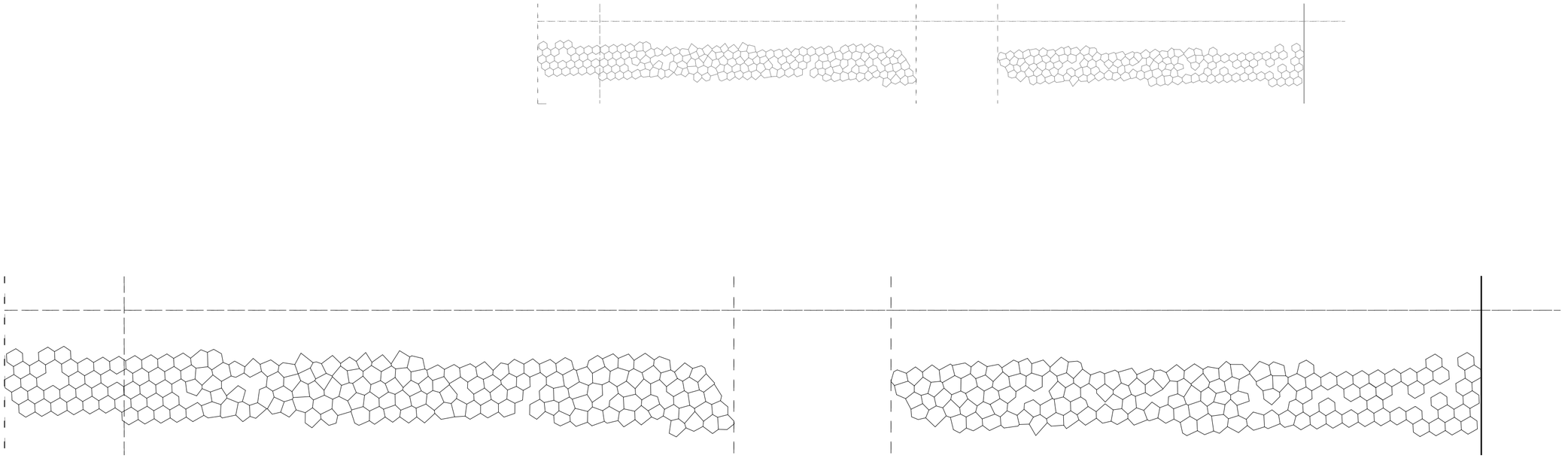
4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY



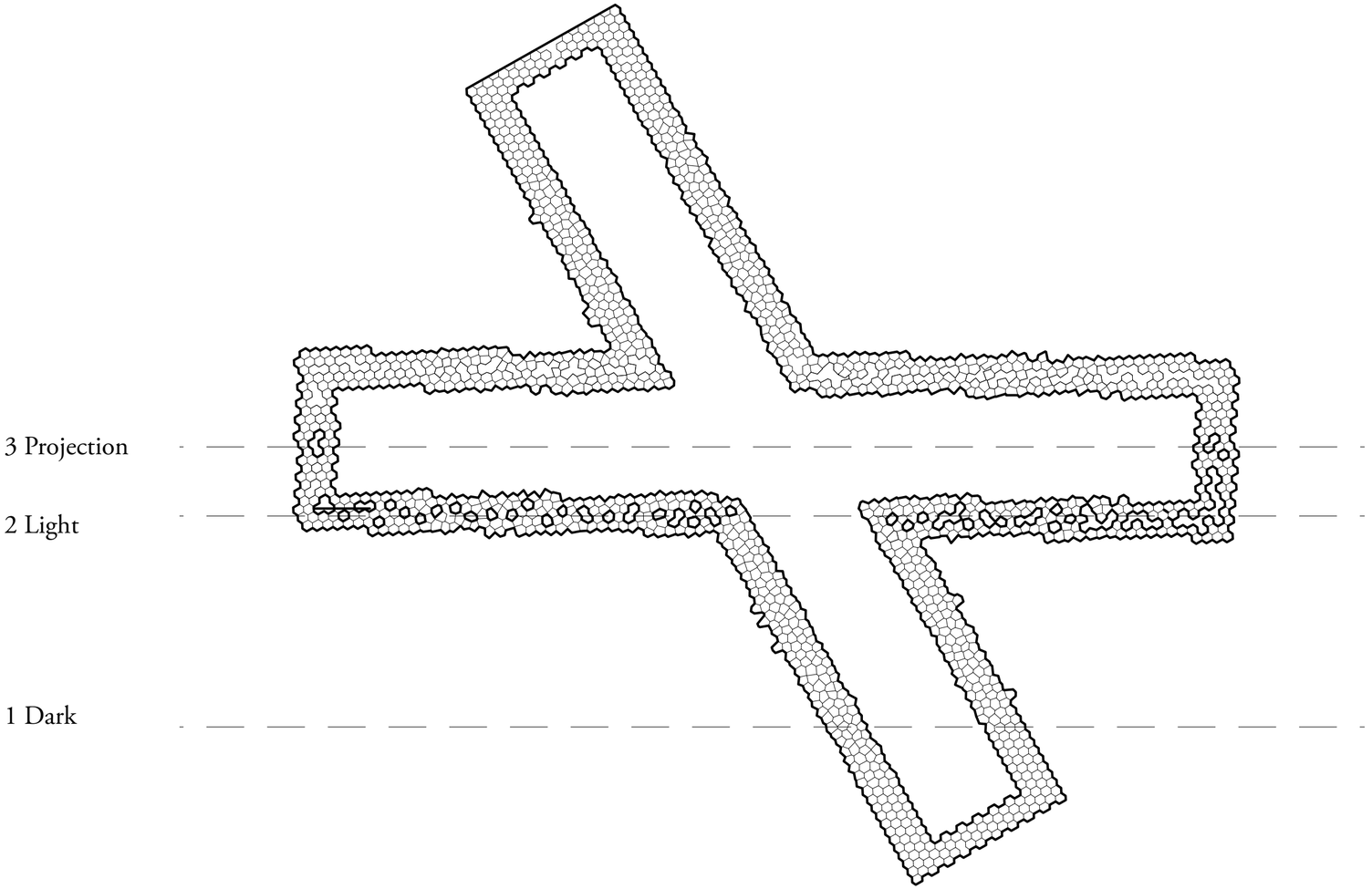


4. MARINE PERMACULTURE

3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY

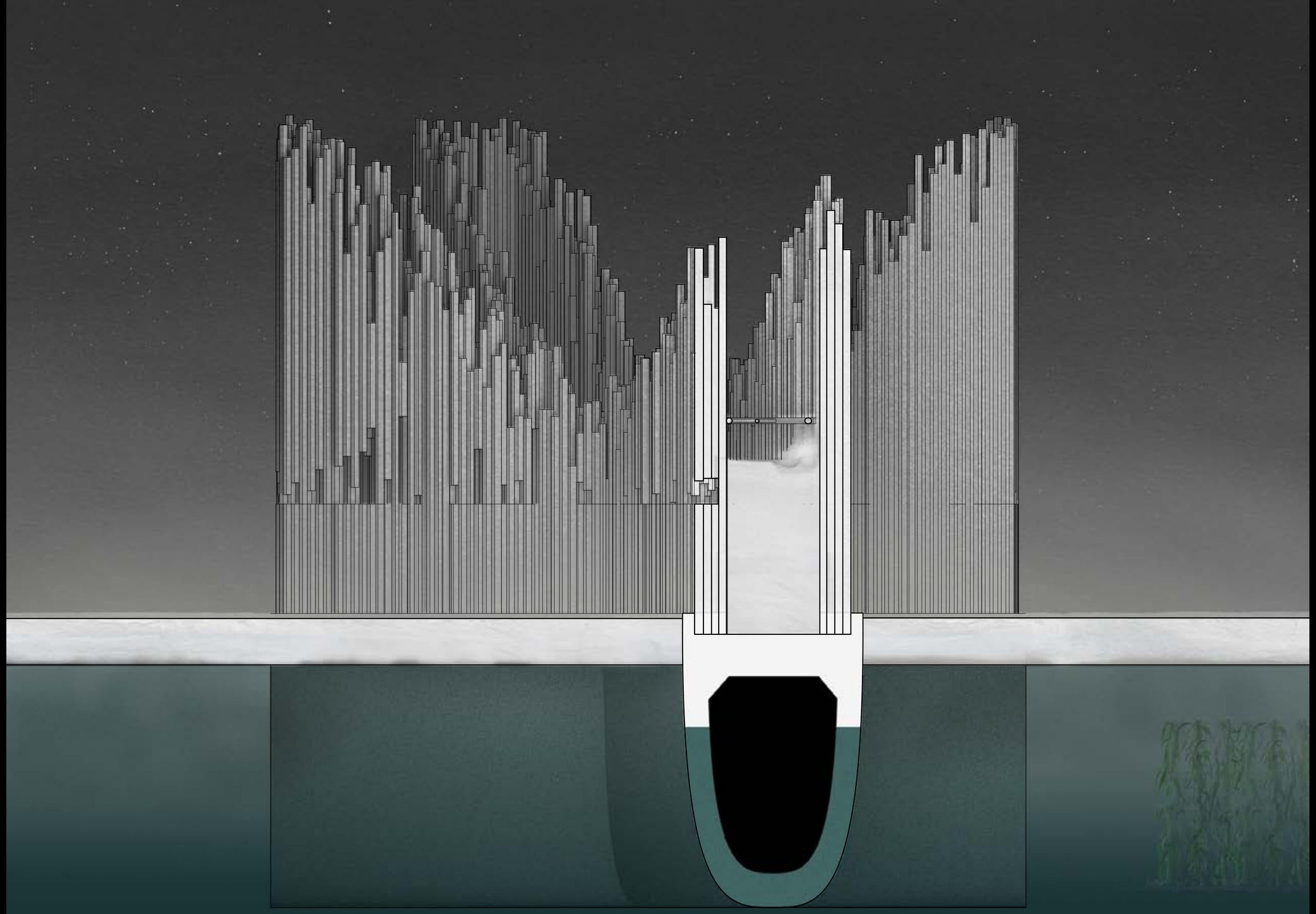


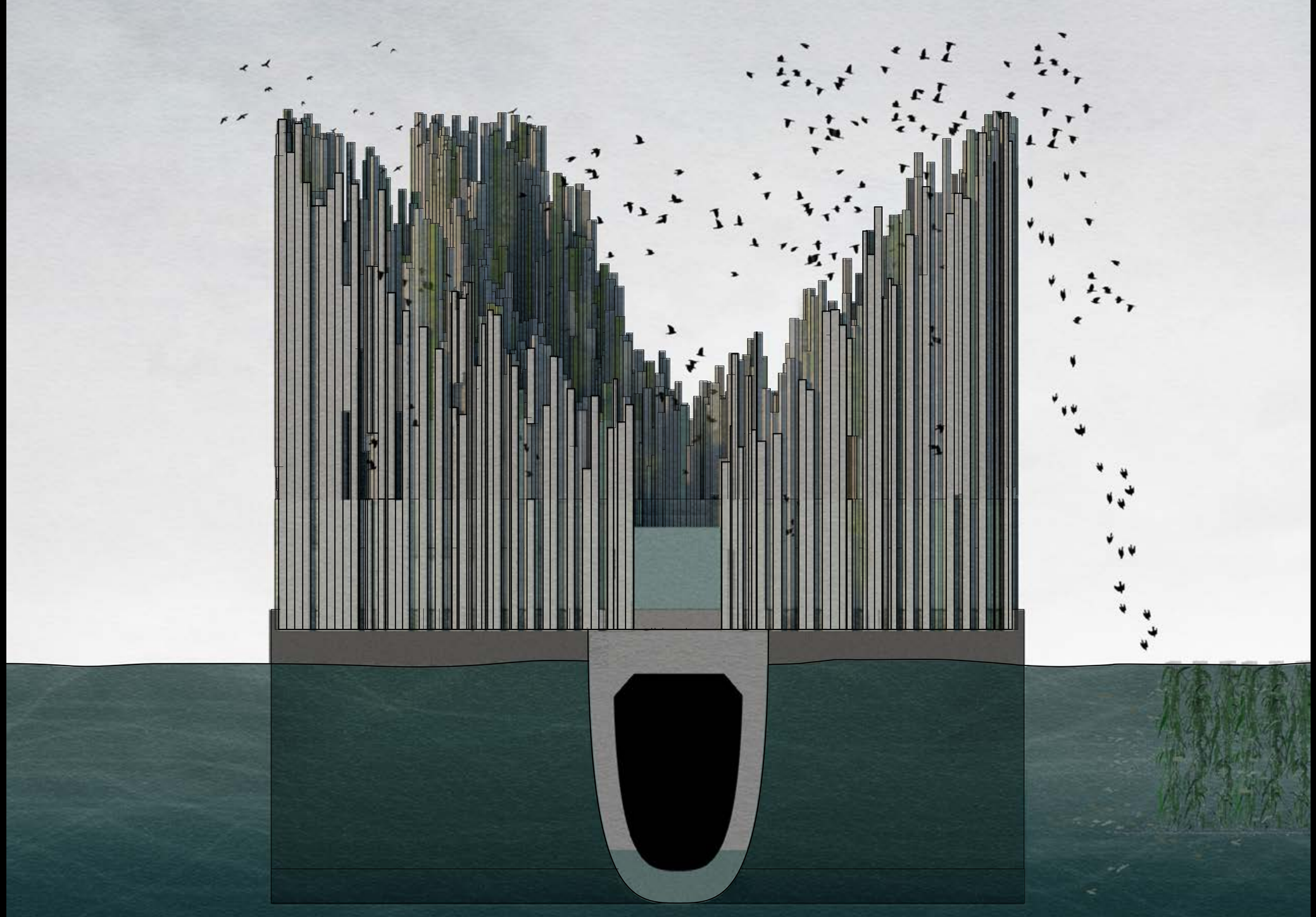
4. MARINE PERMACULTURE

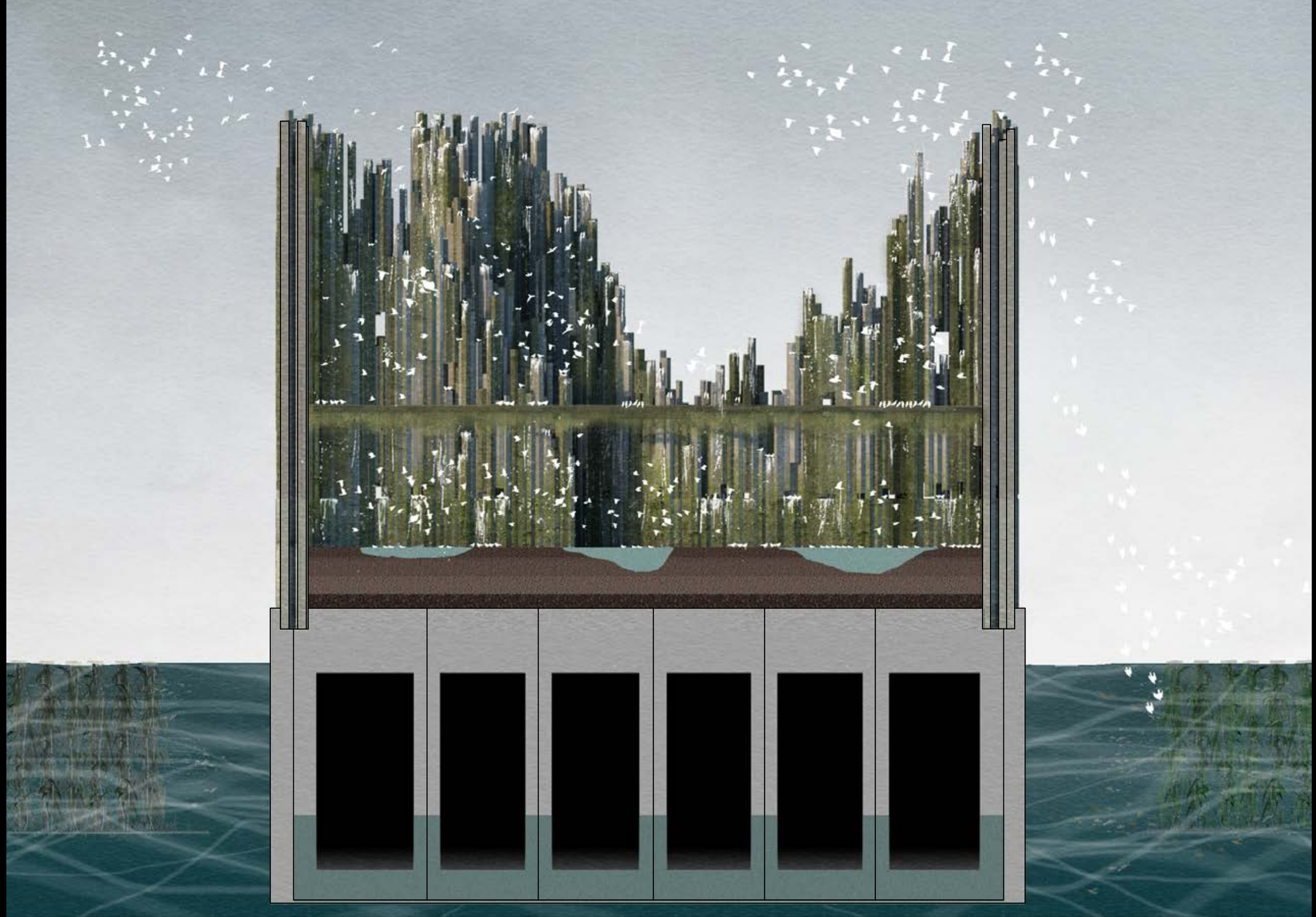
3. ENERGY HARVEST

2. RESEARCH CENTRE

1. BIRD SANCTUARY







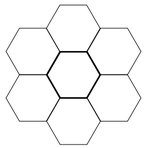
Axonometric Structure

Bird Sanctuary
Pre-fabricated steel and concrete system

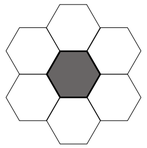
1 Columns
2 Cross Bracing
3 Hull Platform
4 Drainage Vents
5 Ballast

Welding Strategy

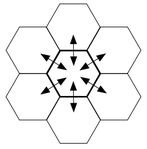
Center Column

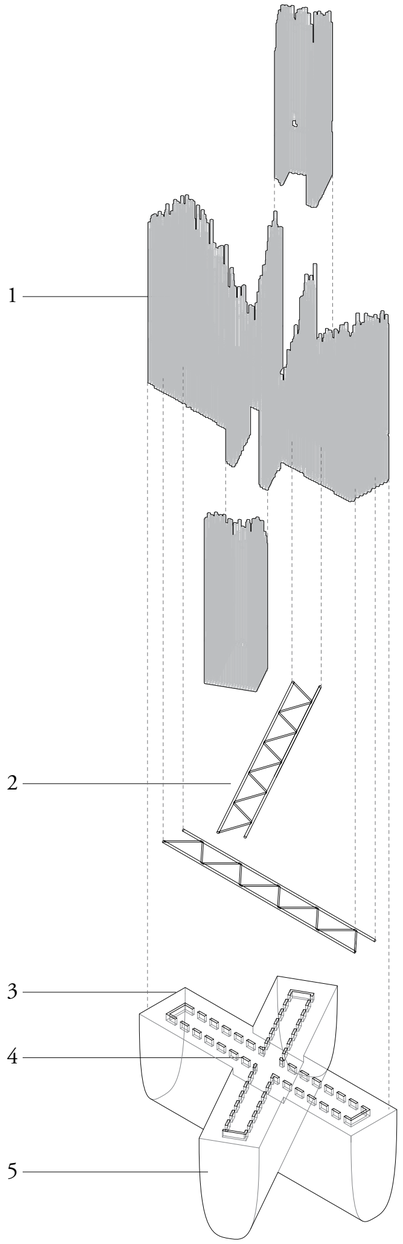


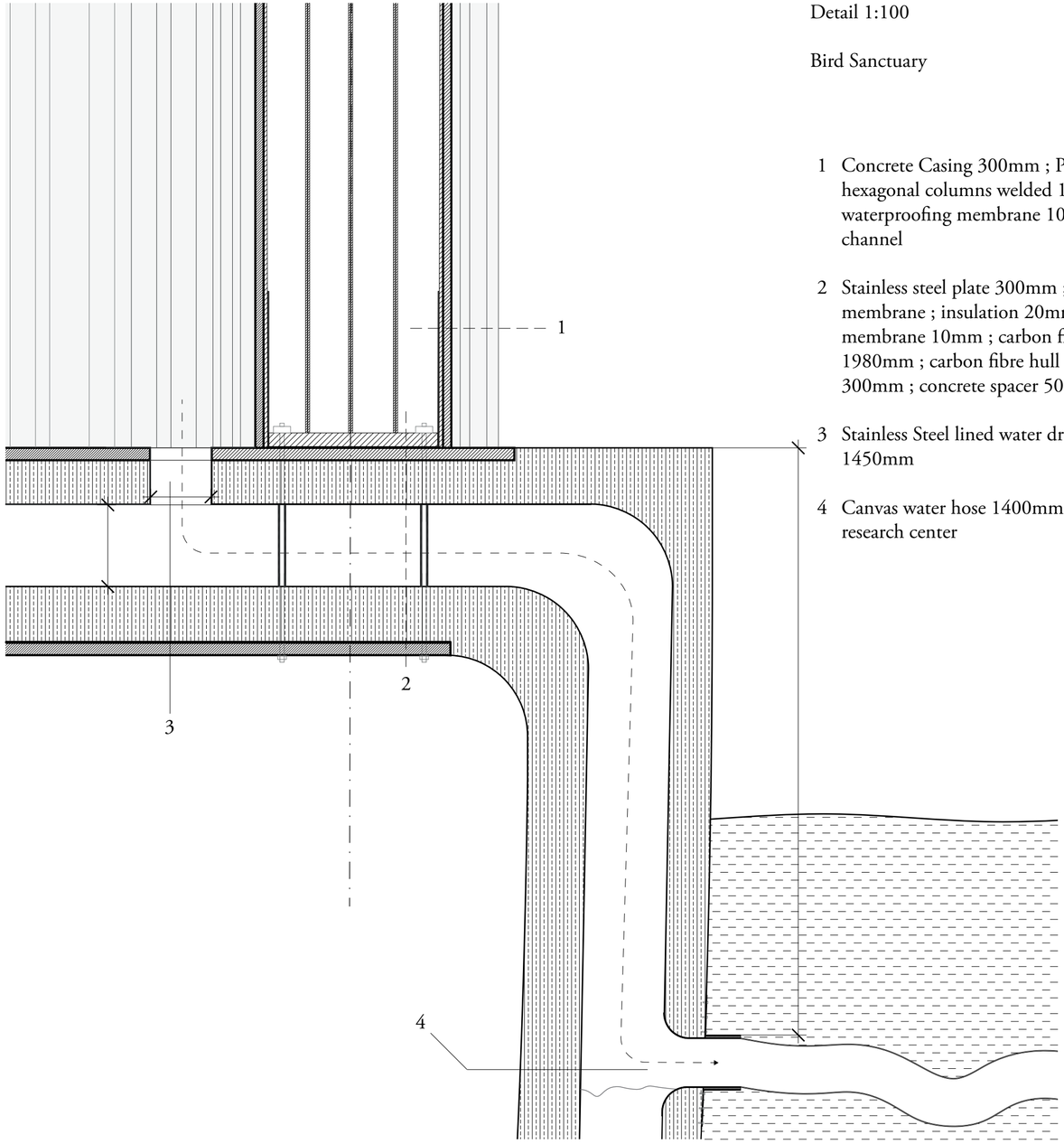
Welded to base



Center welded to neighbour columns







Detail 1:100

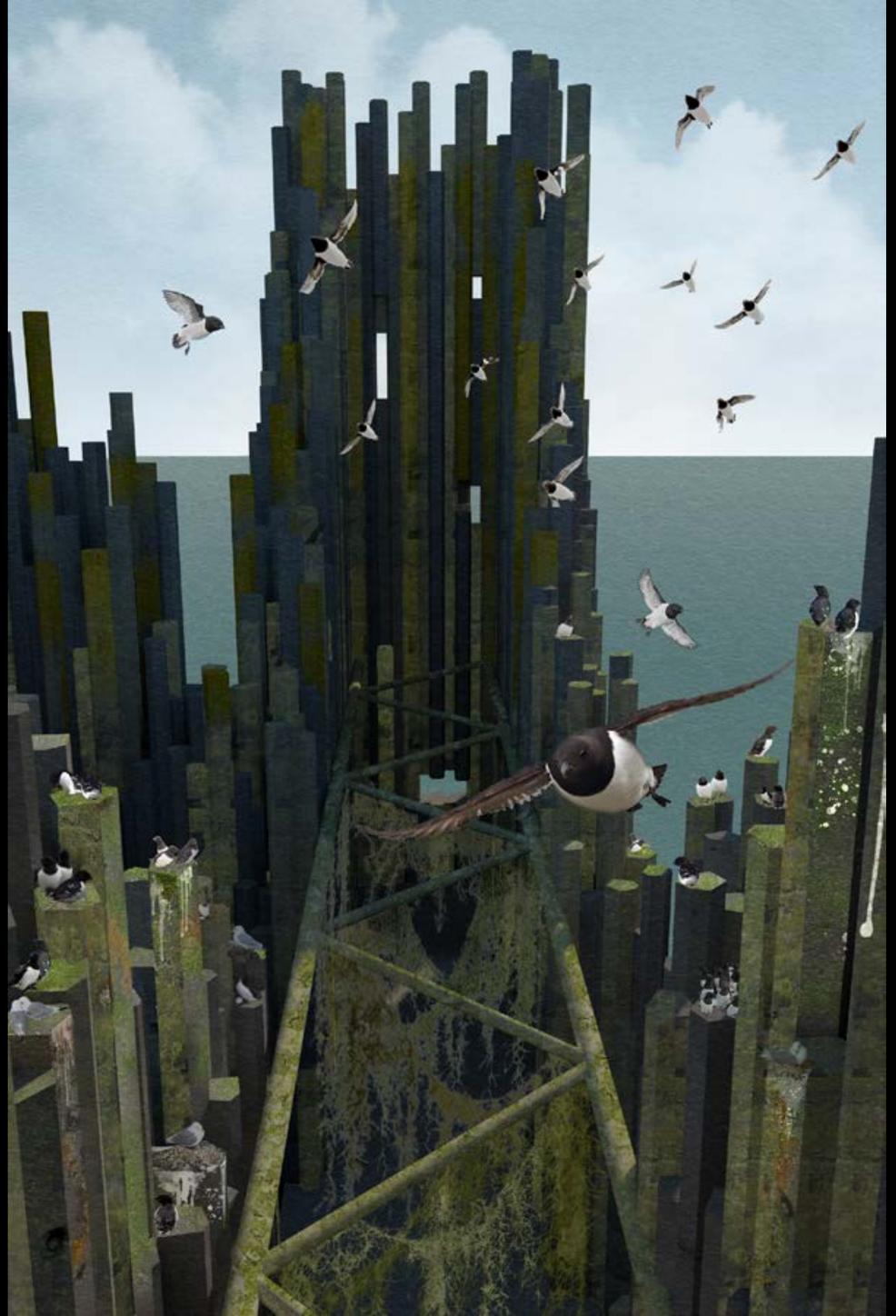
Bird Sanctuary

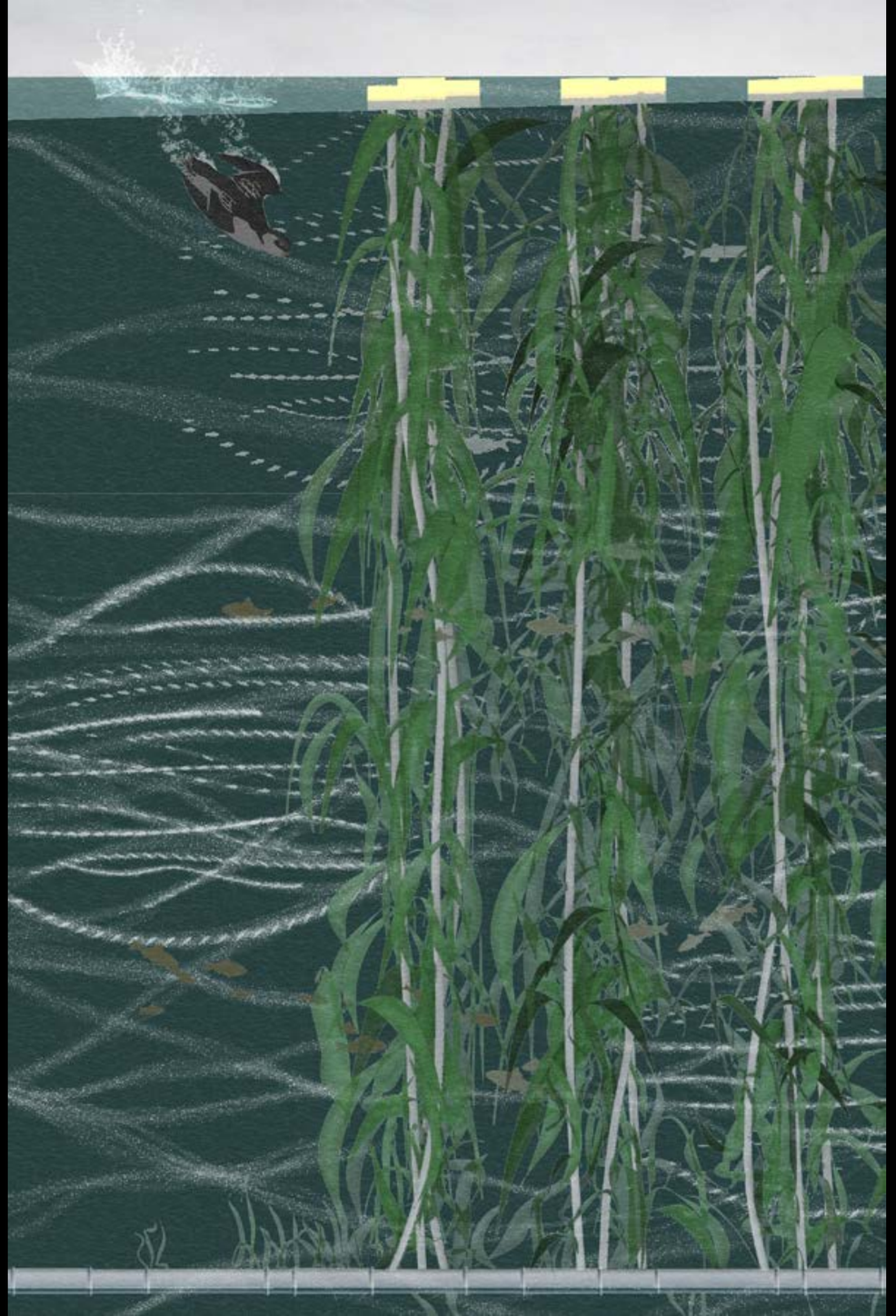
1 Concrete Casing 300mm ; Pre-fabricated Steel hexagonal columns welded 100mm ; 20mm waterproofing membrane 10mm; 20mm Steel channel

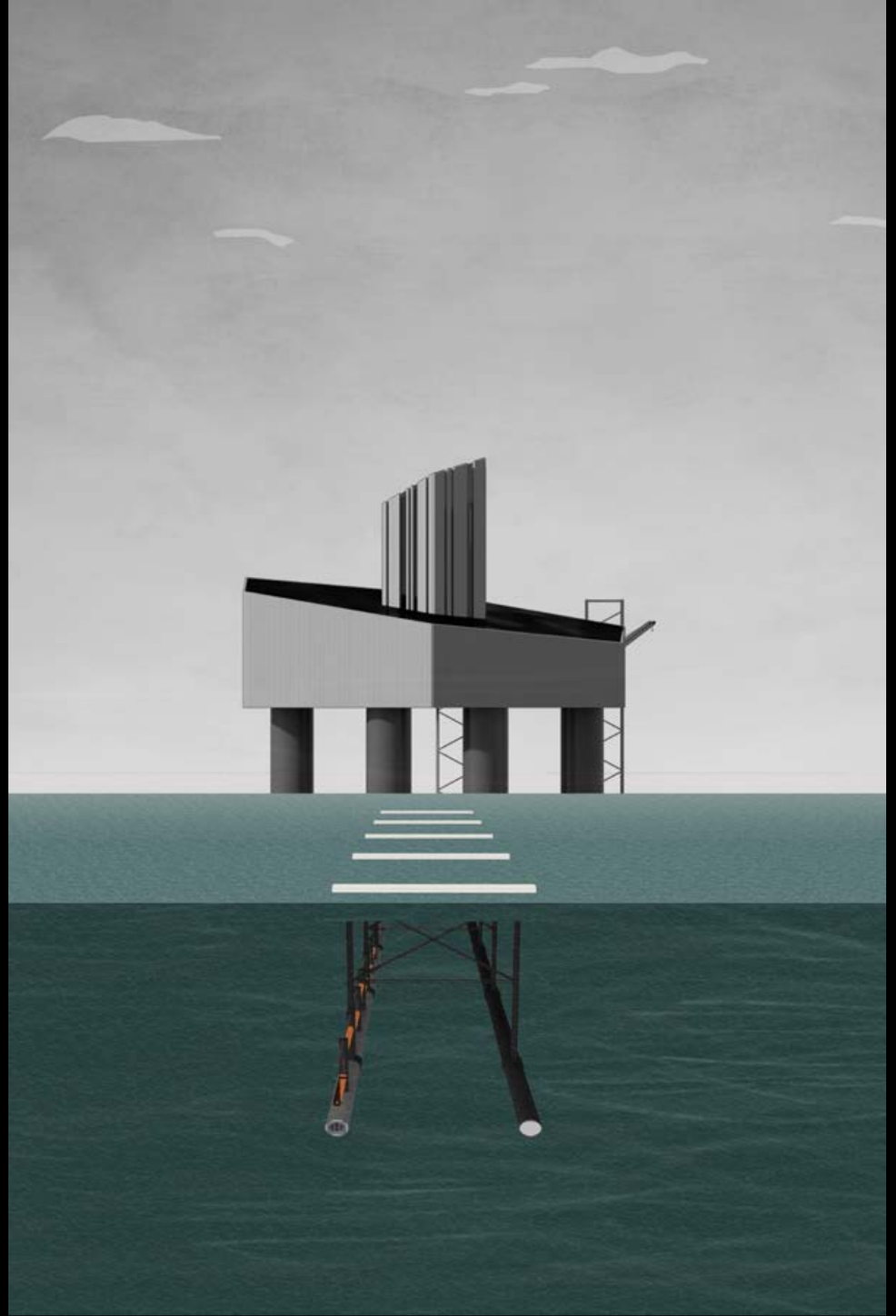
2 Stainless steel plate 300mm ; waterproofing membrane ; insulation 20mm ; water proofing membrane 10mm ; carbon fibre hull, pipe cavity 1980mm ; carbon fibre hull ; Stainless steel plate 300mm ; concrete spacer 500mm

3 Stainless Steel lined water drainage ; Diameter 1450mm

4 Canvas water hose 1400mm ; water drawined to research center

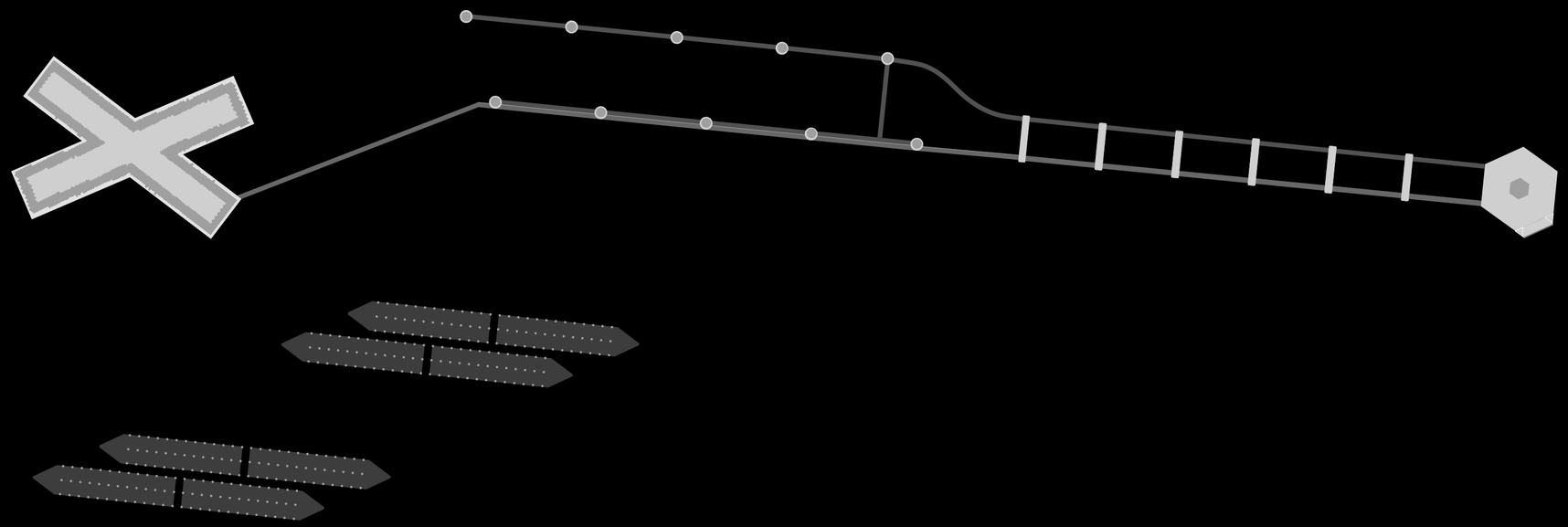


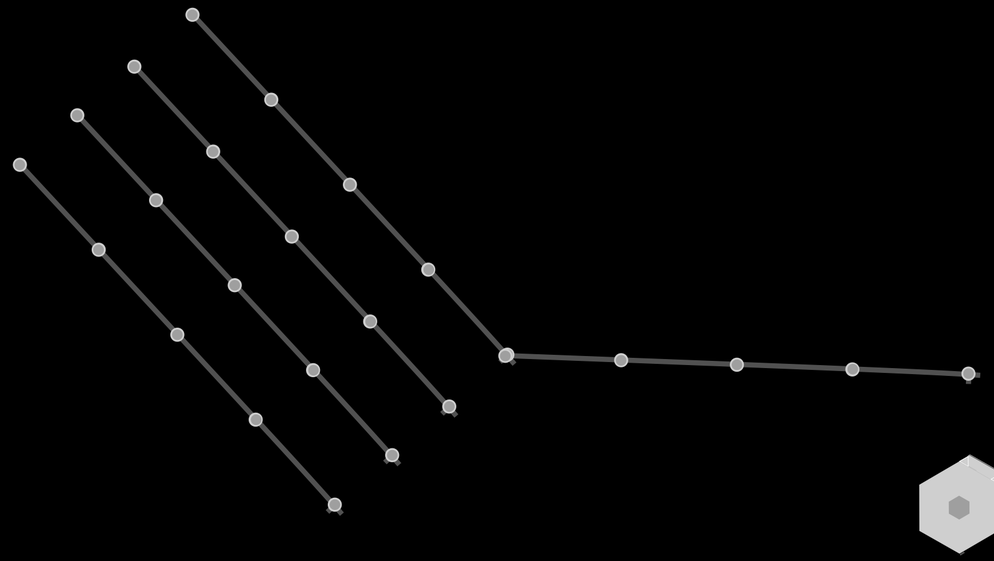


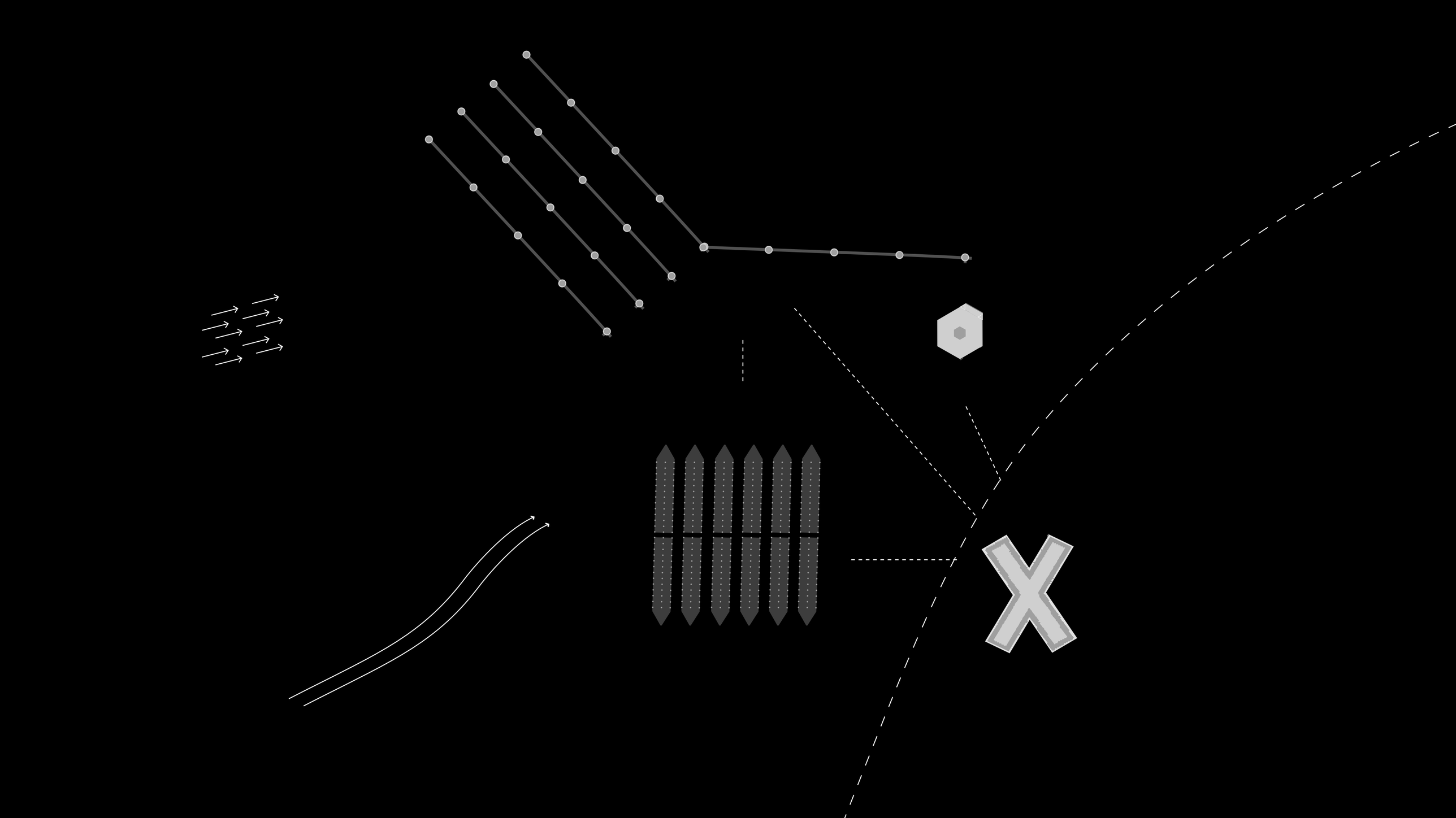


REFLECTION

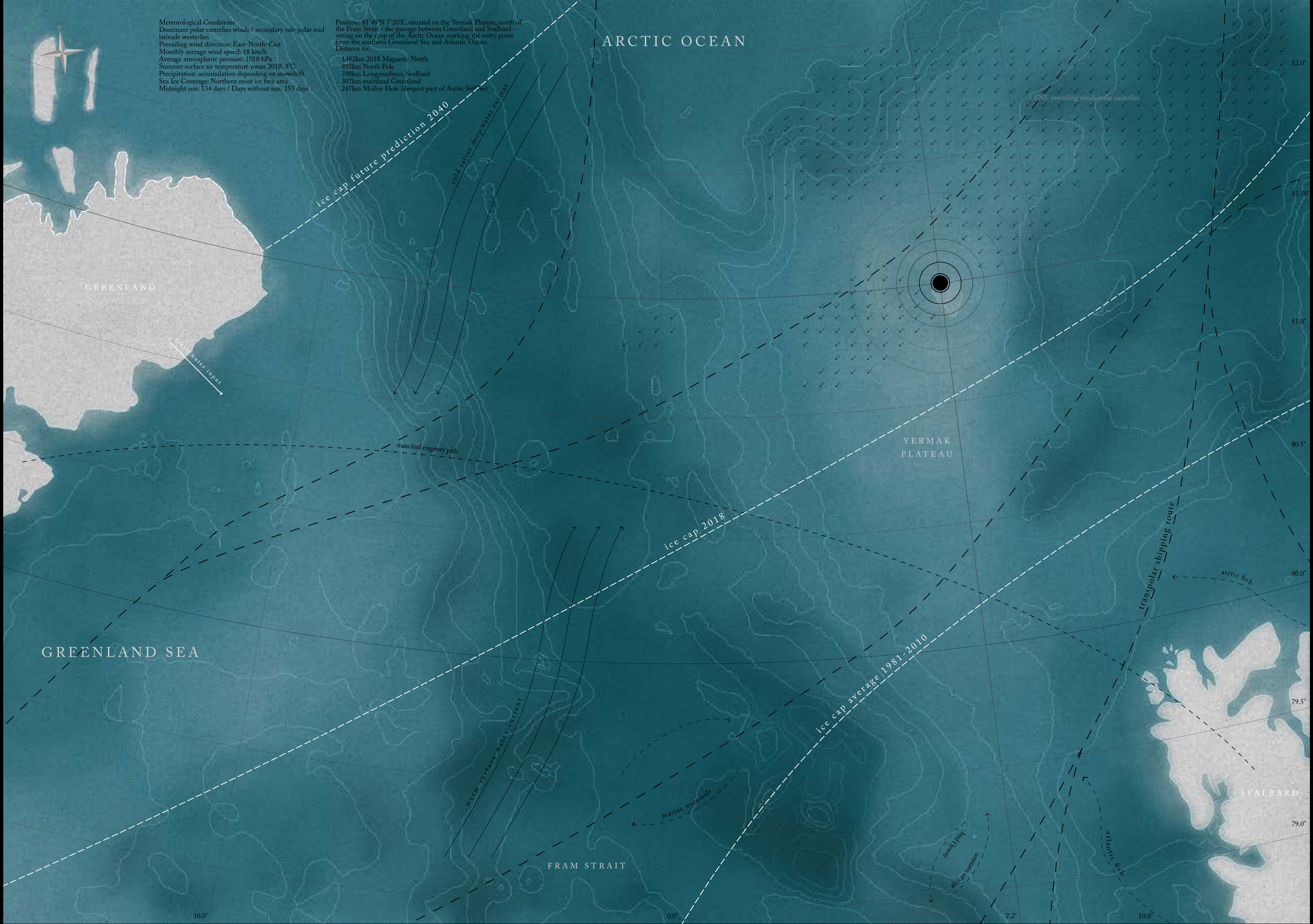

Meteorological Conditions
Dominant polar easterlies winds / secondary sub-polar mid latitude westerlies
Prevailing wind direction: East-North-East
Monthly average wind speed: 18 km/h
Average atmospheric pressure: 1010 hPa
Summer surface air temperature mean 2018: 3°C
Precipitation: accumulation depending on snowdrift
Sea Ice Coverage: Northern most ice free area
Midnight sun: 134 days / Days without sun: 155 days
Position: 81°49’N 7°20’E, situated on the Yermak Plateau, north of the Fram Strait - the passage between Greenland and Svalbard - sitting on the cusp of the Arctic Ocean marking the entry point from the southern Greenland Sea and Atlantic Ocean.
Distance to:
↑ 1482km 2018 Magnetic North
↑ 935km North Pole
↓ 398km Longyearbyen, Svalbard
← 307km mainland Greenland
↓ 247km Molloy Hole (deepest part of Arctic 5607m)
cold saline deep water current
+ ENE prevailing winds polar easterlies
YERMAK PLATEAU
transpolar sea shipping route
+ WSW winds sub-polar westerlies
warm surface water current
arctic fish
marine mammals
african eurasian
atlantic fish
81.50°
81.49°
81.48°
81.47°
81.46°
7.17°
7.18°
7.19°
7.20°
7.21°







NEW CARTOGRAPHY


Meteorological Conditions
Dominant polar easterlies winds / secondary sub-polar mid latitude westerlies
Prevailing wind direction: East-North-East
Monthly average wind speed: 18 km/h
Average atmospheric pressure: 1010 hPa
Summer surface air temperature mean 2018: 3°C
Precipitation: accumulation depending on snowdrift
Sea Ice Coverage: Northern most ice free area
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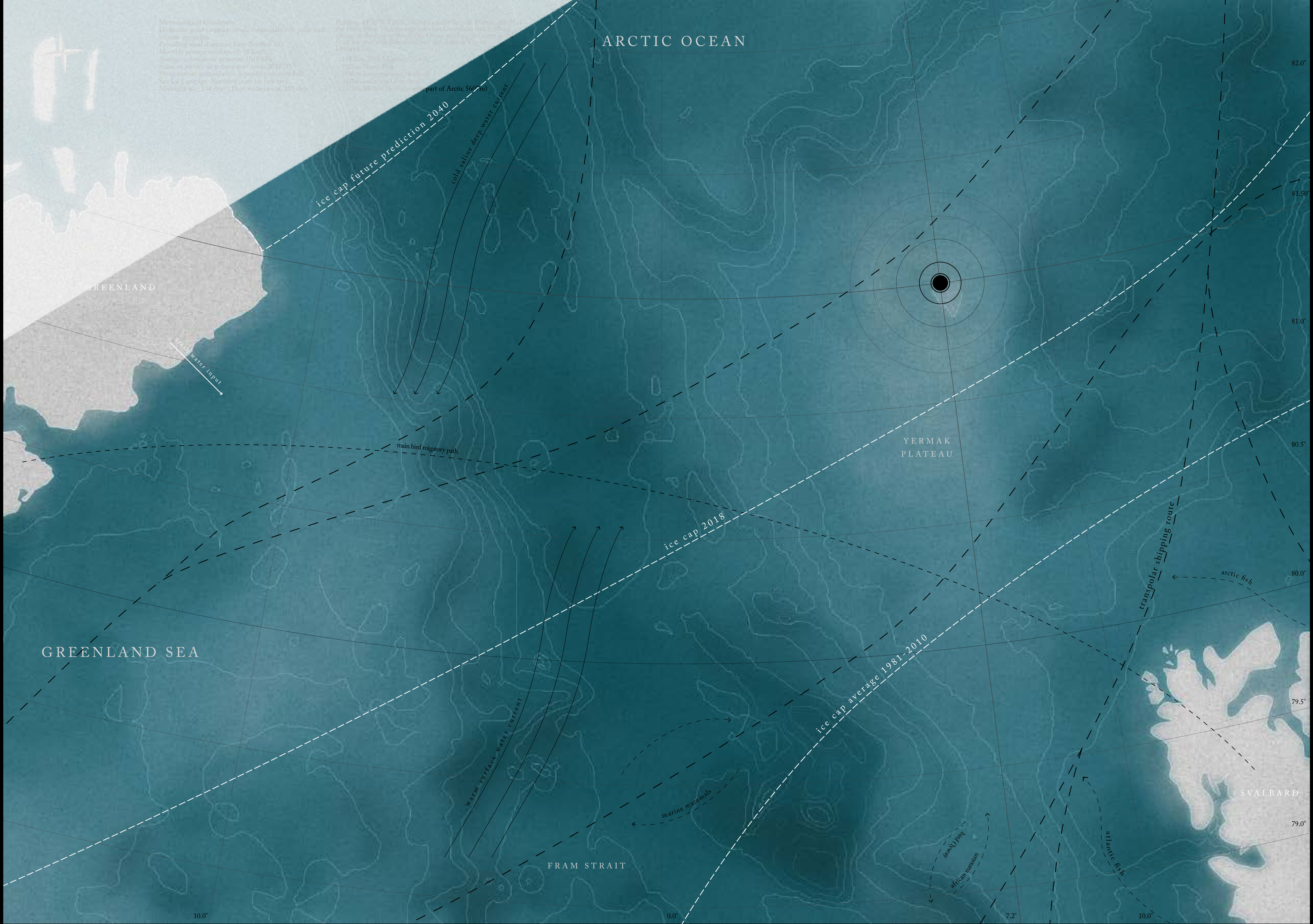
GREENLAND
fresh water input
main bird migratory path
YERMAK
PLATEAU
ice cap 2018
transpolar shipping route
arctic fish
GREENLAND SEA
ice cap average 1981-2010
warm surface water current
marine mammals
bird flyway
african eurasian
atlantic fish
SVALBARD
FRAM STRAIT
82.0°
81.50°
81.0°
80.5°
80.0°
79.5°
79.0°
10.0°
0.0°
7.2°
10.0°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