AQUA FIRMA/INCOGNITA/COMMUNI

A Thesis Submitted to the Department of Landscape Architecture,

Harvard University Graduate School of Design

by

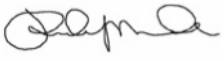
MAXWELL SMITH-HOLMES

In Partial Fulfillment of the Requirements for the Degree of

MASTER IN LANDSCAPE ARCHITECTURE

MAY 2021

Student



Thesis Advisor

Aqua Firma Incognita Communi

Maxwell Smith-Holmes
Master in Landscape Architecture I
Advisor: Rosalea Monacella

MLA Design Thesis
Harvard University, Graduate School of Design
May 2021

Acknowledgements

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I could not have completed this project without the intellectual investment and guidance of my thesis advisor, Rosalea Monacella. Rose first inspired my interest in the ocean through her pedagogy as my section instructor in Landscape Architecture Core III in Fall 2019. I am grateful for all of Rose's teaching throughout my time in Cambridge.

Thank you to all the faculty who gave me invaluable feedback along the way: Craig Douglas, Sergio Lopez-Pinheiro, Jill Desimini, Emily Wettstein, and Charles Waldheim. Also, thank you to Seok Min Yeo for his excellent advice during Thesis Prep.

I wish to thank everyone all the other inspiring faculty I have been lucky to study with at the G.S.D.: Danielle Choi, Ed Eigen, Gary Hilderbrand, Robert Pietrsusko, Sonja Duempelmann, and Karen Janosky.

In many ways, this thesis represents an extension of the research that I began in Core III; thank you to my collaborators in that studio, Nora Chuff and Ayami Akagawa.

And, I want to thank my landscape architecture classmates for their friendship.

Lastly, this project came about through the encouragement, dedication, and criticality of my faculty, mentors, colleagues, friends, and family, during a year which we now, by rote, acknowledge as 'difficult.' I wish to extend an additional dimension of gratitude to everyone mentioned above for continuing to log on, to turn on their cameras, and to support me, despite shaky internet connections and whatever else was going on in the world.

Abstract

This thesis drifts into the ocean's dark, turbulent depths to envision how urbanized seas erode landed geologics. Modernity has figured the ocean as an unknowable expanse opposed to land yet suffuse with extractable resources. In this way, the ocean has played backdrop for contested visions: as a space of biopolitical mobility as well as competition for natural resources and the policing of political borders. The 1982 United Nations Convention of the Law of the Seas (U.N.C.L.O.S.) attempted to reconcile these conflicting seascapes through the international legal principal of res communis, or "the common heritage of mankind." Ultimately, this thesis portrays the ocean-as-commons through the Blake Plateau, a deep-sea landform 300 miles off the southeast coast of the United States currently subject to aggressive prospecting for rare earth minerals. The site acts as the locus of the Ocean Column Observatory (O.C.O.), a multi-scalar assemblage of decommissioned maritime infrastructure that supports vibrant relations between life and matter. Imagining new ways of inhabiting the ocean necessarily entails creating new representations attuned to watery ways of seeing landscape.

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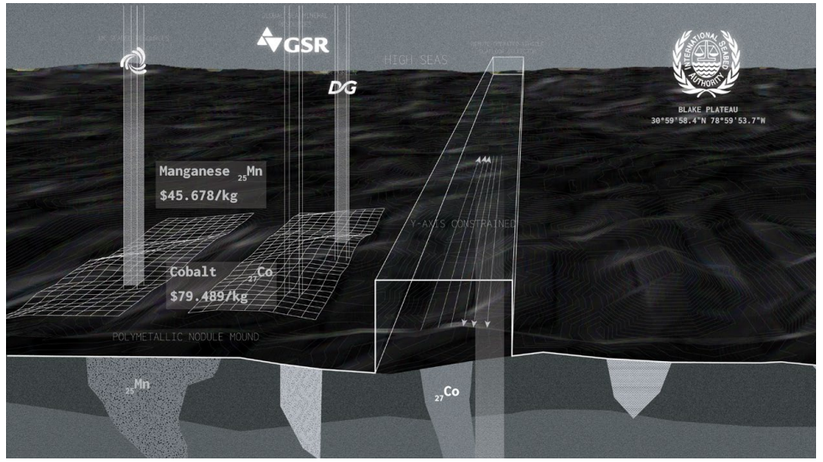
Slide 1

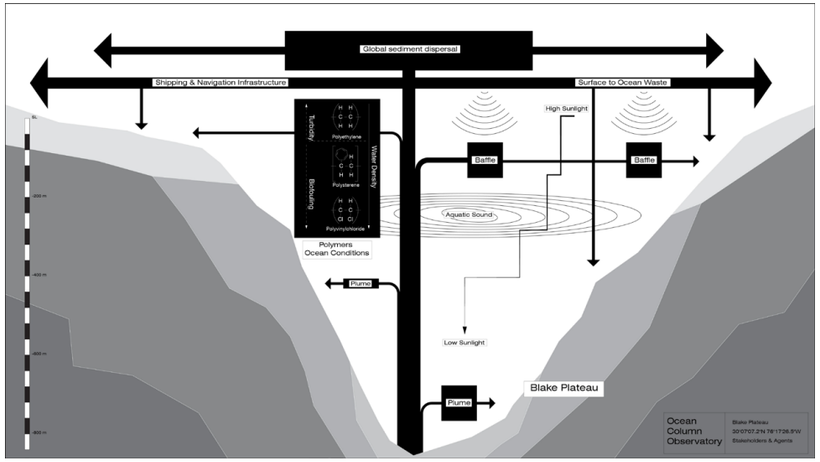
Narration:

“My thesis takes up the ocean as a provocation for thinking about formlessness, about how we design with forces, flows, and sensation -- with ecology. Throughout the past year of research and iteration, I have questioned the role of design in one of the most remote spaces imaginable – the deep sea, a landscape that can only be experienced through abstractions such as maps, models, drawings, data, et cetera. I chose this topic in order to work at the intersection of images and ecology, with an idea that it would be a worthwhile challenge to design a space at the furthest extreme of our capacities for seeing landscape.

Ultimately, I propose a site comprised of the ocean’s turbulence, depth, and volume, and that erodes visions of seascapes grounded in extractive maritime law.”



1
Aqua Firma



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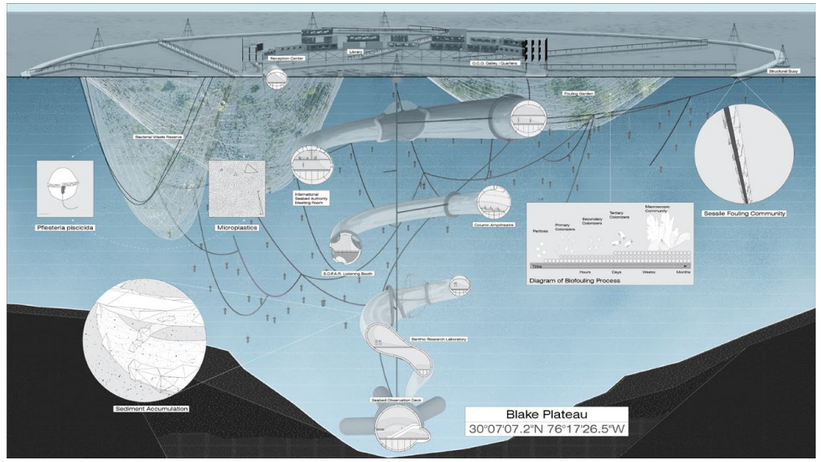
Aqua Incognita



3
Aqua Communi

Slide 2

Narration:

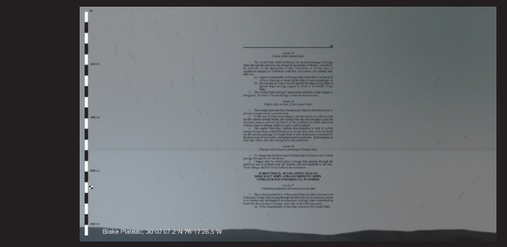
“My thesis is organized into three chapters centered on distinct ways of understanding the ocean: *Aqua firma*, *Aqua incognita*, and *Aqua communi*. The first chapter introduces the site of the Blake Plateau, a submarine landform at the edge of the United States’ territorial seas where deep-sea mining firms are currently prospecting for the extraction of rare earth metals. Through the Blake Plateau, I argue that much of what we know about the ocean has been bound up with the images and technologies involved in natural resource extraction. The second chapter indexes the ocean’s turbulent ecology, asking how we dispense with the biases of land to imagine the ocean on its own terms. The third and final chapter, *Aqua communi*, proposes the ocean column at the Blake Plateau as a research and cultural center that materializes the ocean in all its fluid resistance to land.”

Aqua
Firma
Incognita
Communi

Blake Plateau, 30°07'07.2"N 76°17'26.5"W

United Nations
Convention on the Law of the Sea

1982



1. This Part applies to the Area.
2. Activities in the Area shall be governed by the provisions of this Part.
3. The requirements concerning deposit of, and publicity to be given to, the charts or lists of geographical coordinates showing the limits referred to in article 1, paragraph 1(1), are set forth in Part VI.
4. Nothing in this article affects the establishment of the outer limits of the continental shelf in accordance with Part VI or the validity of agreements relating to delimitation between States with opposite or adjacent coasts.

Article 135
Legal status of the superjacent waters and air space

Neither this Part nor any rights granted or exercised pursuant thereto shall affect the legal status of the waters superjacent to the Area or that of the air space above those waters.

SECTION 2. PRINCIPLES GOVERNING THE AREA

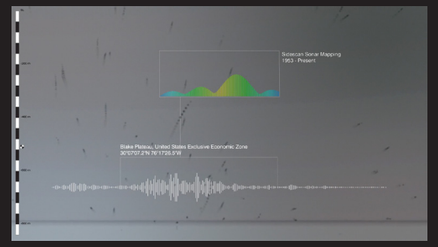
Article 136
Common heritage of mankind

The Area and its resources are the common heritage of mankind.

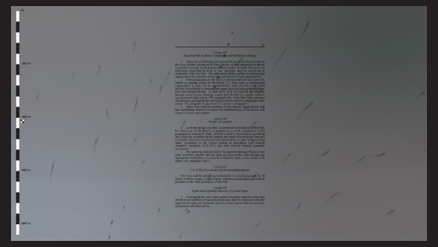
Article 137
Legal status of the Area and its resources

1. No State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty or sovereign rights nor such appropriation shall be recognized.
2. All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, may

The Area and its resources are the common heritage of mankind.



2. All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act.



Article 139
Responsibility to ensure compliance and liability for damage

1. States Parties shall have the responsibility to ensure that activities in the Area, whether carried out by States Parties, or state enterprises or natural or juridical persons which possess the nationality of States Parties or are effectively controlled by them or their nationals, shall be carried out in conformity with this Part. The same responsibility applies to international organizations for activities in the Area carried out by such organizations.
2. Without prejudice to the rules of international law and Annex III, article 22, damage caused by the failure of a State Party or international organization to carry out its responsibilities under this Part shall entail liability; States Parties or international organizations acting together shall bear joint and several liability. A State Party shall not however be liable for damage caused by any failure to comply with this Part by a person whom it has sponsored under article 153, paragraph 2(b), if the State Party has taken all necessary and appropriate measures to secure effective compliance under article 153, paragraph 4, and Annex III, article 4, paragraph 4.
3. States Parties that are members of international organizations shall take appropriate measures to ensure the implementation of this article with respect to such organizations.

Article 140
Benefit of mankind

into particular consideration the interests and needs of developing States and of peoples who have not attained full independence or other self-governing status recognized by the United Nations in accordance with General Assembly resolution 1514 (XV) and other relevant General Assembly resolutions.
2. The Authority shall provide for the equitable sharing of financial and other economic benefits derived from activities in the Area through any appropriate mechanism, on a non-discriminatory basis, in accordance with article 160, paragraph 2(f)(i).

Article 141
Use of the Area exclusively for peaceful purposes

The Area shall be open to use exclusively for peaceful purposes by all States, whether coastal or land-locked, without discrimination and without prejudice to the other provisions of this Part.

Article 142
Rights and legitimate interests of coastal States

1. Activities in the Area, with respect to resource deposits in the Area which lie across limits of national jurisdiction, shall be conducted with due regard to the rights and legitimate interests of any coastal State across whose jurisdiction such deposits lie.

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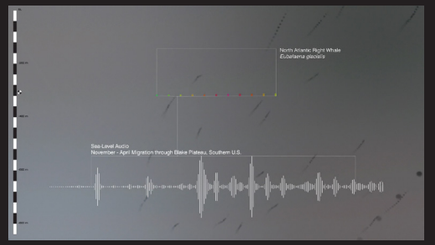
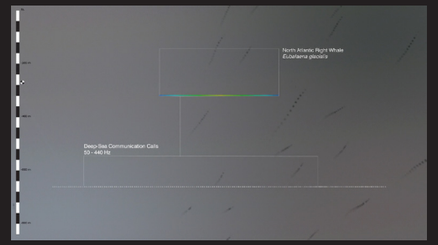




of the Enterprise and the domestic technology of developing States, particularly by providing opportunities to personnel from the Enterprise and from developing States for training in marine science and technology and for their full participation in activities in the Area.

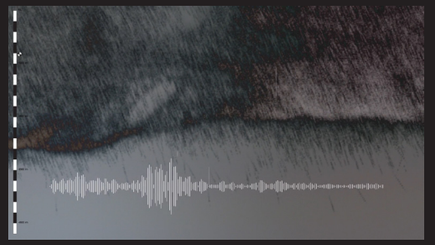
Article 145
Protection of the marine environment

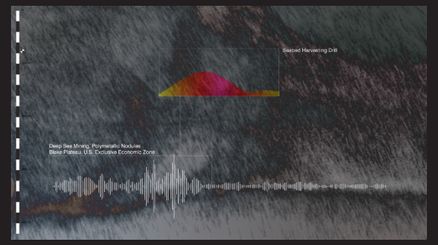
Necessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities. To this end the Authority shall adopt appropriate rules, regulations and procedures for *inter alia*:

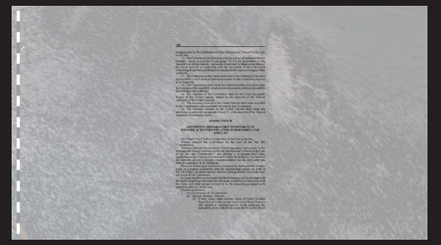
(a) the prevention, reduction and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful effects of such activities as drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities;
(b) the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment.

ecological balance of the marine environment,

drilling, dredging, excavation,







Aqua Firma

Slide 4

Narration:

"The project begins with *aqua firma* and the long-standing practice of making the sea into land, governable and extractable through terrestrial logics."

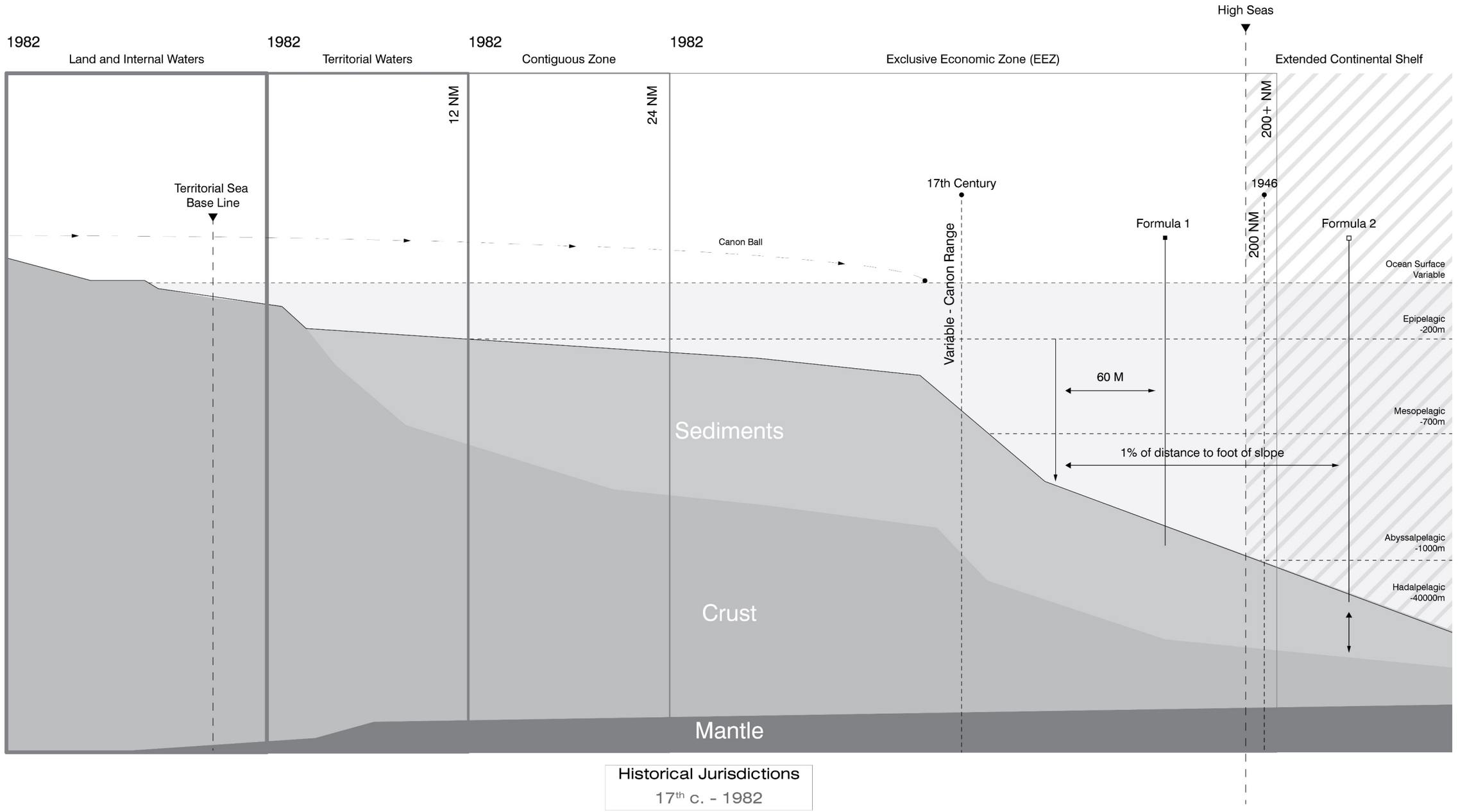
Georg Braun, Franz Hogenberg, Simon Novellanus, et. al., map of Venice (1575).

Slide 5

Narration:

“The phrase *terraferma* originated in 16th-century Venice to describe the dry ground situated beyond the famously amphibious capital city. As Venice sought to expand its dominion, it conquered increasing swaths of *terraferma*, solid ground. The opposition between land and the ocean has long structured Western ways of governing and inhabiting the earth. Instead, I want to think with the ocean in order to view the seas with as much attention as we give to land.

In other words, how might the ocean help us understand land and vice versa?”



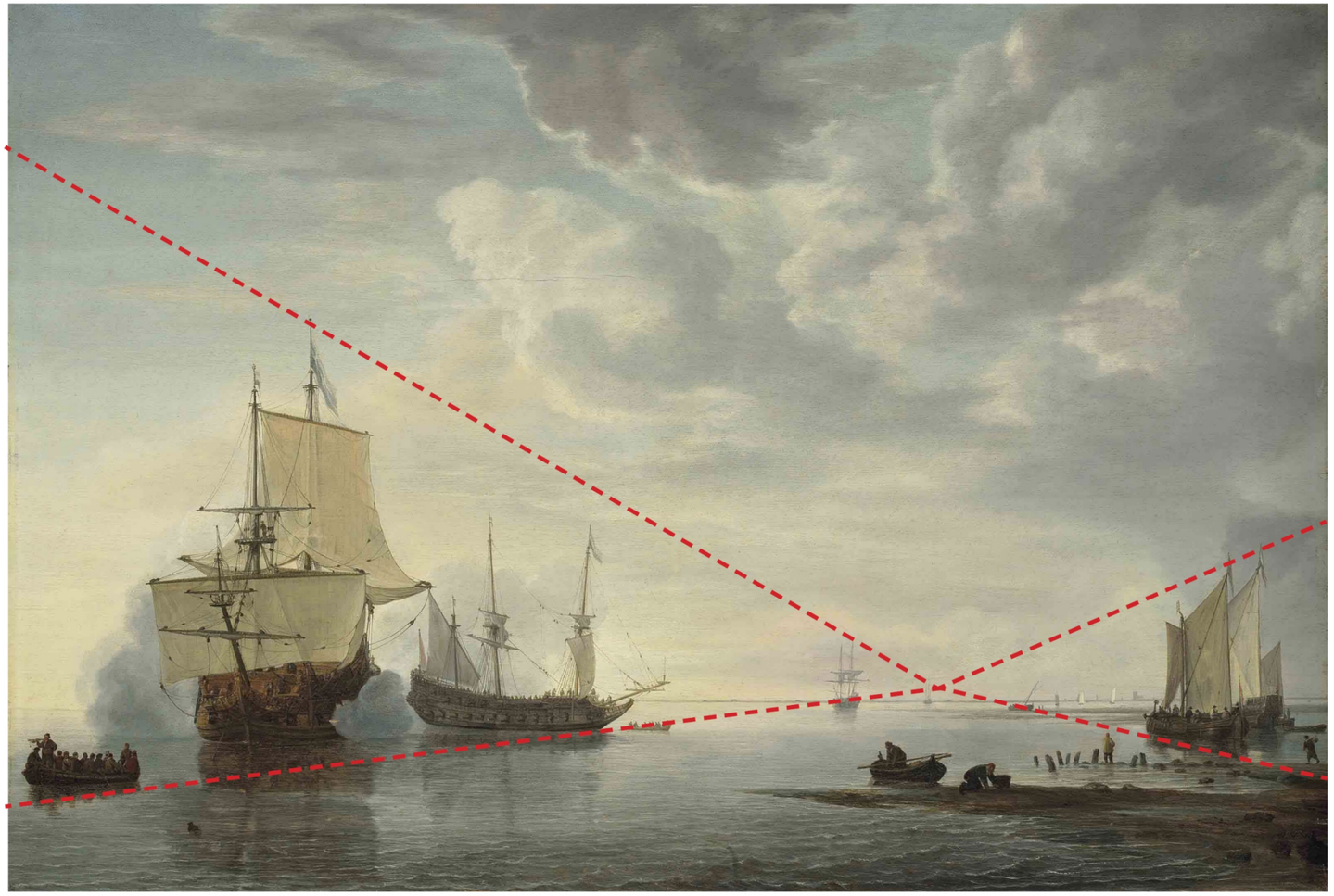
Historical Jurisdictions

17th c. - 1982

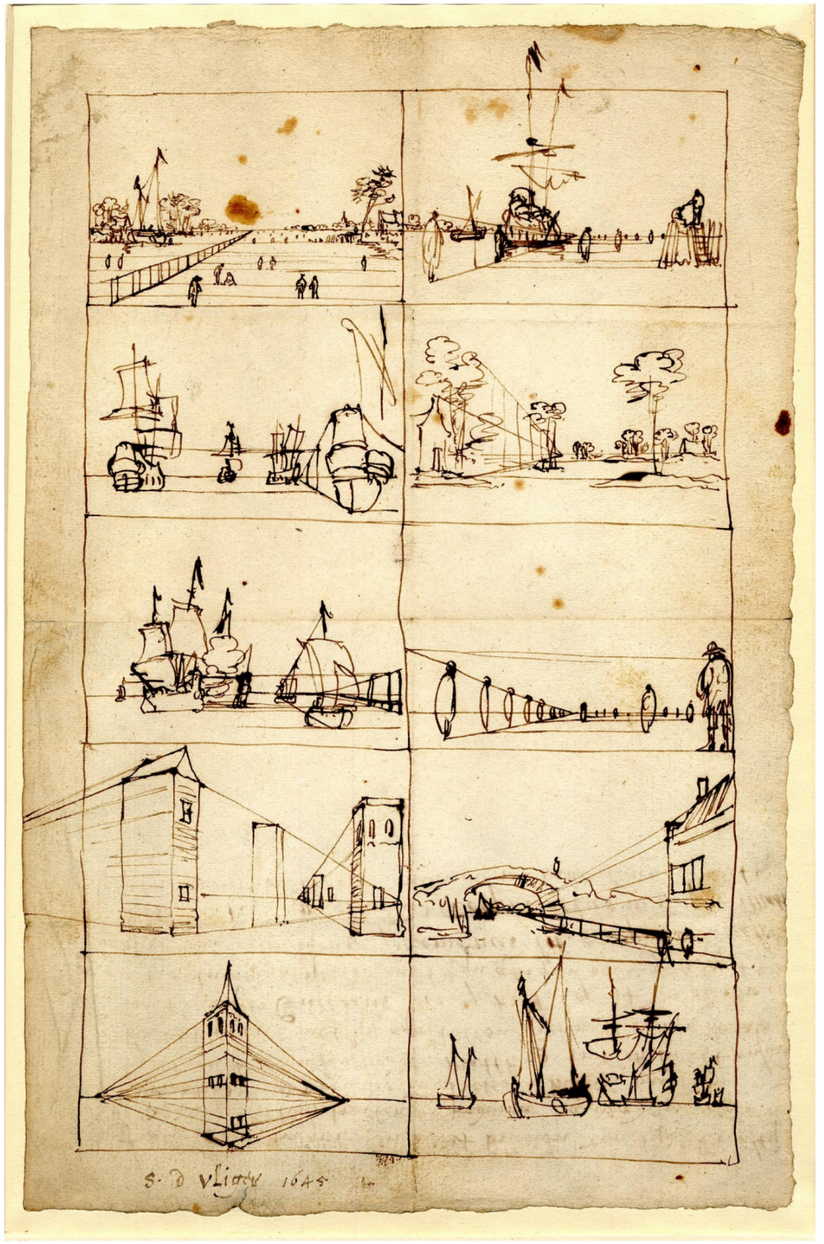
Slide 6

Narration:

“This aspiration is not new and, in fact, has long been part of efforts by governments to claim portions of the ocean as land, governable through the same logics as on land. Over time, state sovereignty expanded over a cross-section of the ocean column. In the 17th century, a country’s territorial claims were limited by the distance of cannonball. In the twentieth-century, land claims began to extend further over the continental shelf. ”



Simon Jacobsz de Vlieger, Seascape, 1653

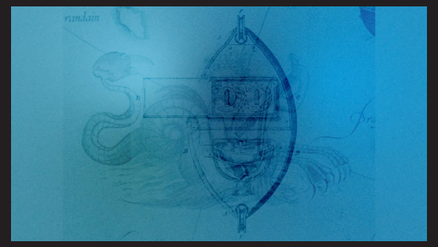


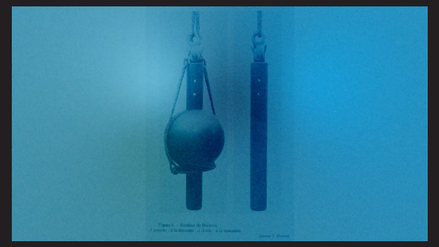
Simon Jacobsz de Vlieger, Study on perspective, 1645

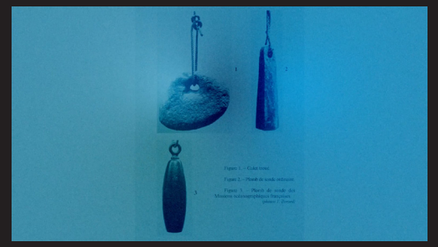
Slides 7-8 Narration:

“As the media theorist Bernhard Siegert illustrates in his 2017 lecture at Princeton School of Architecture, *Architectures of the Ocean*, the Dutch landscapist, Vlieger, acutely understood how the ocean befuddled technologies of representation. On the right, we see a study of how the ocean’s formlessness required adapting the sea to resemble grounded trees and architecture in order to be painted in perspective.

Siegert points out that the solution entailed populating seascapes with ship masts that could inscribe linear perspective onto the ocean, effectively rendering the ocean as landscape. For as long as oceans have been considered landscape, they have also been sites of extraction and territorial conquest.”







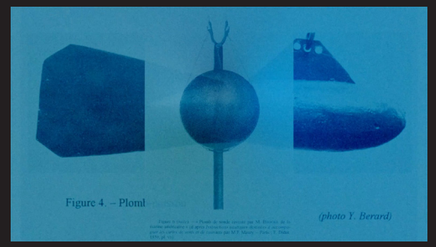
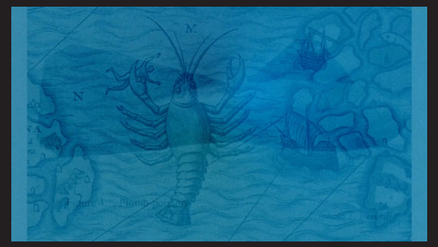
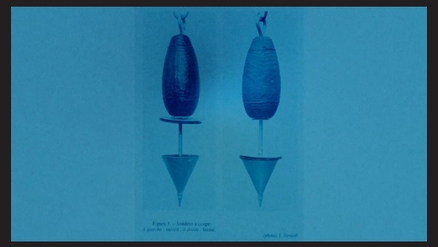
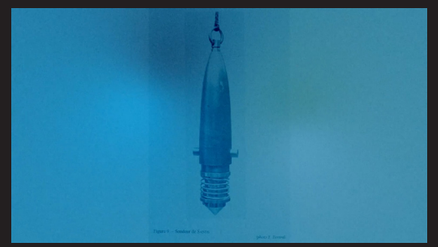


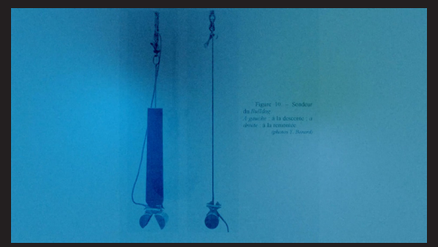
Figure 4. – Ploml

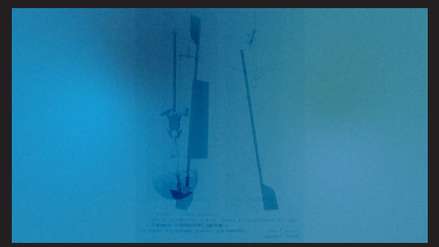
(photo Y. Berard)

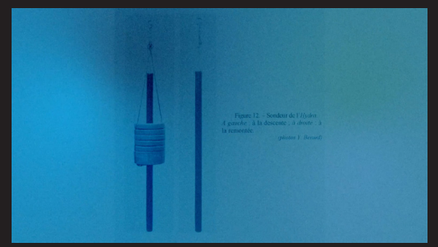


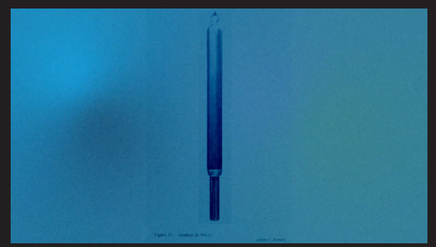


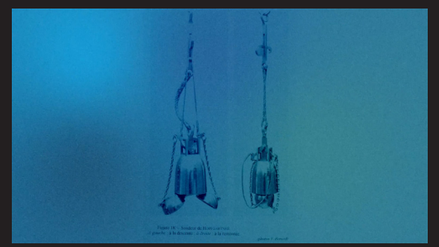


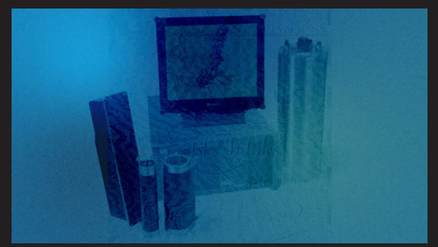


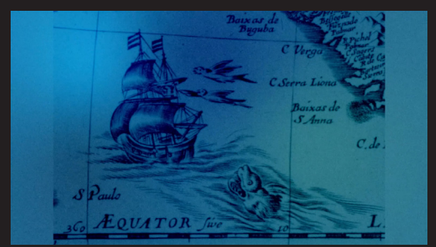


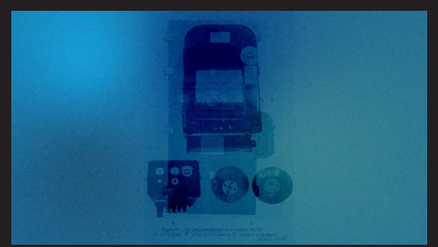


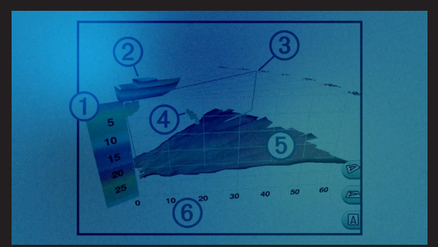








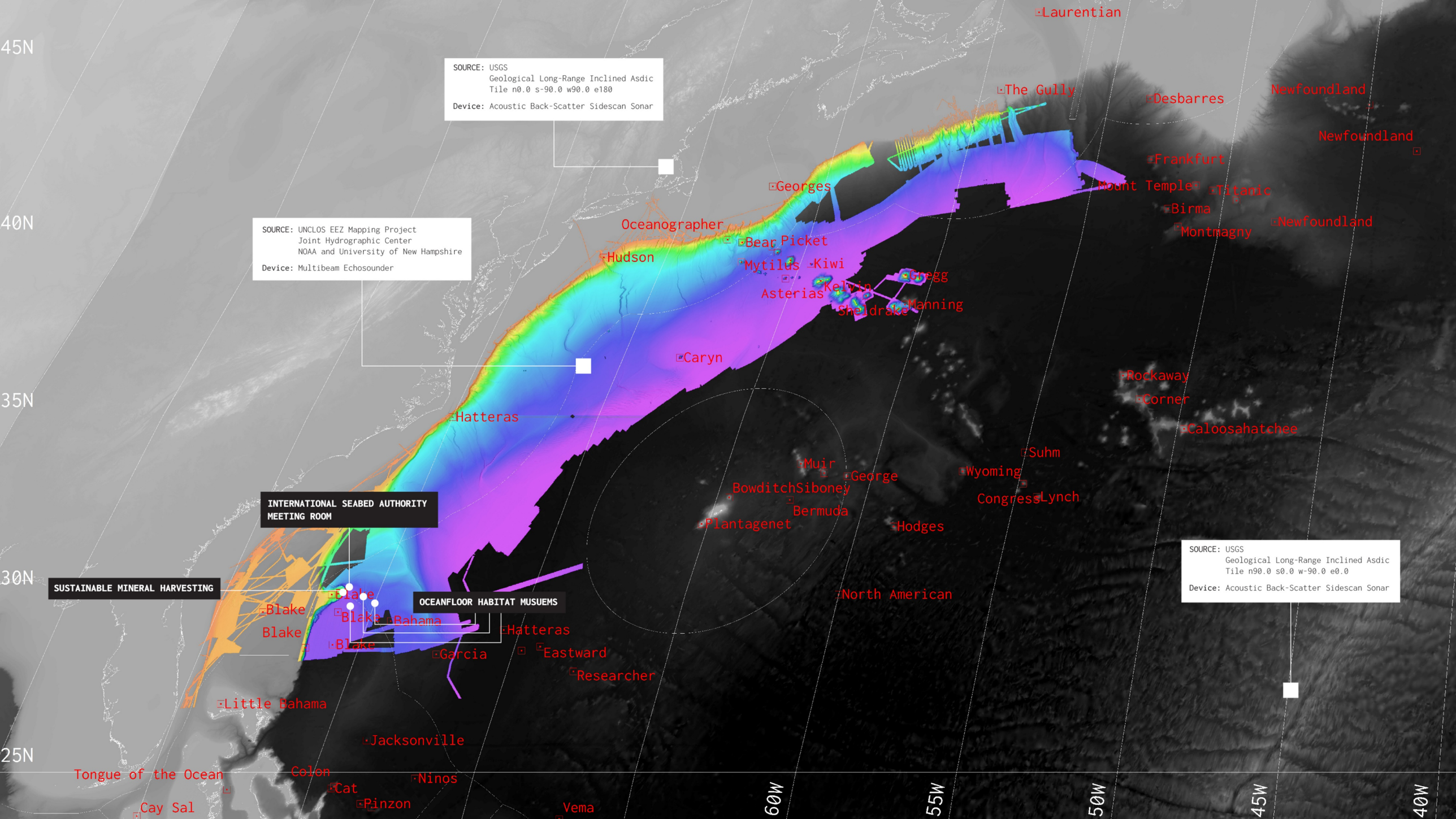




Slide 9

Narration:

"The history of the sea is also a history of measurement, a history of media such as sounding devices, lines with weights, messages in bottles, satellite navigation, and aerial photography, that have been used to understand and make sense of the world's vast littorals. The ocean's inky depths have inspired legend as well as confounded, serving as a set piece for mystery, danger, and the unknown. The Blake Plateau earned its name from a research vessel, the *George S. Blake*, that set sail on an experimental sounding mission in 1880 led by Alexander Agassiz, the son of Harvard professor and theorist of scientific racism, Louis Agassiz. The crew identified the plateau when their sounding lines returned unexpectedly shallow depths, indicating an underwater landform."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SOURCE: UNCLOS EEZ Mapping Project
Joint Hydrographic Center
NOAA and University of New Hampshire
Device: Multibeam Echosounder
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SUSTAINABLE MINERAL HARVESTING
OCEANFLOOR HABITAT MUSUEMS
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Geological Long-Range Inclined Asdic
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Mount Temple
Titanic
Birma
Montmagny
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Georges
Oceanographer
Bear
Picket
Hudson
Mytilus
Kiwi
Gregg
Asterias
Kelvin
Sheldrake
Manning
Caryn
Rockaway
Corner
Caloosahatchee
Hatteras
Suhm
Muir
George
Wyoming
Bowditch
Siboney
Congress
Lynch
Bermuda
Plantagenet
Hodges
North American
Blake
Blake
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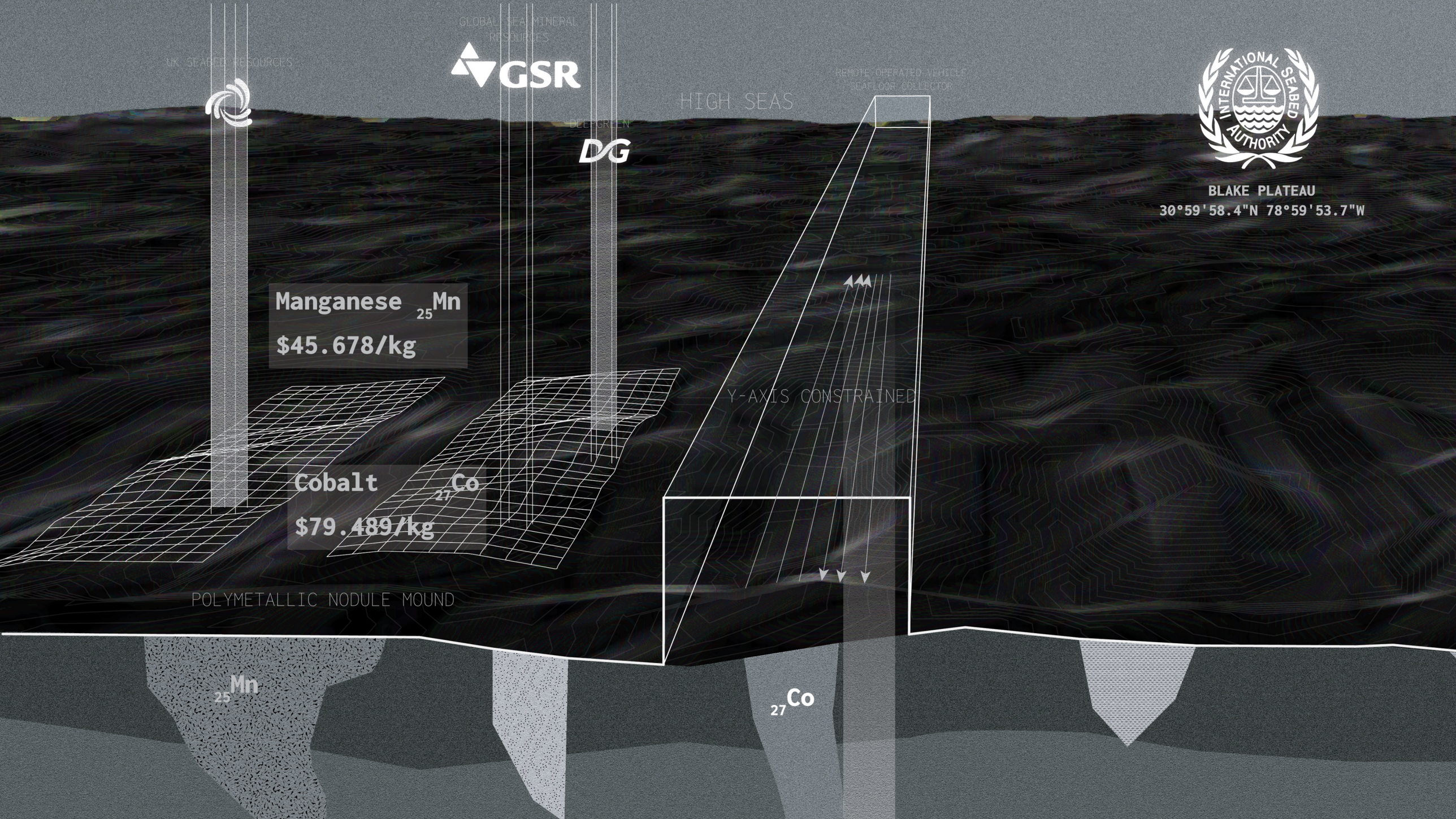
Blake
Blake
Bahama
Hatteras
Garcia
Eastward
Researcher
Little Bahama
Jacksonville
Tongue of the Ocean
Colon
Cat
Ninos
Pinzon
Cay Sal
Vema

Slide 10

Narration:

“In order to claim the Blake Plateau as land, it has first had to be visualized. While all maps are abstractions, projections of the deep-sea have exaggerated the circuits of quantification and interpretation that underly all cartographic operations. Because very few people have seen below several meters into the sea, the oceans are primarily experienced as two-dimensional images. What’s more, because of the ocean’s obscurity, its representations have drawn little scrutiny despite clear biases.

Maps of the ocean reveal the intentions of their users. In the case of the ocean, this has meant depicting those areas which are the most economically or strategically valuable.”


UK SEABED RESOURCES
GLOBAL SEA MINERAL RESOURCES
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INTERNATIONAL SEABED AUTHORITY
BLAKE PLATEAU
30°59'58.4"N 78°59'53.7"W
Manganese 25Mn
$45.678/kg
Cobalt 27Co
$79.489/kg
Y-AXIS CONSTRAINED
POLYMETALLIC NODULE MOUND
25Mn
27Co

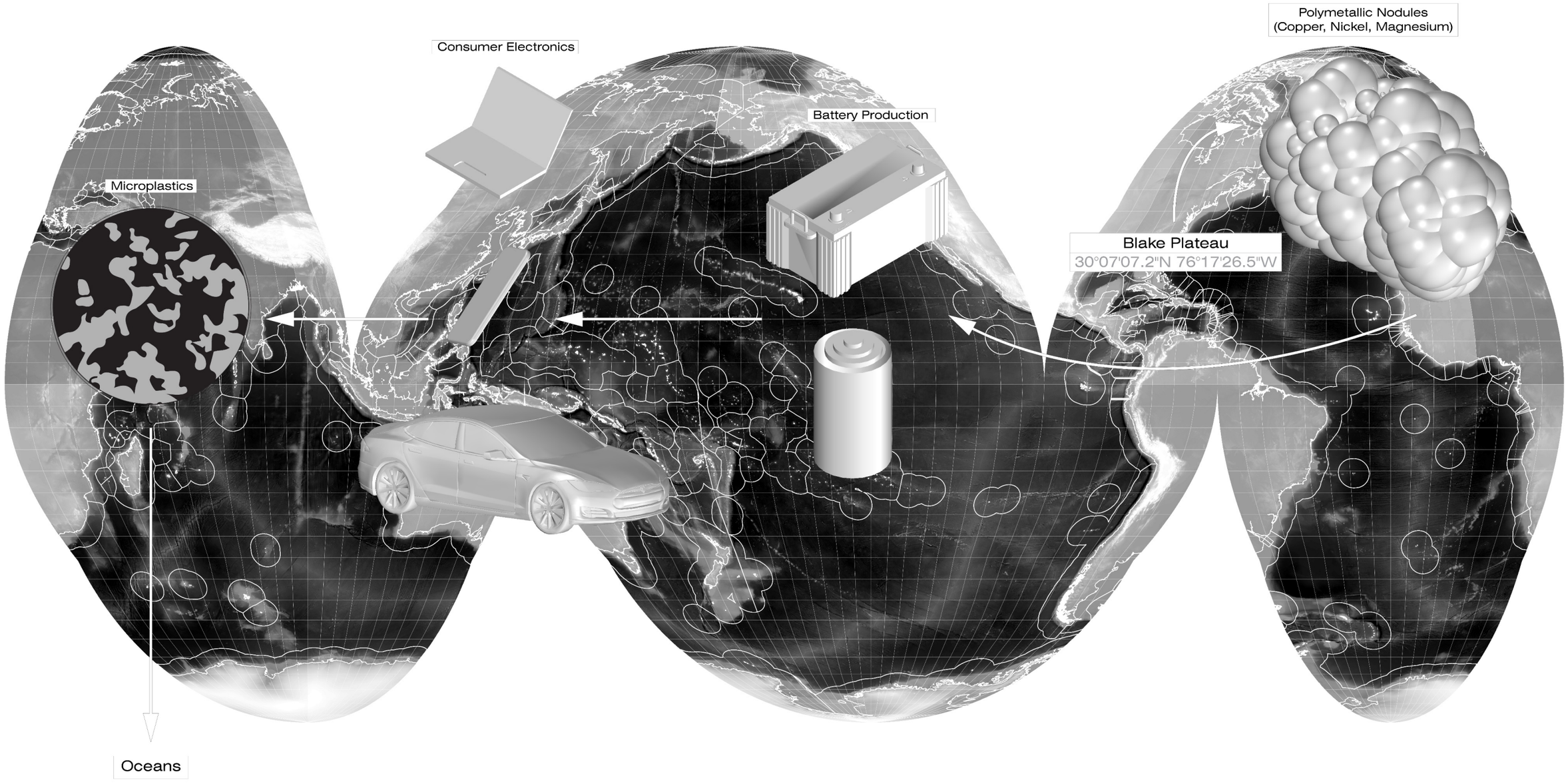
Slide 11

Narration:

“The Blake Plateau is one of these areas. It is a submarine landform at the edge of the continental shelf about 300 miles offshore from the southeast coast of the United States and about 80 meters underwater. The Blake Plateau is currently being explored for deep-sea mining of rare earth metals such as cobalt that are used in the manufacturing of digital devices.

The Blake Plateau, sits within the “Exclusive Economic Zone,” or E.E.Z., of the United States. Because of the possibility for profit, the world’s E.E.Z.’s are the subject of most deep-sea research and mapping, often undertaken as partnerships between academic institutions and mine planners.

The transformation of the site from a pelagic outpost into land took place through its representation via sensors and devices for the purposes of plotting out natural resource reserves.”


Polymetallic Nodules
(Copper, Nickel, Magnesium)
Consumer Electronics
Battery Production
Microplastics
Blake Plateau
30°07'07.2"N 76°17'26.5"W
Oceans

Slide 12

Narration:

“Rare earth minerals are embedded in the site’s ground as small lumps of mineral rich matter called polymetallic nodules. These are extracted through remotely operated vehicles that prowl the ocean floor, scraping away these pieces of rock and releasing into the ocean large, unregulated plumes of miscellaneous sediment and pollution. The minerals dredged up through deep-sea mining are instrumental in the manufacturing of batteries used in consumer electronics. In this way, ocean floor mineral deposits are part of a planetary network of mining, refinement, industrial production, and shipping, that ceaselessly produces landscapes of waste. With the prevailing tech industry doctrine of planned obsolescence, it is certain that the oceans will continue to absorb the runoffs of digital consumerism, most visibly in the carboniferous pollution of microplastics.”

February 27, 1981

Third United Nations Conference on the Law of the Sea, informal meeting of the Drafting Committee,
United Nations Headquarters, New York.

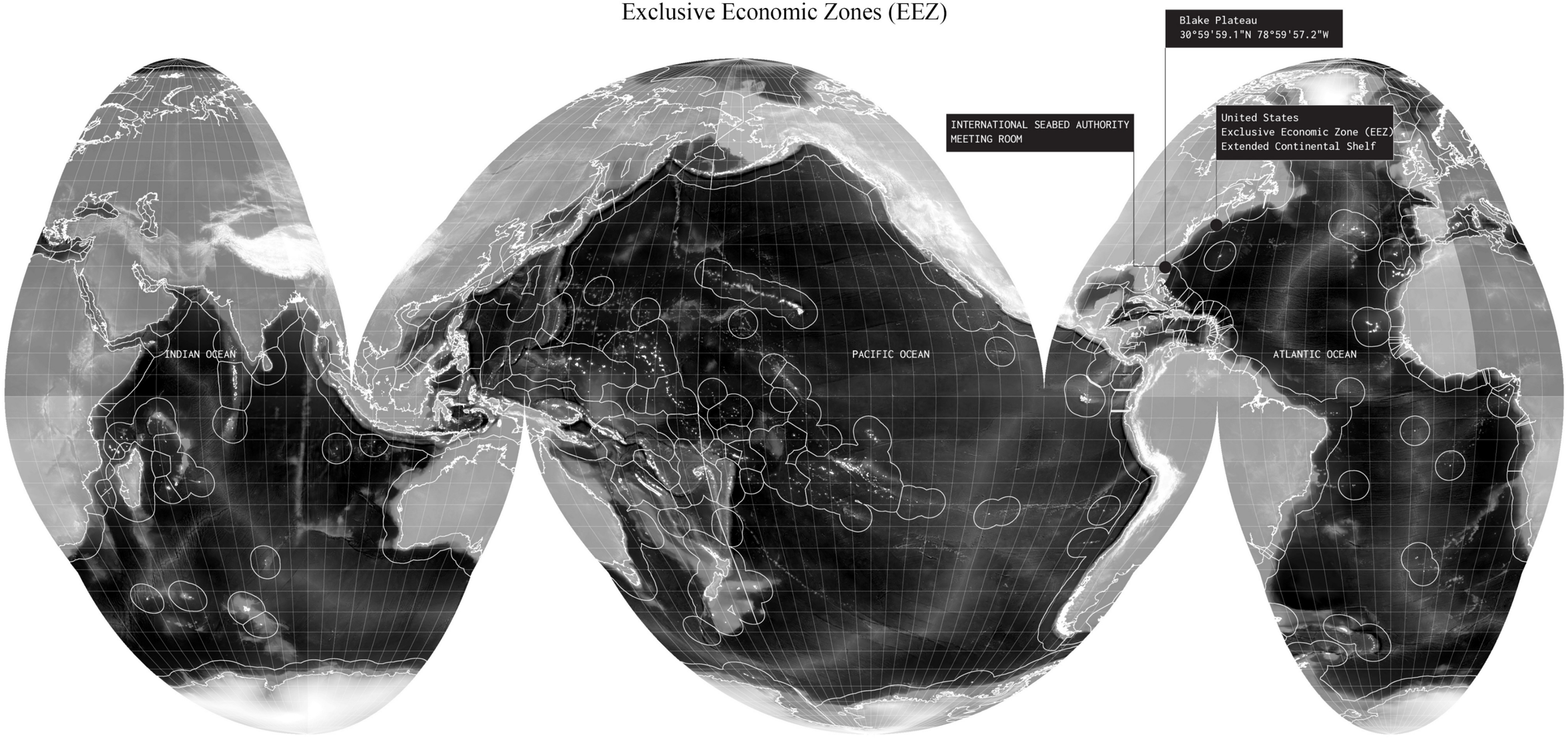
Slide 13

Narration:

“In the early 1980s, maritime sovereignty was dramatically expanded through the passage of the United Nations Convention on the Law of the Seas, an international maritime policy that codified territorial claims in the ocean and set global standards for managing marine resources.”

December 10, 1982

Exclusive Economic Zones (EEZ)



Slide 14 Narration:

“With the passage of the law, land was expanded 300 miles off the coasts of UN member states into the ocean. The convention on the law of the seas codified a further conversion of oceans into land.”

United Nations
Convention on the Law of the Sea

DOCUMENT A/CONF.62/122*

International Seabed Authority

Article 61
Conservation of the living resources

1. The coastal State shall determine the allowable catch of the living resources in its exclusive economic zone.

2. The coastal State, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation. As appropriate, the coastal State and competent international organizations, whether subregional, regional or global, shall cooperate to this end.

3. Such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors, including the economic needs of coastal fishing communities and the special requirements of developing States, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether subregional, regional or global.

4. In taking such measures the coastal State shall take into consideration the effects on species associated with or dependent upon harvested species with a view to maintaining or restoring populations of such associated or dependent species above levels at which their reproduction may become seriously threatened.

5. Available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks shall be contributed and exchanged on a regular basis through competent international organizations, whether subregional, regional or global, where appropriate and with participation by all States concerned, including States whose nationals are allowed to fish in the exclusive economic zone.

United Nations Convention on the Law of the Sea (U.N.C.L.O.S.), Signed 1982, pg. 42

Article 136
Common heritage of mankind

The Area and its resources are the common heritage of mankind.

Article 137
Legal status of the Area and its resources

1. No State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty or sovereign rights nor such appropriation shall be recognized.

2. All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, may only be alienated in accordance with this Part and the rules, regulations and procedures of the Authority.

3. No State or natural or juridical person shall claim, acquire or exercise rights with respect to the minerals recovered from the Area except in accordance with this Part. Otherwise, no such claim, acquisition or exercise of such rights shall be recognized.

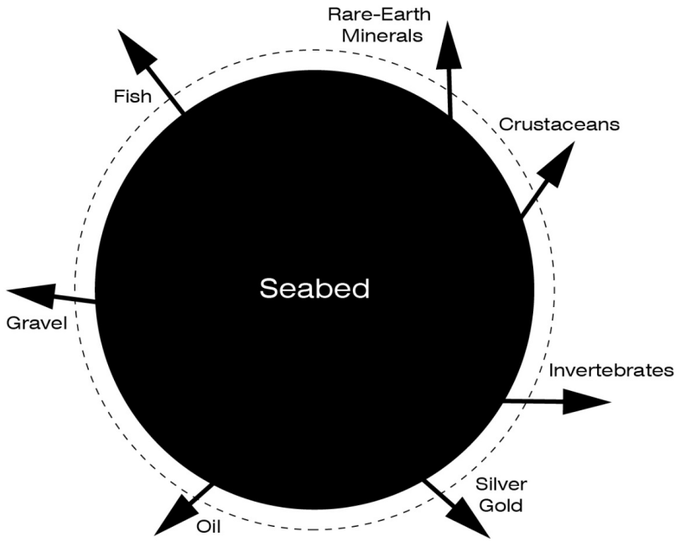
U.N.C.L.O.S., pg. 61

"...the maintenance of the living resources in the exclusive economic zone..."

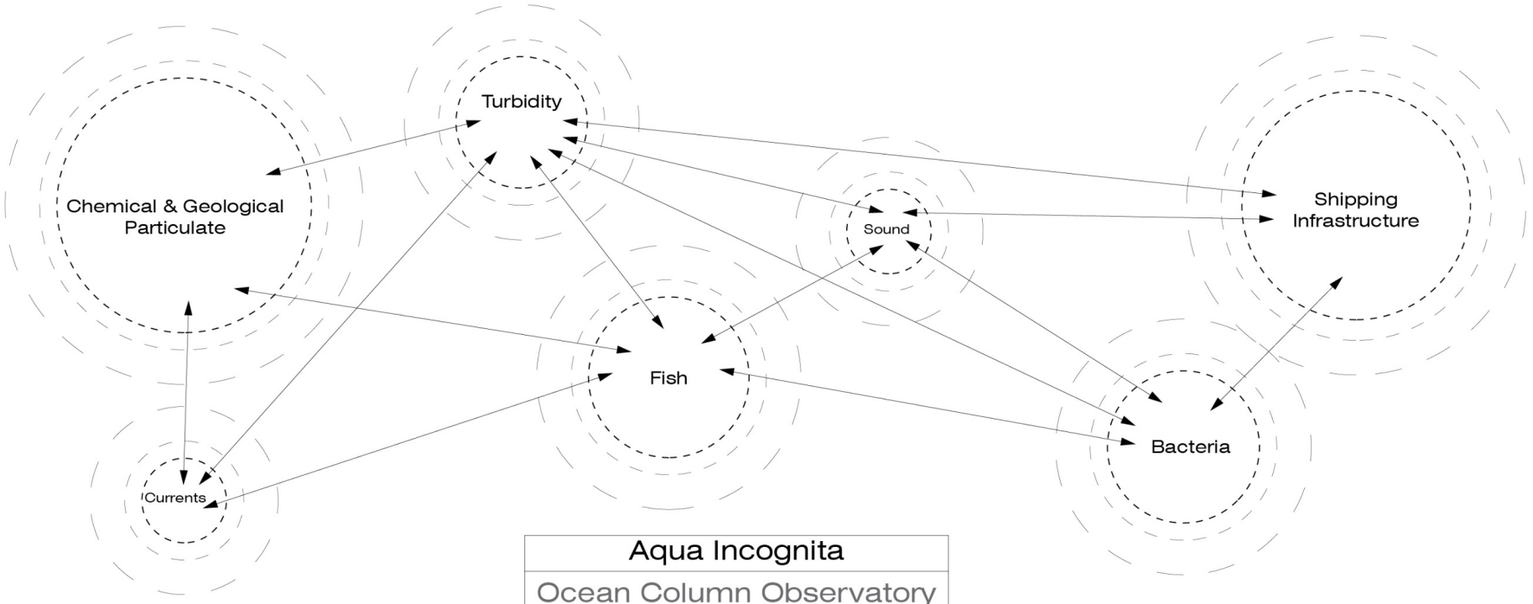
"...designed to maintain or restore populations of harvested species at level shich can product the maximum sustainable yield..."

"All rights in the resources of the Area are vested in mankind as a whole..."

"The Area and its resources are the common heritage of manind."



Aqua Firma
The Area

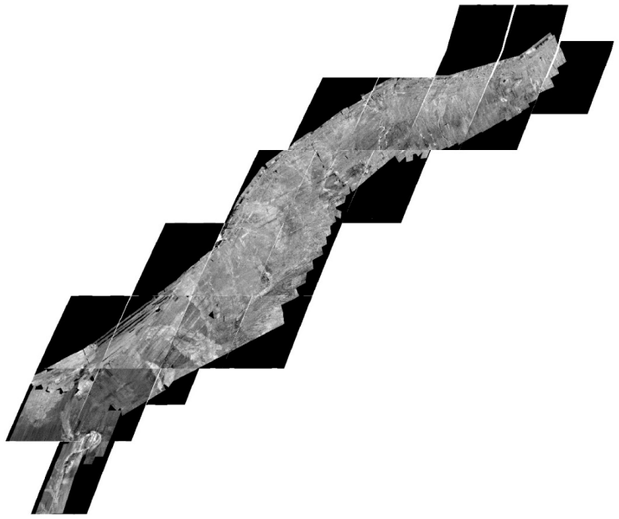


Aqua Incognita
Ocean Column Observatory

Slide 16 Narration:

“My project builds on the UN Convention on the Law of the Seas (U.N.C.L.O.S.) to think past extractive maritime legal frameworks

The UN maritime law classifies the deep sea as simply The Area. It labels The Area as the “Common heritage of mankind,” under the international legal principle of res communis. While claiming the seabed as mankind’s common heritage, the U.N.C.L.O.S. makes no distinction between the mineral and organic entities residing on the ocean floor, instead subsuming all deep-sea matter into the category of natural resources. Moreover, the version of the commons evoked by the U.N.C.L.O.S. serves the interests of extractive enterprises rather than human communities or ocean ecologies.”



U.S. Exclusive Economic Zone

G.L.O.R.I.A. Raster Tiles, 1989

SL

-200 m

-400 m

-600 m

-800 m

Blake Plateau

30°07'07.2"N 76°17'26.5"W

E1 Geological Long Range Inclined Asdic (G.L.O.R.IA.) Sonar

1,000’

Slide 17

Narration:

“After the establishment of U.N.C.L.O.S., and delimitation of the United States E.E.Z., the Blake Plateau become highly represented. Here, a multibeam sonar produces a digital elevation model of the Blake Plateau as part of the Geological Long Range Asdic imaging project. This project produced two-dimensional representations of The Area.

The practices represented by this form of seeing landscape have rendered the ocean as land: *Aqua firma*.”

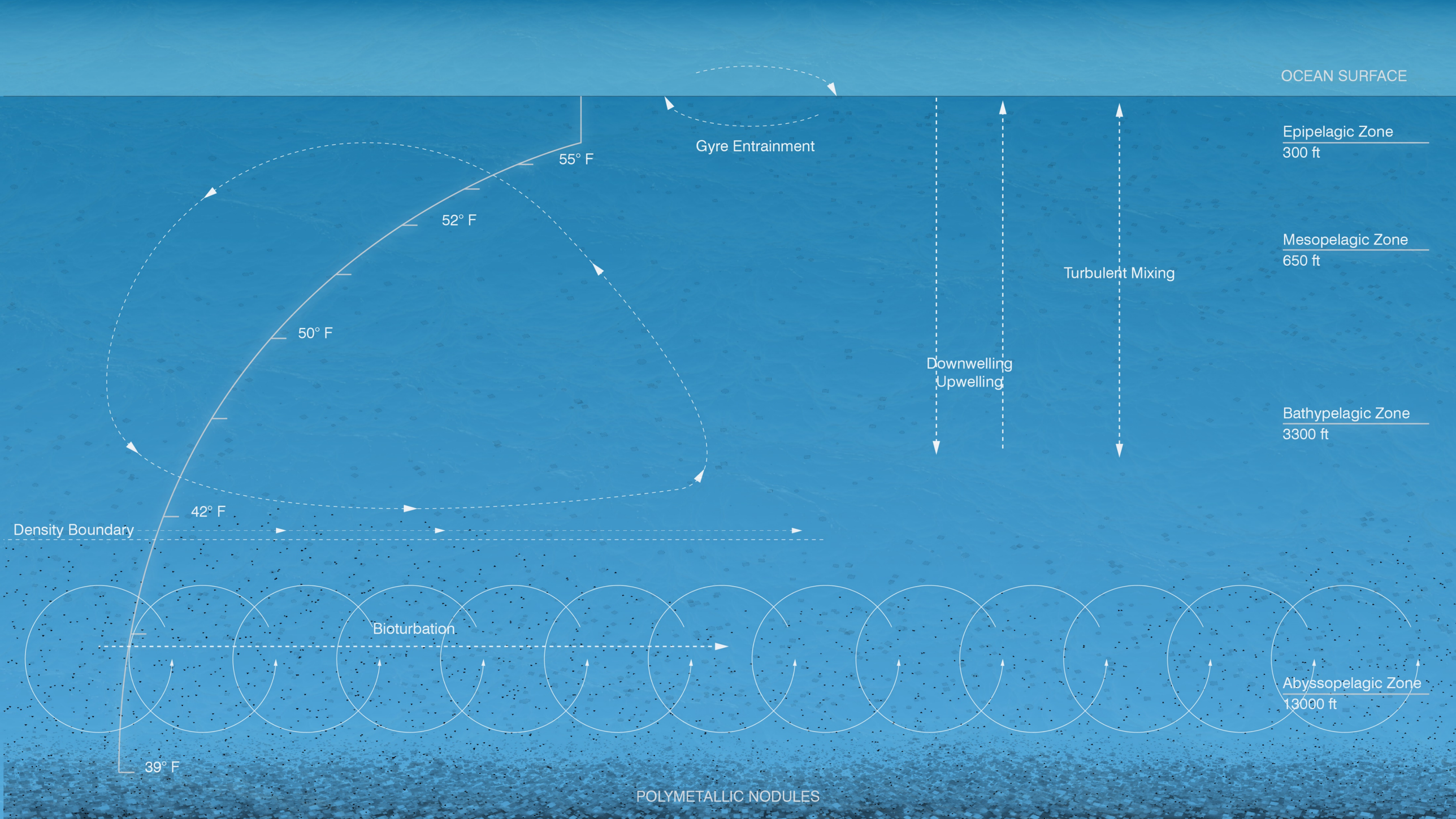
Aqua Incognita

Slide 18

Narration:

“In place of *Aqua Firma*, I propose *Aqua Incognita*, a watery update of land-based ways of knowing the ocean.

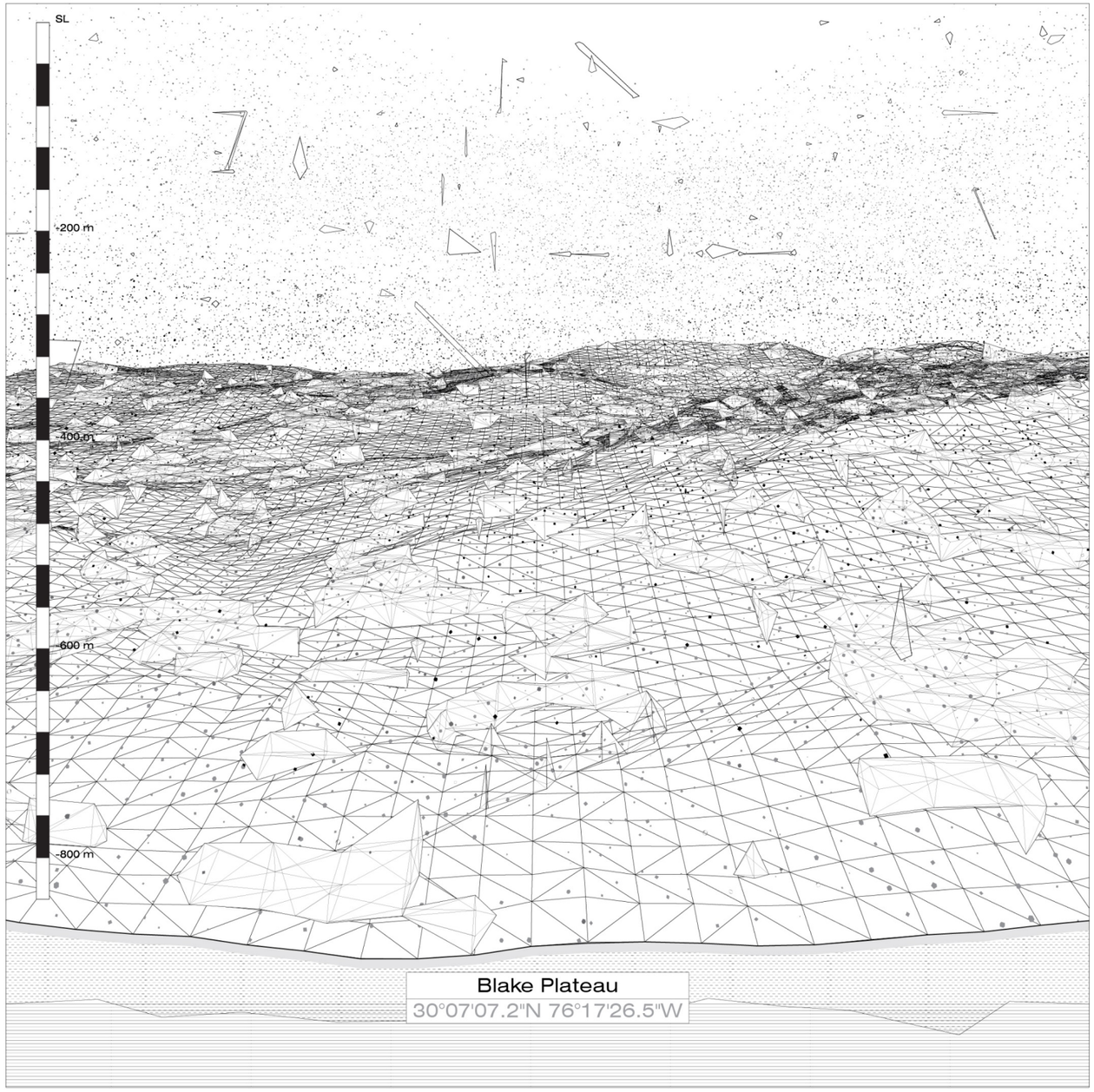
In this chapter, I index the ocean’s ecologies for future decommissioning processes.”


OCEAN SURFACE
Gyre Entrainment
55° F
52° F
50° F
42° F
39° F
Density Boundary
Bioturbation
Downwelling
Upwelling
Turbulent Mixing
Epipelagic Zone
300 ft
Mesopelagic Zone
650 ft
Bathypelagic Zone
3300 ft
Abyssopelagic Zone
13000 ft
POLYMETALLIC NODULES

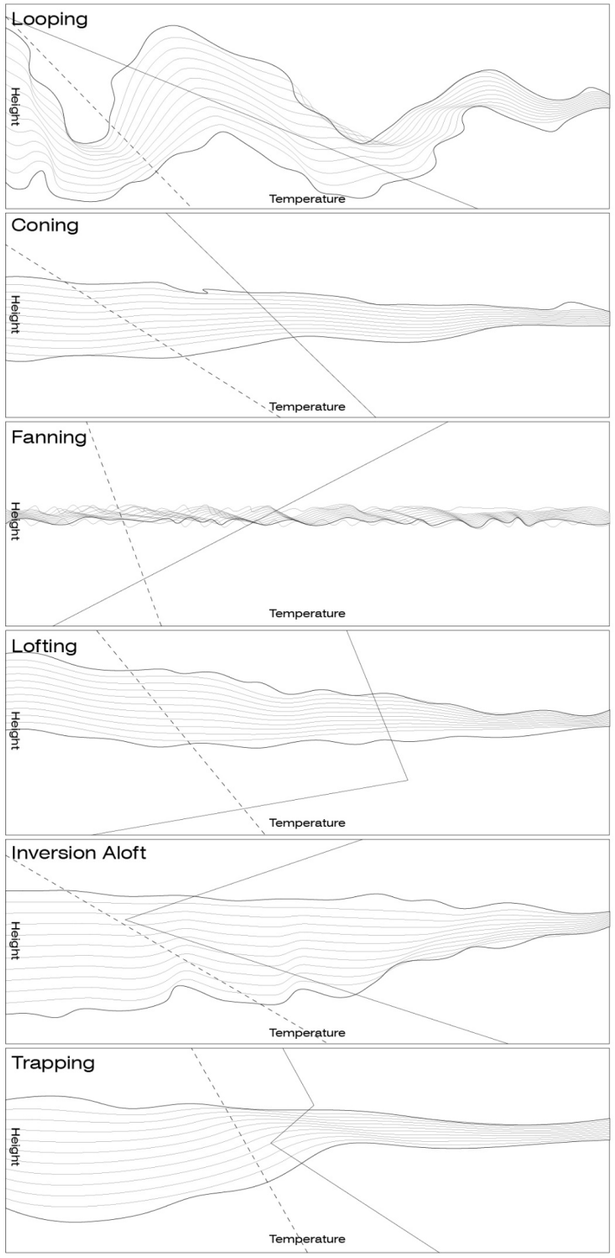
Slide 19

Narration:

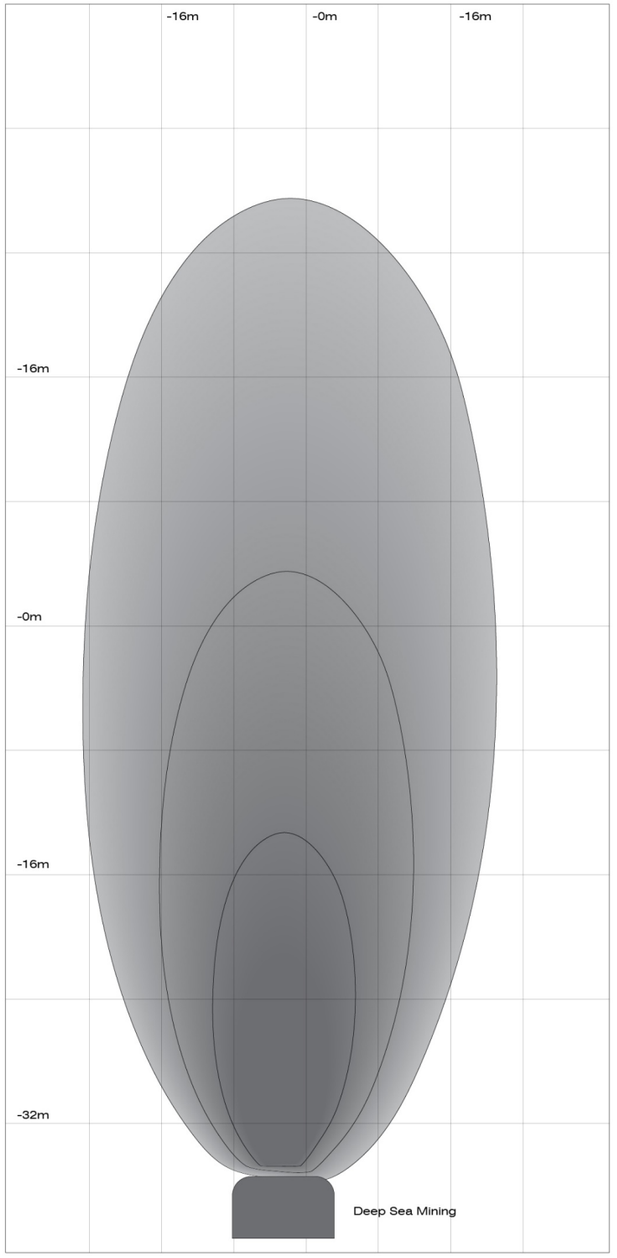
“The flow of objects through the ocean primarily has to do with water temperature and density. Anthropogenic sediments are distributed through the seas via the material processes of gyre entrainment, downwelling, upwelling, turbulent mixing, and bioturbation, to name only a few of the physical processes at play.”



1 Ocean Column Sediment Plume



2 Height/Temperature & Plume Form



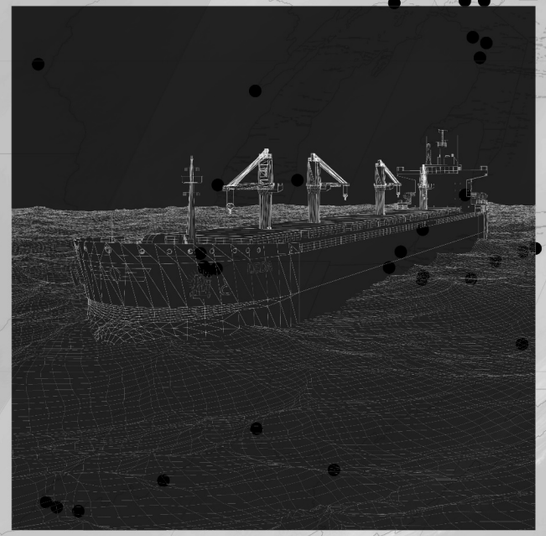
3 Plume Plan

Slide 20

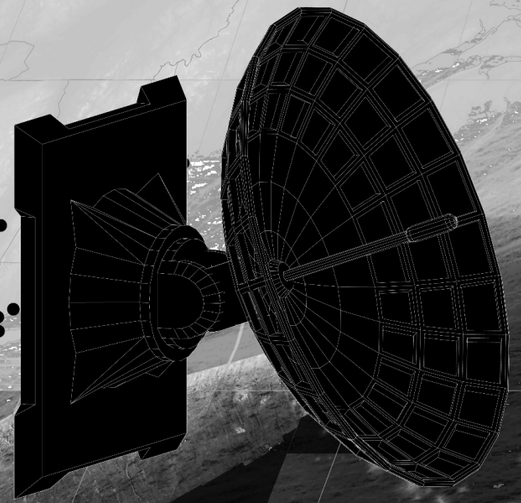
Narration:

“This drawing identifies some of the formal properties of plumes as a crucial ocean topography. At the Blake Plateau, exploration devices prowl the seabed, probing various mineral deposits, sending the site’s basalt soils up into the column.

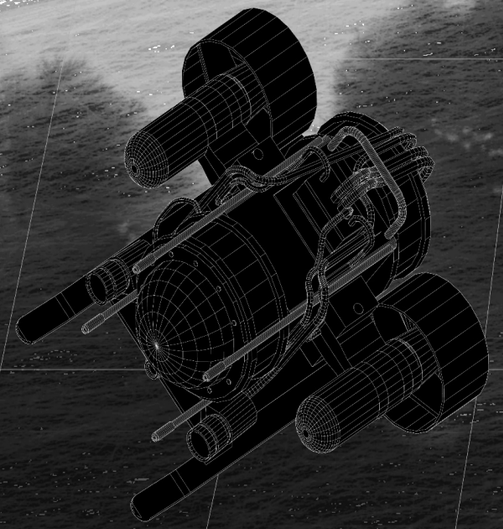
Fields of minuscule sediment and anthropogenic particulate flow through the ocean column guided by water densities and currents. Shipping and industrial uses of the ocean disperse matter picked up from around the globe into the column. These geological specimens mix with the rocky clouds naturally released from the ocean floor. Seeing the ocean column as mineral challenges assumptions about viscosity and transparency that depict the ocean as frictionless space.”



Commercial Shipping



Navigation and Communications



Oceanographic Research

45N

40N

35N

30N

25N

80W

75W

70W

65W

60W

55W

50W

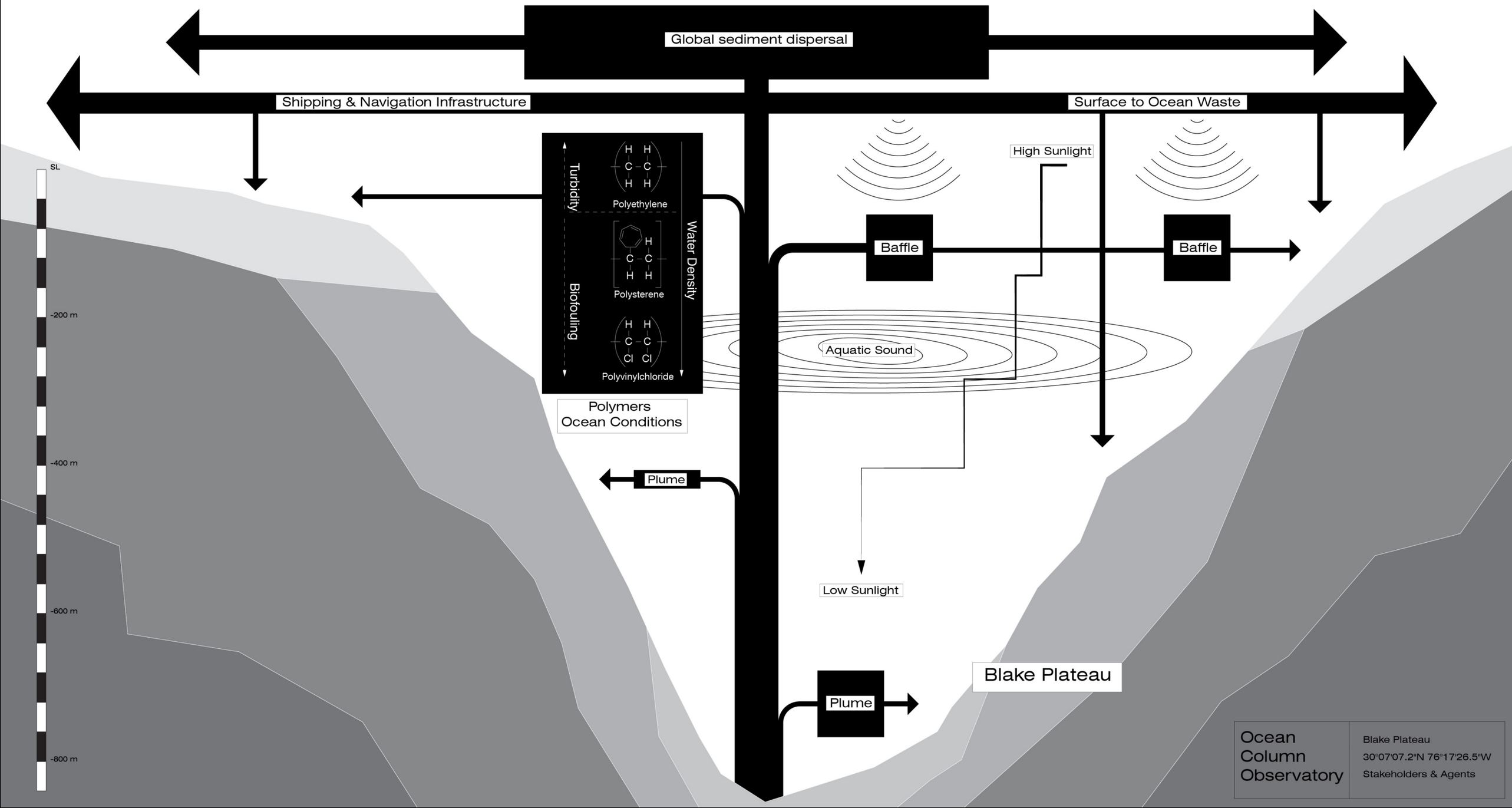
45W

40W

Slide 21

Narration:

“Shipping, commercial fishing, deep sea mining, and oceanographic research all interact with and, in different ways, take advantage of various ocean characteristics such as buoyancy or depth.”


Global sediment dispersal
Shipping & Navigation Infrastructure
Surface to Ocean Waste
SL
-200 m
-400 m
-600 m
-800 m
Turbidity
Biofouling
Water Density
Polyethylene
Polysterene
Polyvinylchloride
Polymers
Ocean Conditions
High Sunlight
Baffle
Baffle
Aquatic Sound
Low Sunlight
Plume
Plume
Blake Plateau
Ocean
Column
Observatory
Blake Plateau
30°07'07.2"N 76°17'26.5"W
Stakeholders & Agents

Slide 22

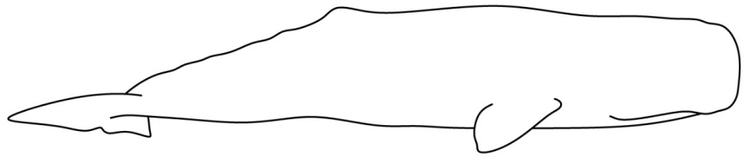
Narration:

“Boats on the ocean surface deposit sediment and microorganisms traveling in their ballast water. These ships along with other industrial practices including oil drilling cause noise pollution. Microplastics in the ocean can serve as a habitat for bacteria and behave differently throughout the column, depending on factors such as water density and salinity. These conditions also affect how bacteria respond to the engineered surfaces of boats and other installation. In most cases, these organisms attach to the these object, causing fouling, itself a significant aspect of ocean ecology.”

MARINE NOISE POLLUTION
0 Hz - 25 kHz

MID-COLUMN BAFFLE

SOFAR CHANNEL



Sperm Whale
10 - 39 Hz

Great White Shark
10 - 800 Hz

Atlantic Bluefin Tuna
20 - 40 Hz

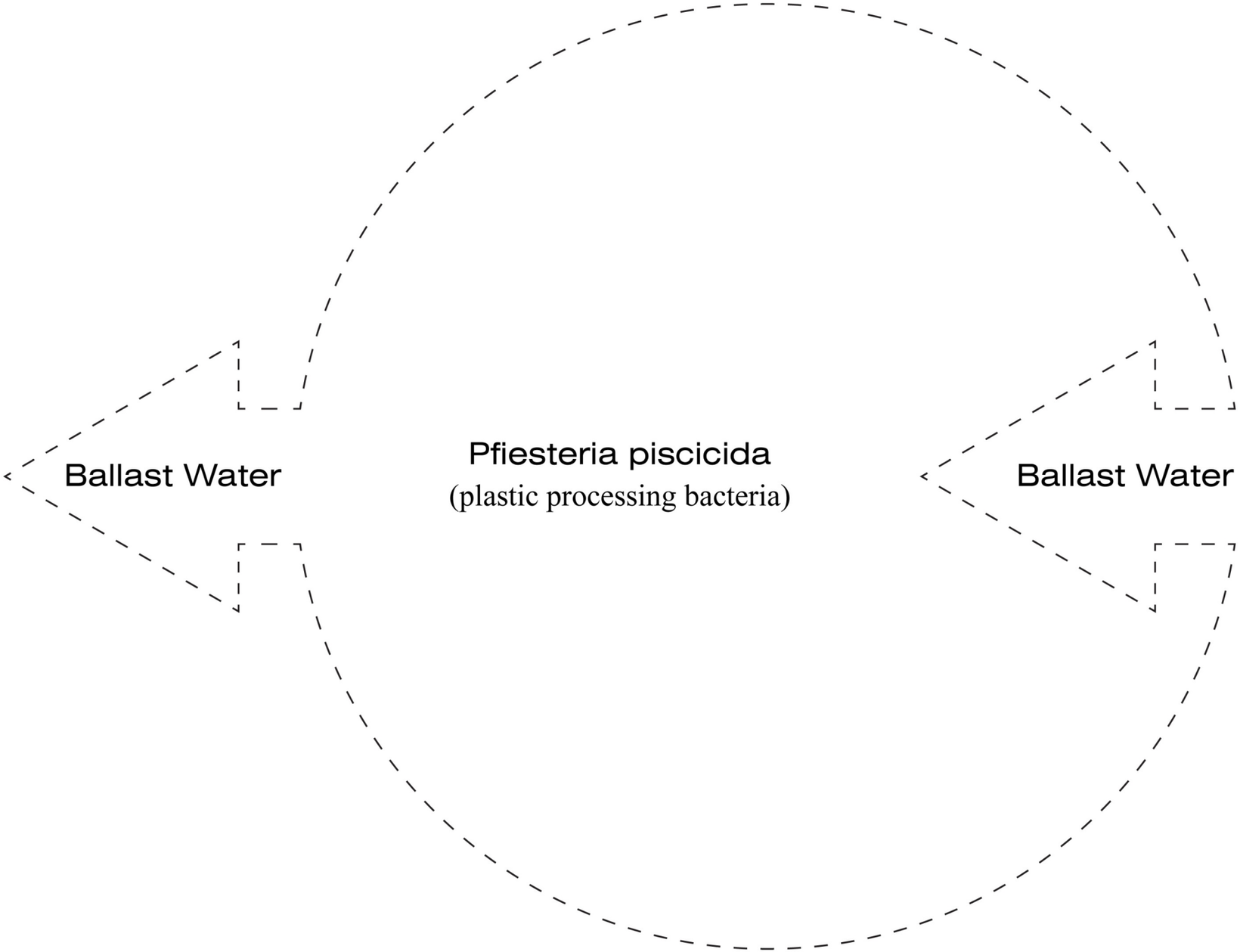
Human
20 Hz - 20 kHz

OMNIDIRECTIONAL BAFFLE

Slide 23 Narration:

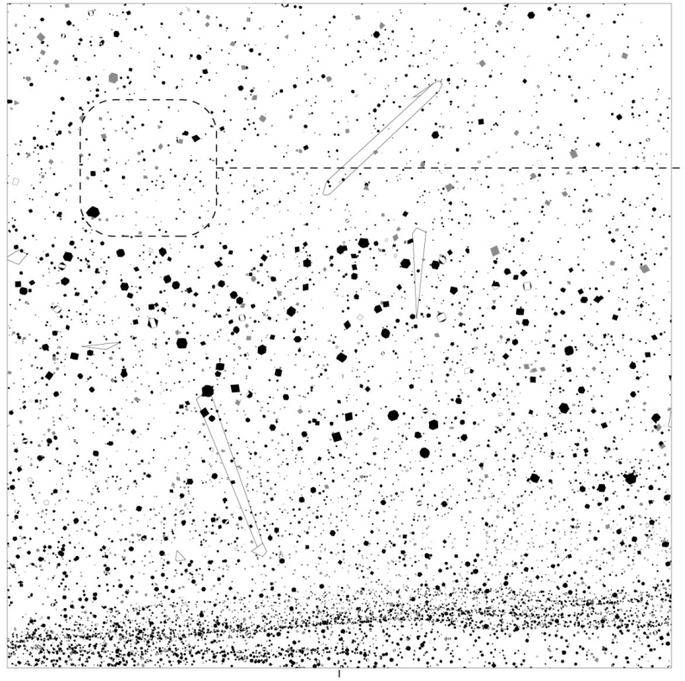
“Marine noise pollution majorly disrupts marine mammals, especially those that communicate using a band of deep-sea known as the S.O.F.A.R. channel where low frequencies travel particularly well.

For organisms which use sound to sense space, noise pollution can have drastic effect.”

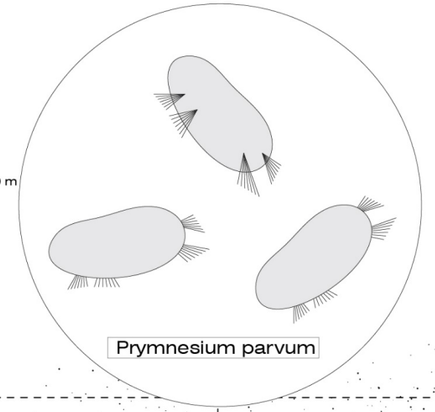

Ballast Water
Pfiesteria piscicida
(plastic processing bacteria)
Ballast Water

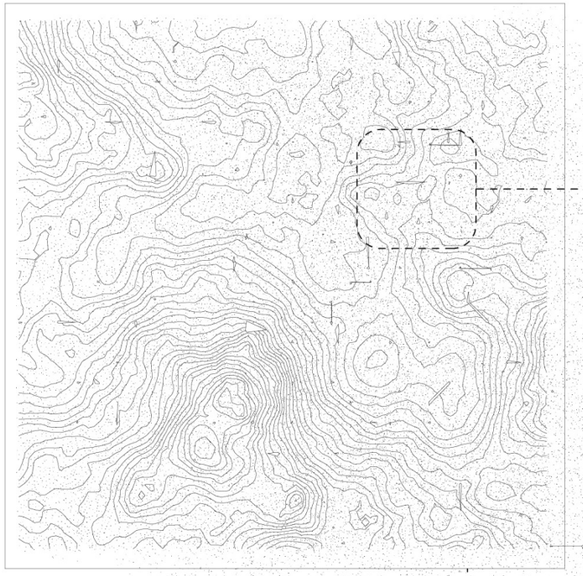
Slide 24 Narration:

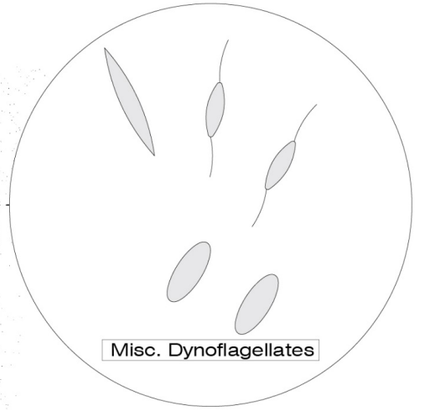
“Ships take up ballast water to make up for differences in weight cause by the unloading of cargo in ports. The water contains geologic and organic matter including bacteria. In their trail, they leave behind a global ecosystem.”

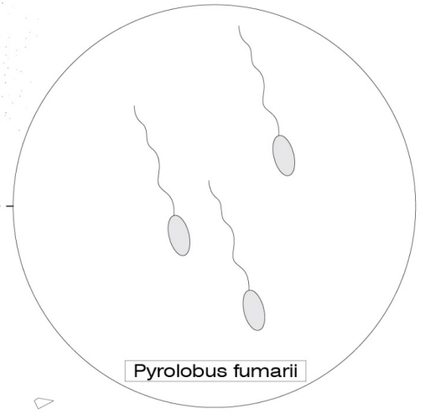


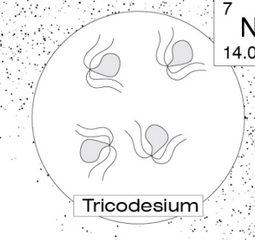
1 Habitat in Microplastic / Ballast Water











7
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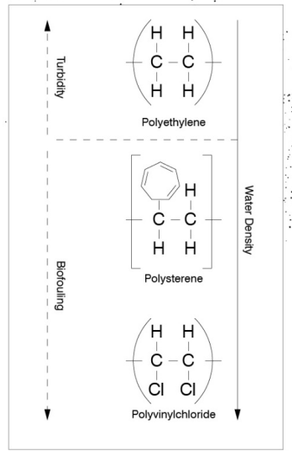
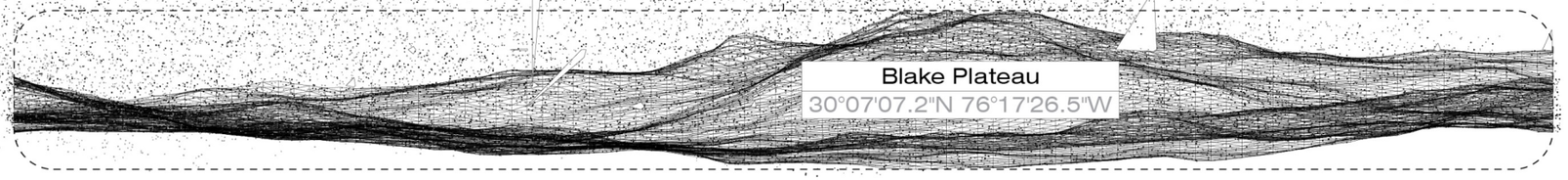
14.007



3 Plastic Chemicals and Water Density



Slide 25 Narration:

“Just as chemical energy travels through organisms, physical energy animates plume.

As floating aggregates of organic and inert miscellany, plumes are mobile densities that confuse the boundary between the mineral and the organic. And, by moving at a planetary scale, plumes provide an important hinge between the Blake Plateau and global networks.”


Aqua Communi

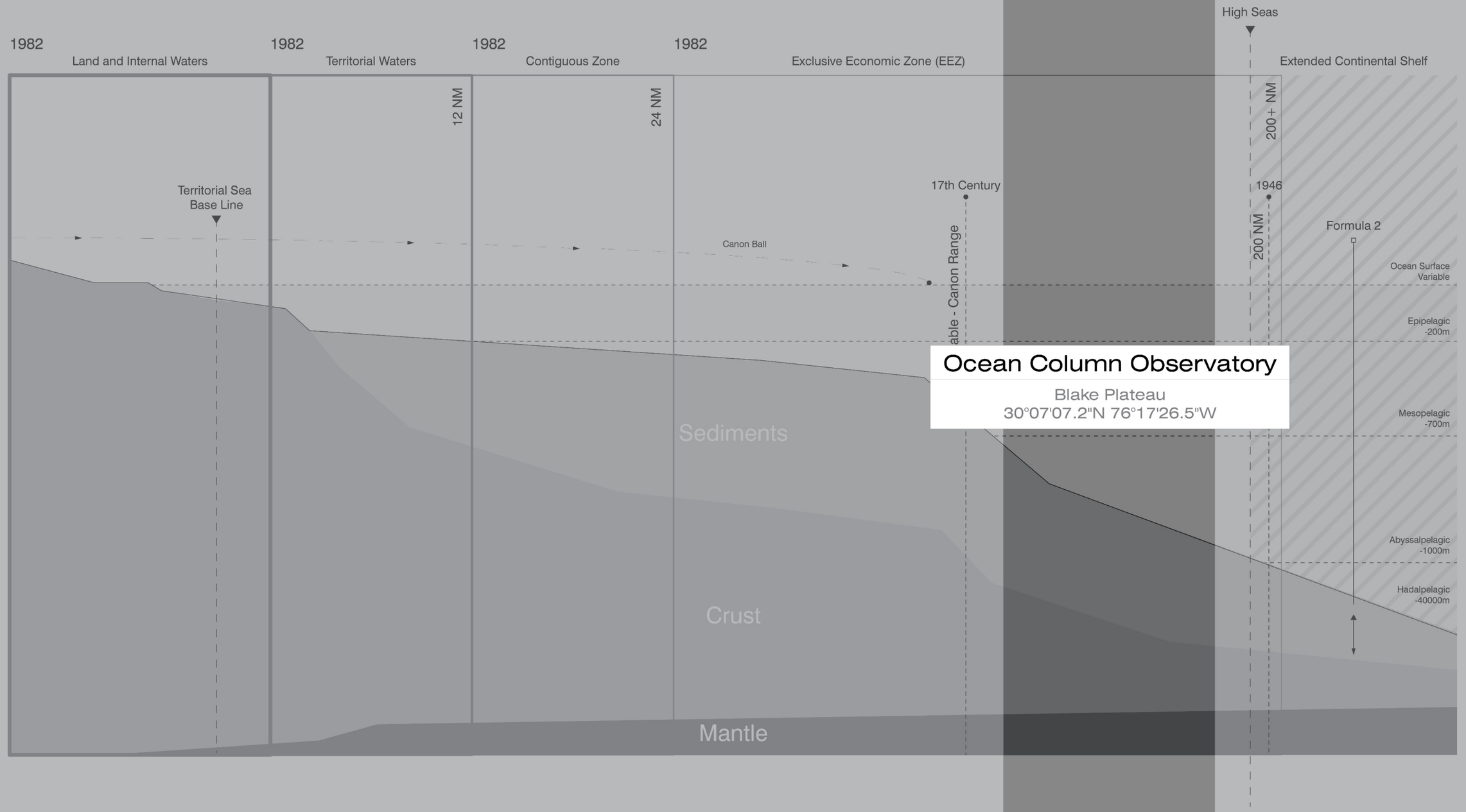
Slide 26

Narration:

“The third chapter of this thesis transitions from *aqua firma* and *aqua incognita*, to *aqua communi*, or an ocean as commons.

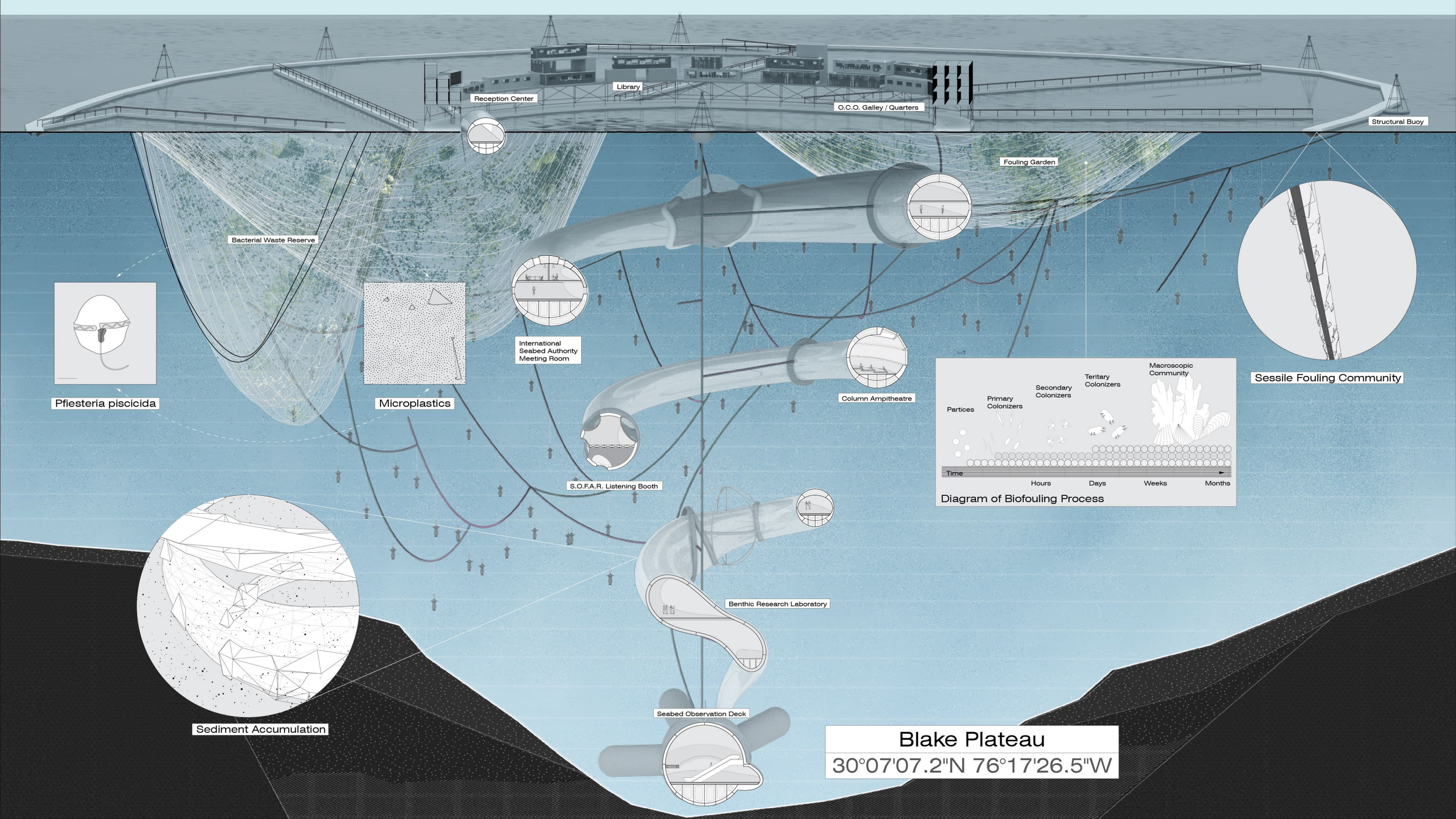
In this chapter, the International Seabed Authority (I.S.A.), an organization formed through the U.N. Convention on the Law of the Sea, has mounted a new initiative to decommission aspects of the world’s Exclusive Economic Zones. The Authority works with local informants to transition sites of ocean floor extraction like the Blake Plateau into platforms that provide researchers and cultural institutions access to the multiplicity of ocean column activities.

This project came about after the I.S.A. held a series of workshops to interrogate the meaning of the ‘common heritage of mankind’ in relation to ocean ecology. It was decided that if the oceans are to be held in common, then they must be open to all actors, not only those tied to natural resource extraction.”


1982
Land and Internal Waters
1982
Territorial Waters
1982
Contiguous Zone
1982
Exclusive Economic Zone (EEZ)
High Seas
Extended Continental Shelf
12 NM
24 NM
200+ NM
200 NM
Territorial Sea
Base Line
Canon Ball
17th Century
able - Canon Range
1946
Formula 2
Ocean Surface
Variable
Epipelagic
-200m
Mesopelagic
-700m
Abyssalpelagic
-1000m
Hadalpelagic
-40000m
Sediments
Crust
Mantle
Ocean Column Observatory
Blake Plateau
30°07'07.2"N 76°17'26.5"W

Slide 27 Narration:

“Through this framework, the International Seabed has established the Blake Plateau as the Ocean Column Observatory, or O.C.O.”

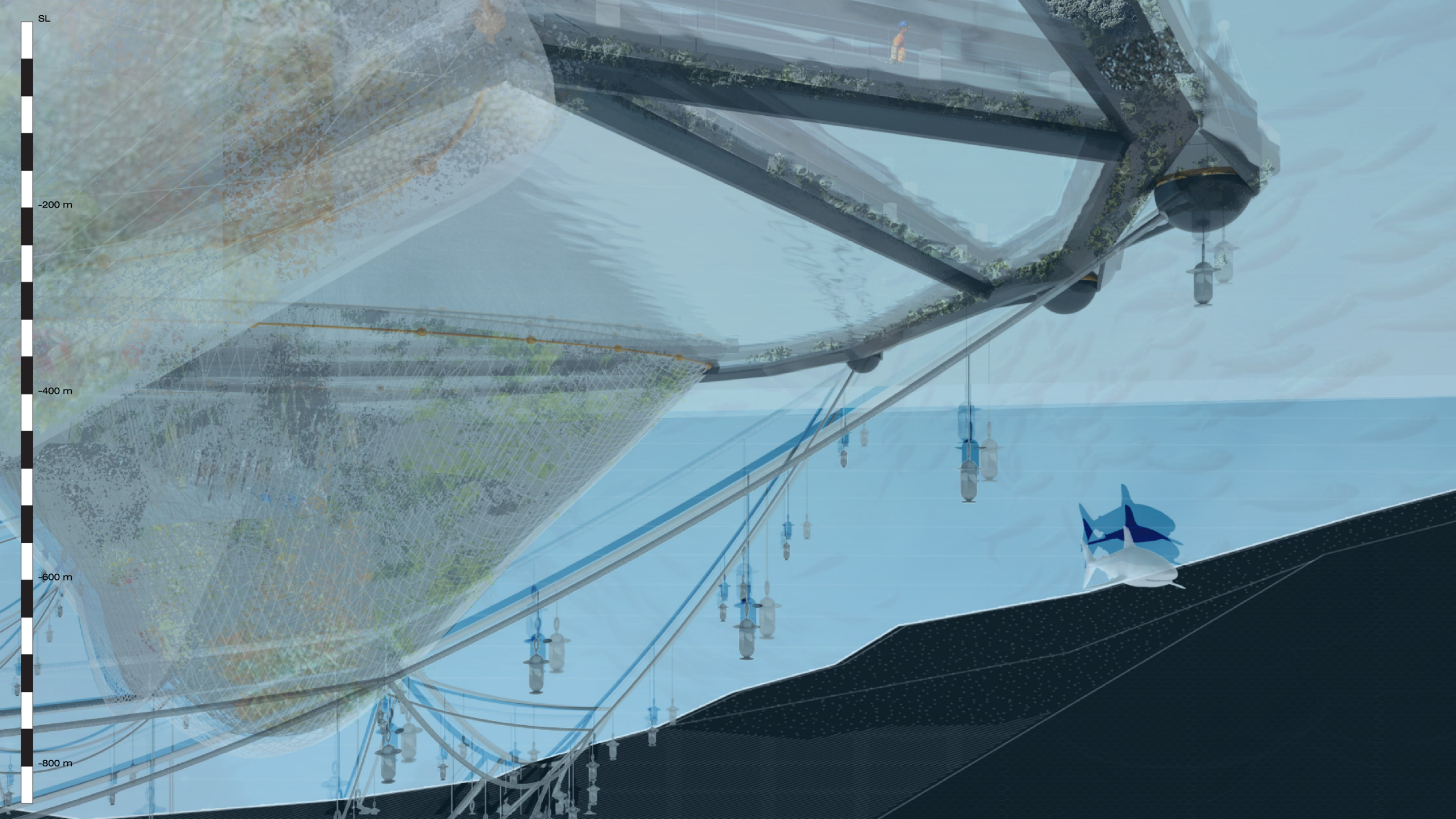

Reception Center
Library
O.C.O. Galley / Quarters
Structural Buoy
Fouling Garden
Bacterial Waste Reserve
Pfiesteria piscicida
Microplastics
International Seabed Authority Meeting Room
Column Ampitheatre
S.O.F.A.R. Listening Booth
Sessile Fouling Community
Partices
Primary Colonizers
Secondary Colonizers
Teritary Colonizers
Macroscopic Community
Time
Hours
Days
Weeks
Months
Diagram of Biofouling Process
Benthic Research Laboratory
Seabed Observation Deck
Sediment Accumulation
Blake Plateau
30°07'07.2"N 76°17'26.5"W

Slide 28 Narration:

“You arrive within range of the Observatory after a day aboard the Gold Bug, a fishing vessel registered in Wilmington, North Carolina, enrolled in an I.S.A. program that offers incentives to private firms to ferry passengers to the observatory on weekends.

It is windy and as you near the ring of floating pontoons where you disembark, you hear sounds of metal creaking with the rhythm of the waves. The Observatory looks like an aggregate of old decking, buoys, and shipping containers, held together by flexible joints. The structure divides the surface of the ocean into accessible parterres of water, bordered on all sides by stacks of shipping containers modified to house a galley, several apartments, and a library. Walking along the installation’s decks, you notice the scent of marine life and see lines of small floats cutting across the water, suspending various habitats beneath the sea.

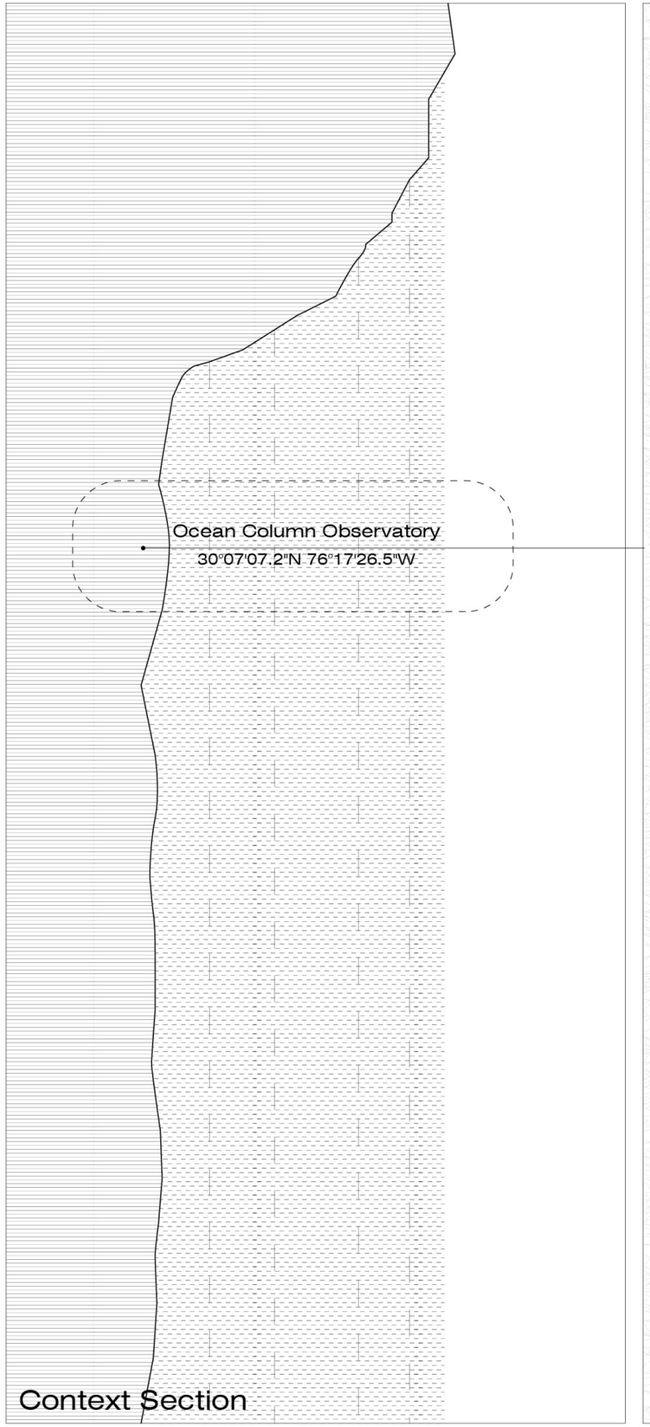
After meeting some of the researchers and other participants in the Observatory’s artist residency, you take a bicycle for a ride through a corridor providing access to a deep-sea observation deck along with a number of laboratories and administrative facilities along the way. You pass a meeting room of the I.S.A. and then stop to chat with colleagues at a stepped amphitheater facing a curved glass wall overlooking the epipelagic zone. Peering out of the observatory windows, some of which are magnified, you see buildups of basalt dust, lumpy blue and green bacterial fields, and aggregations of marine invertebrates like barnacles and coral.”


SL
-200 m
-400 m
-600 m
-800 m

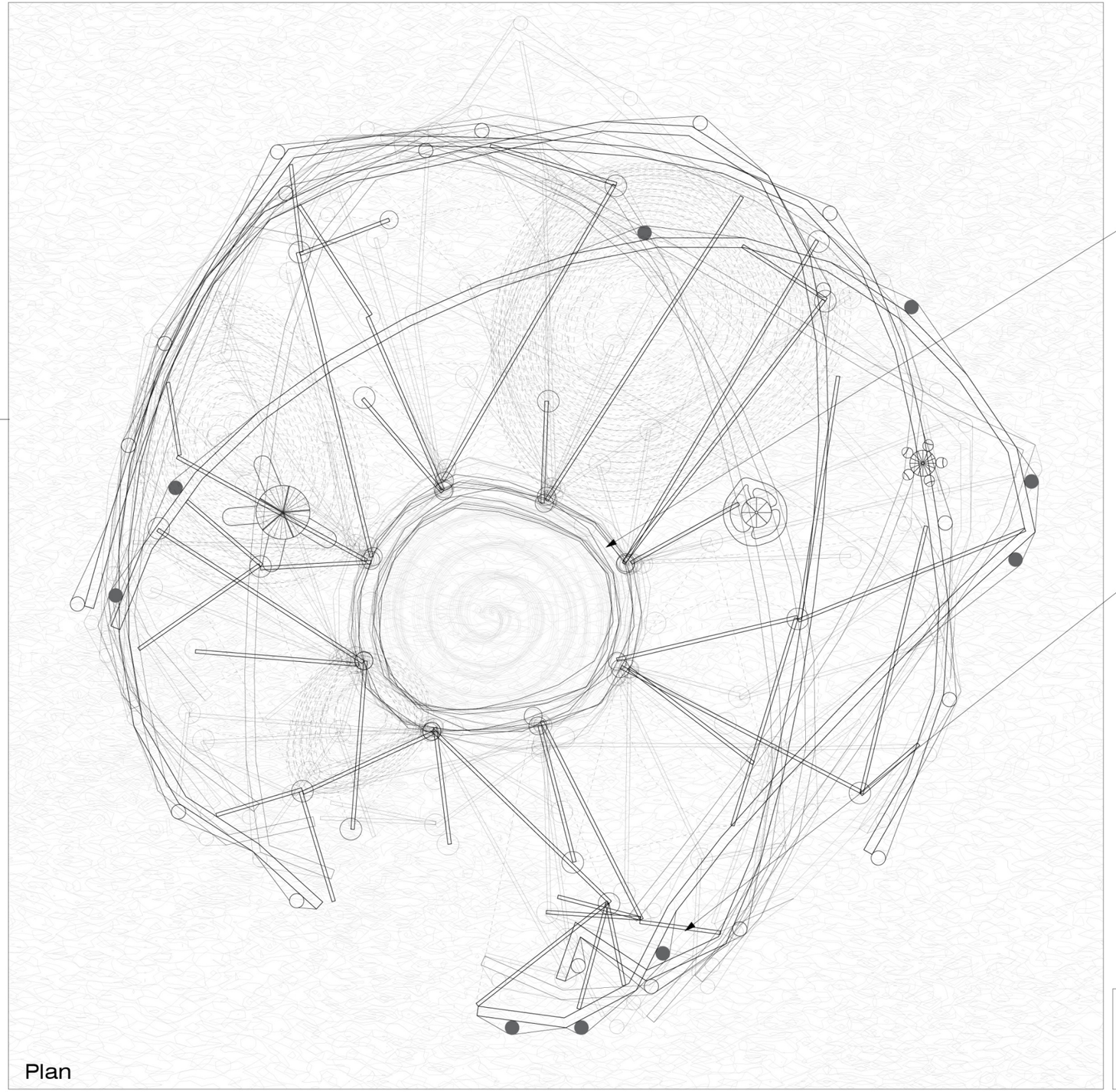
Slide 29 Narration:

“An illustrator making a graphic novel about biofoul suggested you take a dive to observe the Observatory’s fouling garden. They told you about how within minutes of exposure to seawater, boats and other objects come into contact with bacteria like *Vibrio parahaemolyticus* which transform to attach to surfaces. Eventually a layer of slime gets created which larger creatures can colonize. The illustrator’s excitement has rubbed off on you about how bacteria paves the way for resilient habitats of creatures well adapted to the Southeast Atlantic like fan worm, Wakame seaweed, seastar, turnicate, bay barnacles, and green mussels. The observatory’s fouling gardens are made of loose nets suspended from the surface. They were installed several years ago and now look almost like floating, confetti colored boulders.

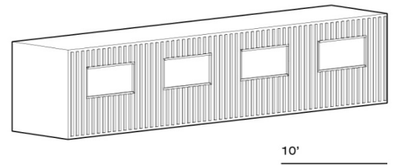
While on your dive, you come across a reef shark in the distance that has migrated slightly north to the area around the Blake Plateau from its winter home in the Caribbean Ocean. It is a very clear summer day and above you see one of the Observatory ombudsman walking on the deck above to swap out a memory card in one of the buoy’s DNA samplers. The gentle movement of the ocean causes the observatory to slightly sway. As the whole thing moves, bits of sediment debris and loose fouling organisms tumble through the water.”



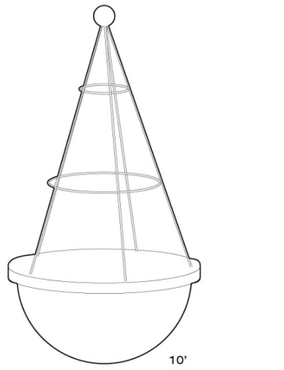
Context Section



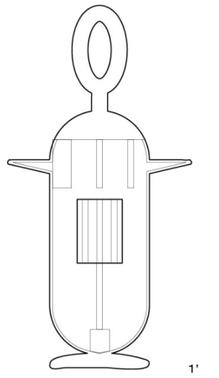
Plan



N3 40' Cargo Container



N2 Structural Buoy



M4 A.R.G.O. Sensor

Ocean Column Observatory

Blake Plateau
30°07'07.2"N 76°17'26.5"W

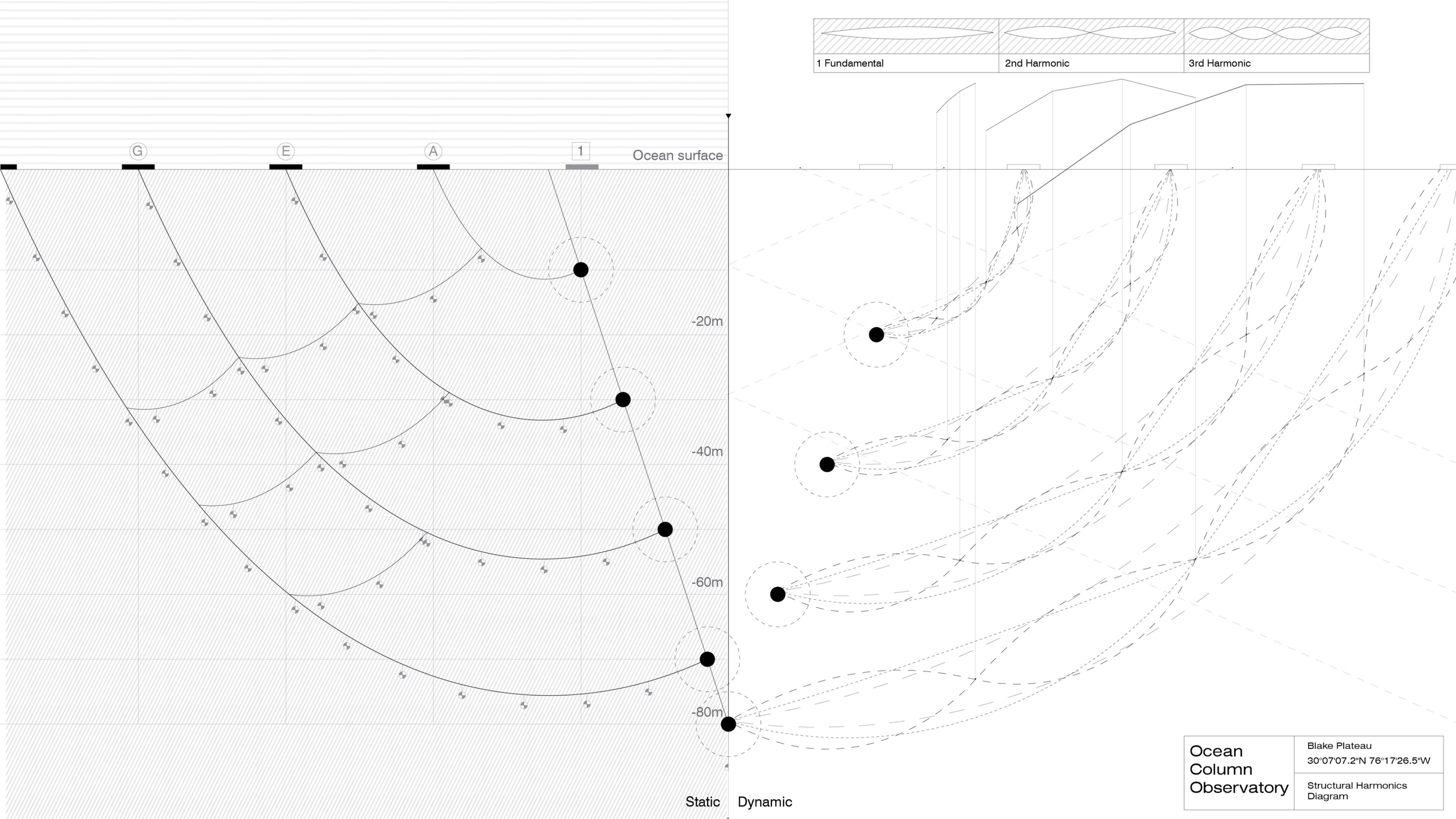
100 ft.

Slide 30

Narration:

“Plans for the observatory account for the ocean’s constant movement, defining parameters for movement rather than a fixed form. The design remixes many of the standard components used in navel architecture so that the observatory can be continually adapted and built upon depending on ongoing decommissioning processes occurring nearby the Blake Plateau.

A perimeter of floating pontoons are arranged with a variable diameter of around 500 ft. The pontoons are hinged and strapped to buoys that are tethered to the center of the structure by metal wires. Intermediary pontoons are constructed similarly so that the structure’s movement are choreographed by the flow of the ocean.”



Ocean Column Observatory

Blake Plateau
30°07'07.2"N 76°17'26.5"W

Structural Harmonics Diagram

Slide 31

Narration:

“The structure resonates with the harmonics of the ocean’s turbulence, flow, and drift. Within the individual parameters afforded each structural member, the ocean animates the observatory.

Through its constant movement, the observatory embodies pelagic fluidity, vibrating with the ocean’s frequencies.”

Radiowaves, Measurement, Communications

Geo-prospecting

International Maritime Organization

National Oceanic and Atmospheric Administration

Federal Communications Commission

International Seabed Authority

Woods Hole Oceanographic Institution

Governmental and Academic Stakeholders

Logistics

Hanjin Shipping

CMA CGM

American President Lines

Maersk

Bio-prospecting

Red Chamber

Trident Seafoods

Deep Sea Mining

Geomarine Inc.

Global Sea Mineral Resources

Deep Green

UK Sea Resources

Decommissioned Agents

Ocean Column Observatory

Blake Plateau
30°07'07.2"N 76°17'26.5"W
Stakeholders & Agents

Slide 32

Narration:

“The construction and continued operation of the observatory depends upon its relationships with existing human stakeholders in the Blake Plateau. Shipping companies lend their equipment and navigational expertise to the observatory, deep sea mining firms cooperate with the observatory’s geological research and, as mentioned, fishing vessels are involved in transporting people to and from the O.C.O.”

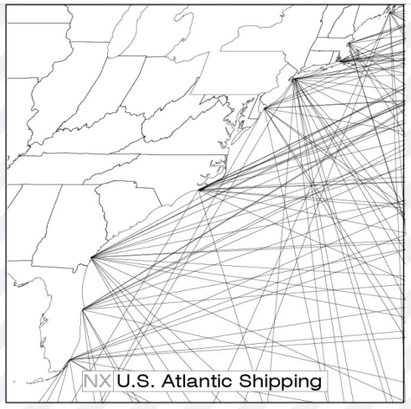
Matrix of Decommissioned Components

Ocean Column Observatory

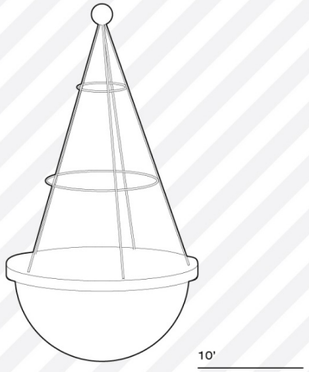
Blake Plateau
30°07'07.2"N 76°17'26.5"W

International Seabed Authority

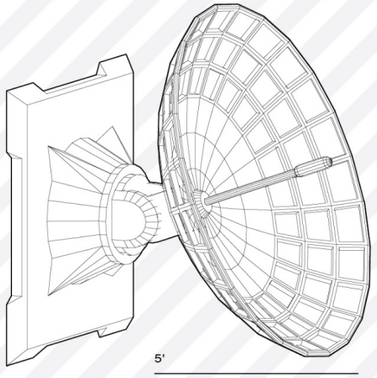
N1 ASIMET Buoy System



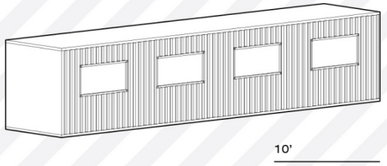
NX U.S. Atlantic Shipping



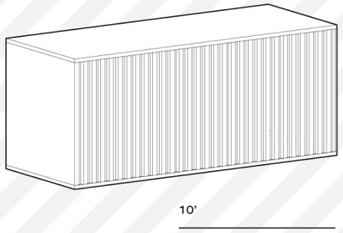
N2 Structural Buoy



N5 UHF/SHF/SATCOM

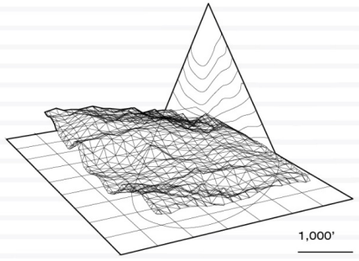


N3 40' Cargo Container

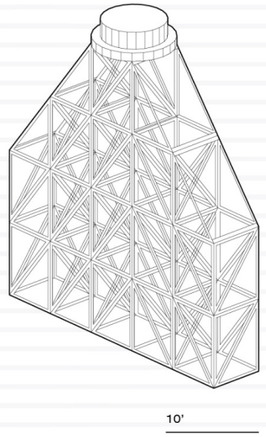


N4 20' Cargo Container

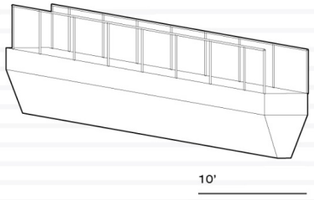
Navigation



E1 Multibeam Sonar

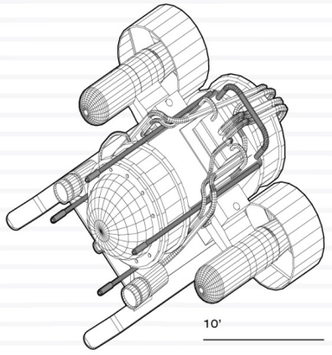


E2 Oil Rig Scaffolding

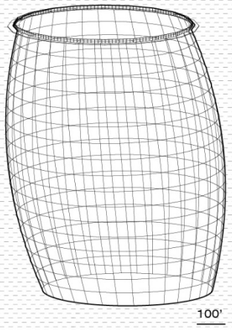


E3 Auxiliary Pontoon

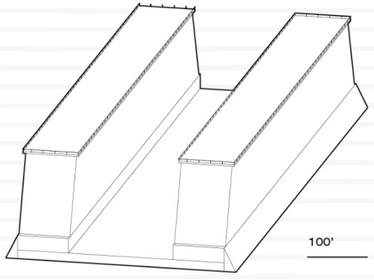
Extraction



E4 Remotely Operated Submersible

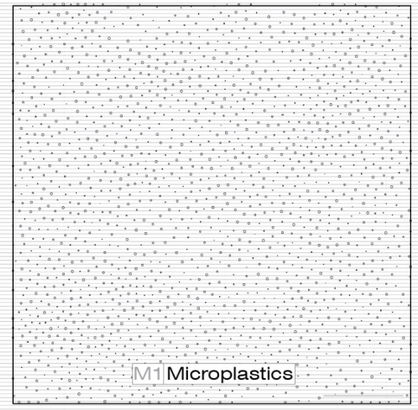


B1 Drum-Style Farm

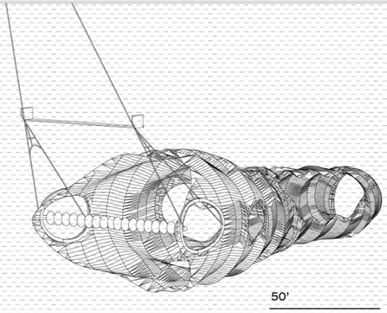


E5 Floating Dry Dock

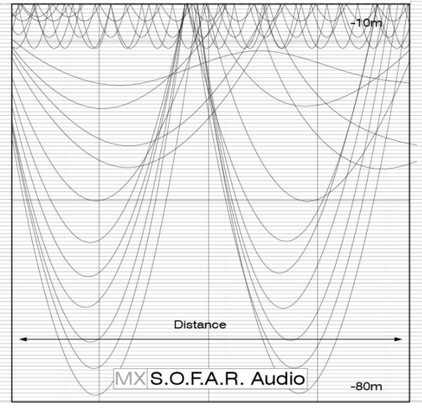
Bio-Prospecting



M1 Microplastics

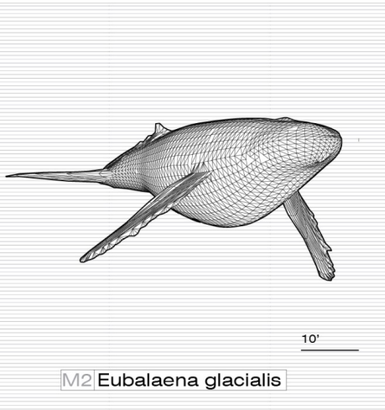


B2 Trawling Net

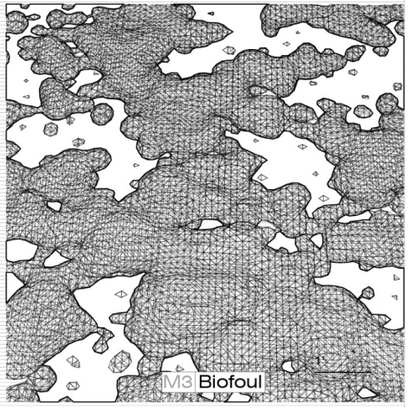


MX S.O.F.A.R. Audio

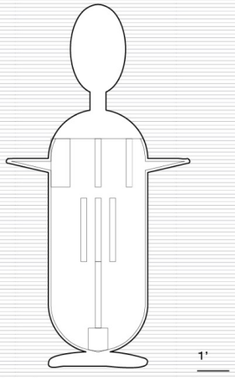
Non-Human Media



M2 Eubalaena glacialis



M3 Biofoul



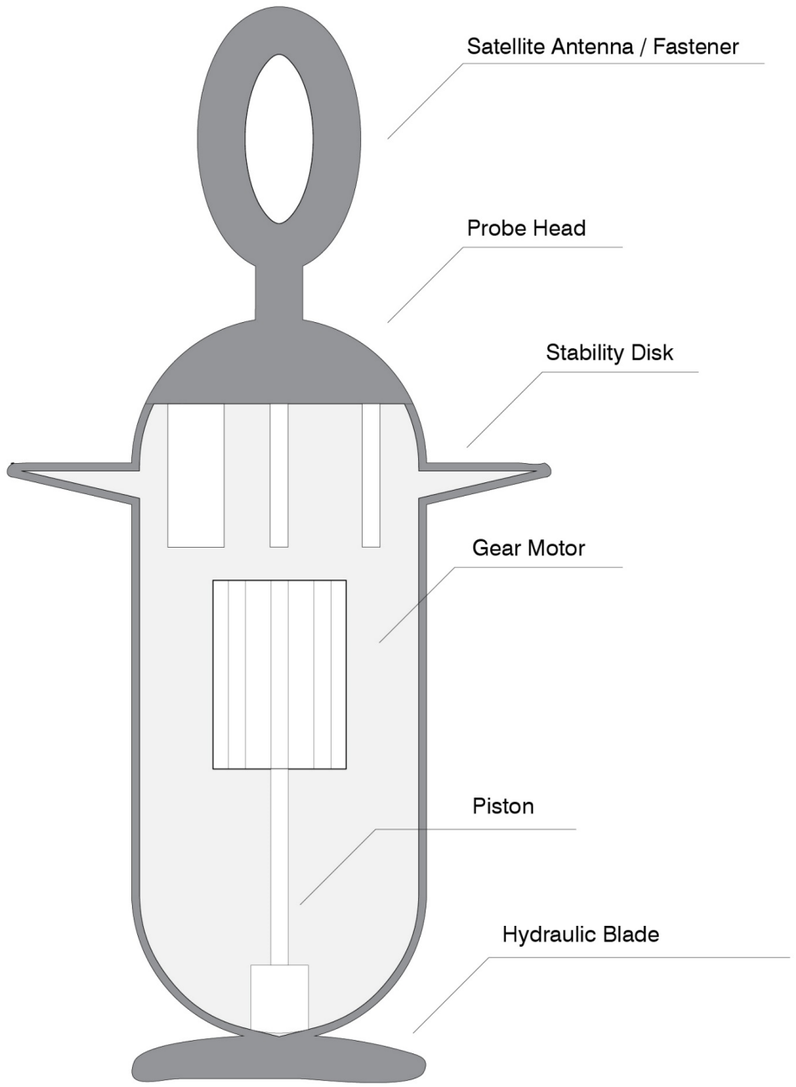
M4 A.R.G.O. Sensor

Slide 33 Narration:

“Additionally, with the reorientation of the I.S.A., the physical objects that comprise the O.C.O. are derived from the four categories of:

Navigation
Extraction
Bioprospecting
Non-Human Media

While these particular elements are specific to the activities at the Blake Plateau, the International Seabed Authority maintains a matrix of components which can be recombined to support ocean ecology throughout the world.”



M4 A.R.G.O. Sensor

1'

Slide 34

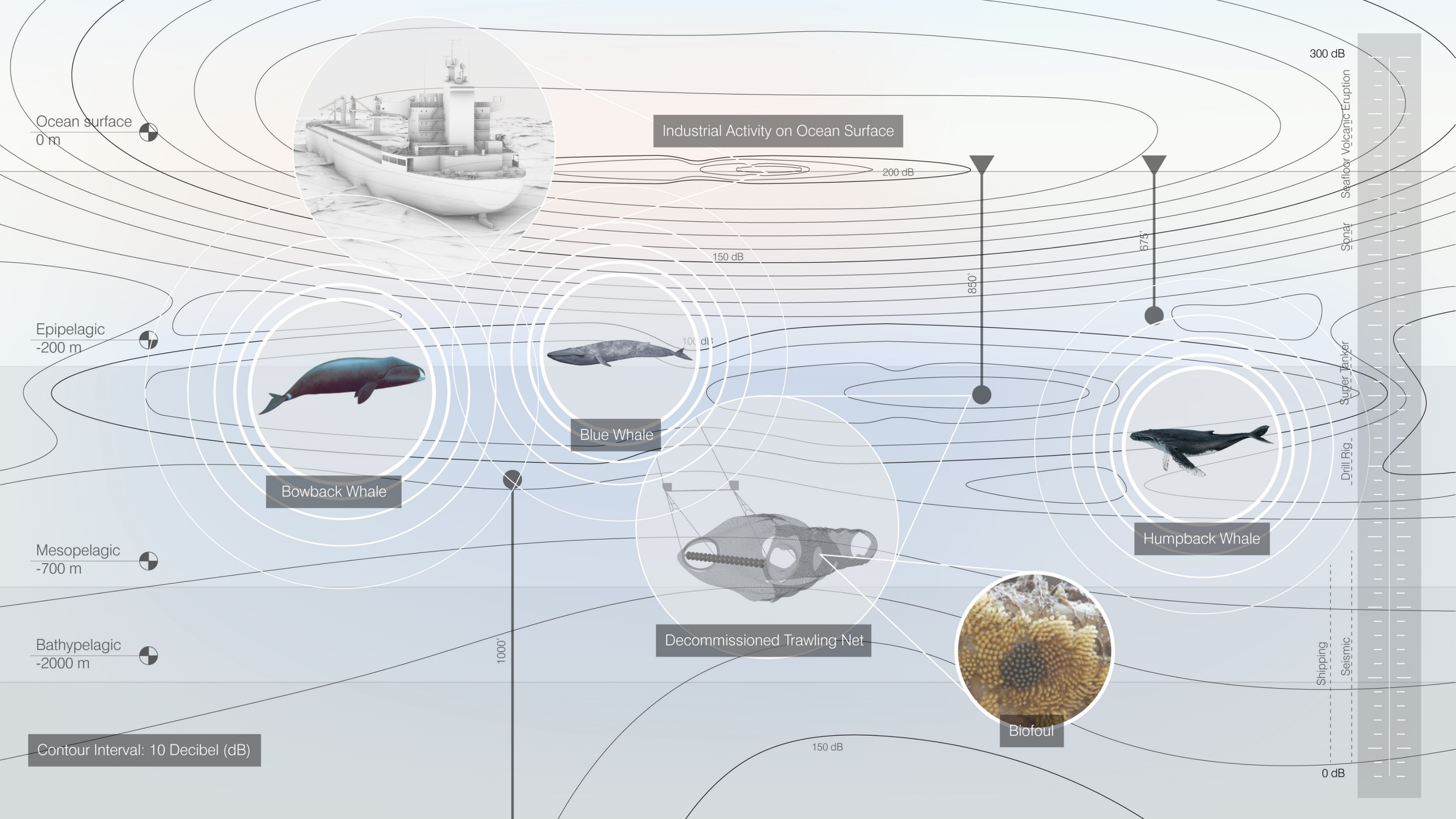
Narration:

“The I.S.A. has designed the observatory as a research and cultural center as part of a concerted effort to shape how we understand and depict the sea. The I.S.A. has decided to address the limited depictions afforded to the ocean head-on, recognizing that the tools we use to experience seascapes shape how we inhabit the planet.

The observatory responds to the need for new technologies that capture the ocean beyond is capacity for natural resource extraction.”

Slide 35 Narration:

“One morning you visit the deep-sea listening booth during a visit by a North Atlantic Right Whale. Its deep bellows resonate throughout the chamber. Through the slightly fouled glass, you catch a glimpse of your collaborator diving through the observatory’s jungle of catenary arches connecting its various buoys. Sensors affixed to each wire help maintain the structure’s form while providing a grid of temperature and salinity measurements.”


Ocean surface
0 m
Epipelagic
-200 m
Mesopelagic
-700 m
Bathypelagic
-2000 m
Industrial Activity on Ocean Surface
200 dB
150 dB
100 dB
850'
675'
1000'
Bowback Whale
Blue Whale
Humpback Whale
Decommissioned Trawling Net
Biofoul
150 dB
Contour Interval: 10 Decibel (dB)
300 dB
Seafloor Volcanic Eruption
Sonar
Super Tanker
Drill Rig
Shipping
Seismic
0 dB

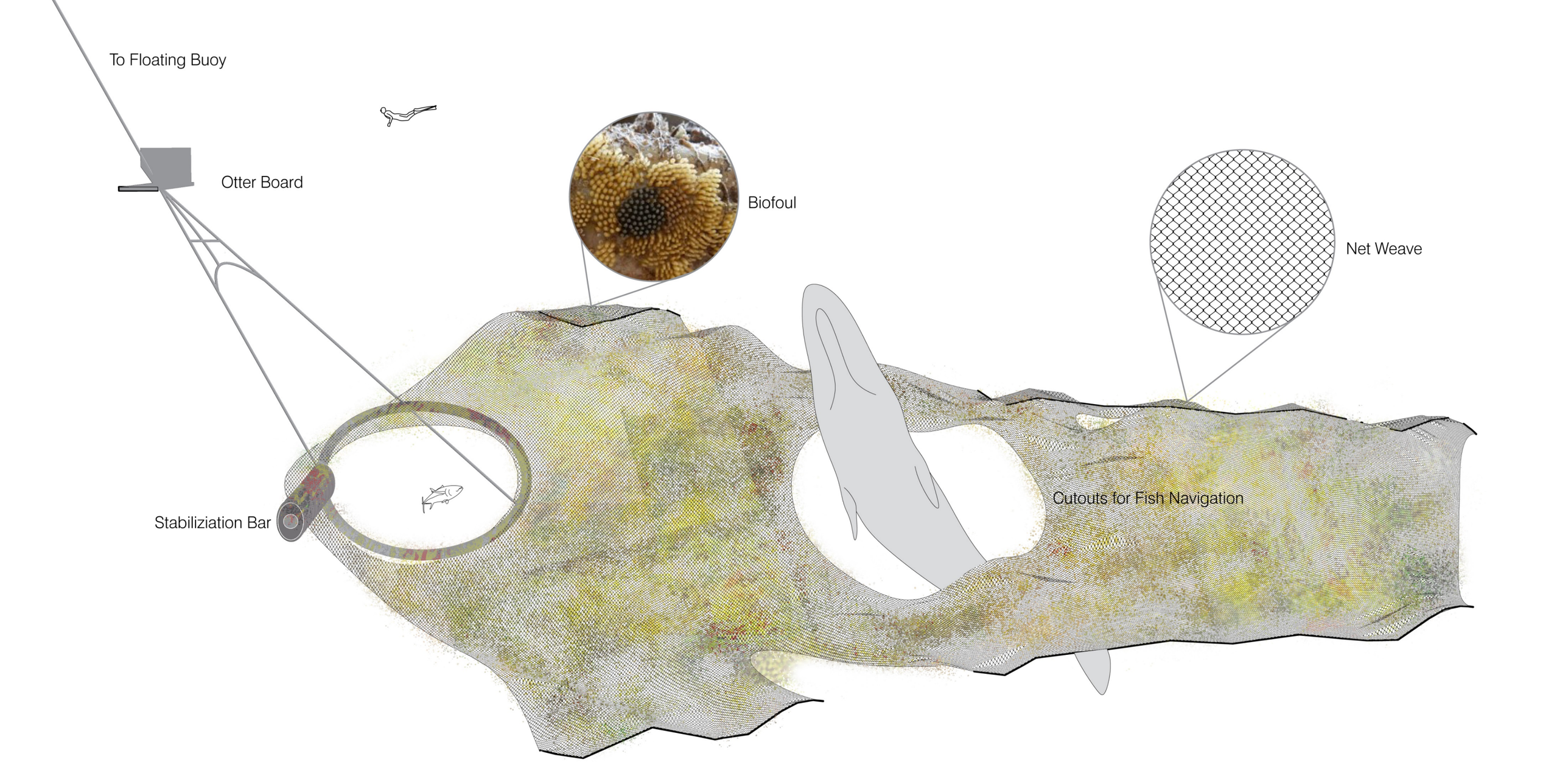
Slide 36

Narration:

“Away from the observatory, the I.S.A. has transformed trawl fishing nets into biofoul encrusted sound baffles.

Baffles are suspended at several heights in the column to help dull industrial noise pollution emanating from shipping at the ocean surface and drilling at the ocean floor.

This contour plan of the ocean column shows some of the essential creatures that use the S.O.F.A.R. channel to communicate. In this example, the baffle itself is a decommissioned trawling net of the kind used in damaging industrial fishing operations.”



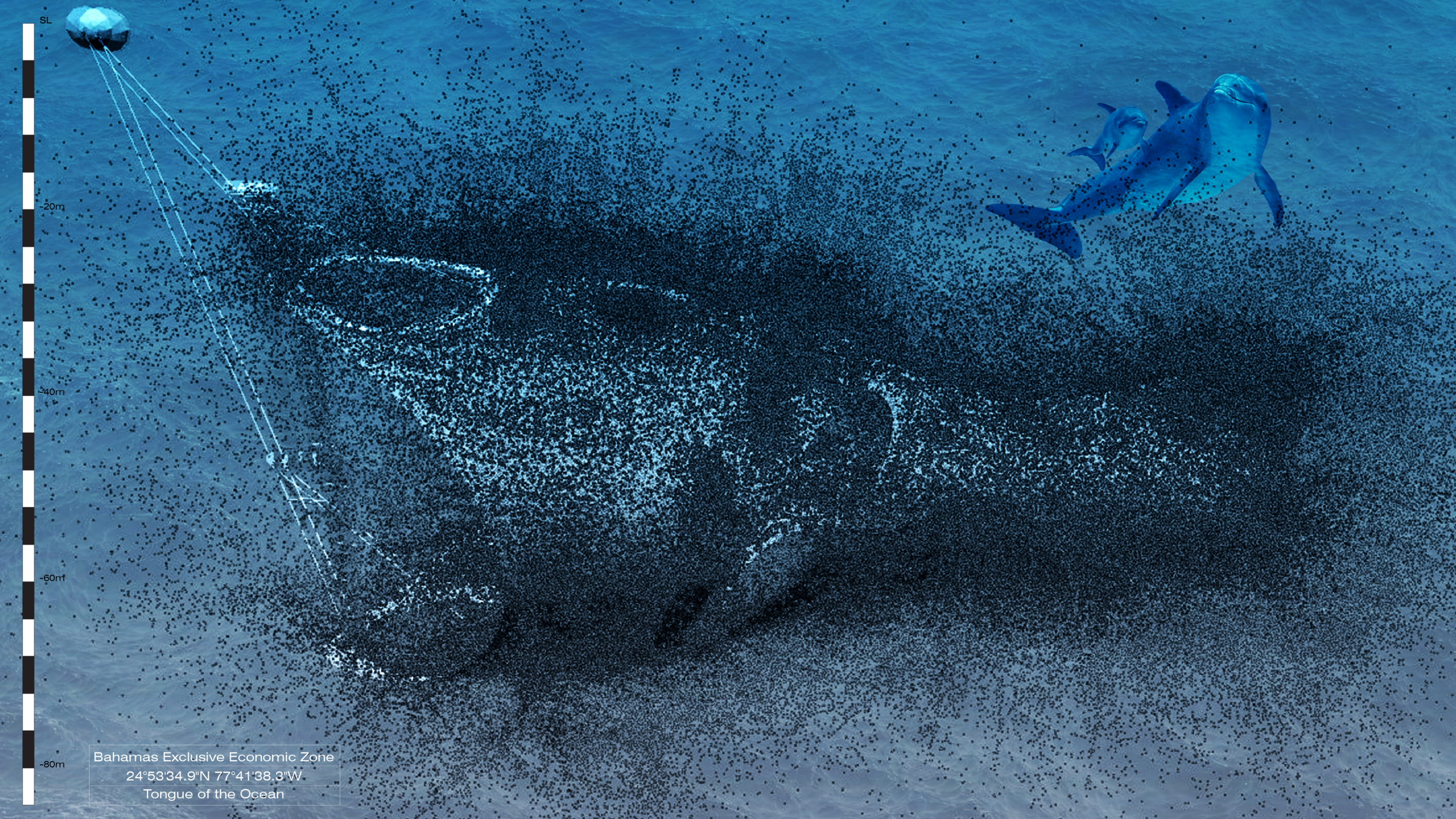
Decommissioned Trawling Net

10 ft.

Slide 37

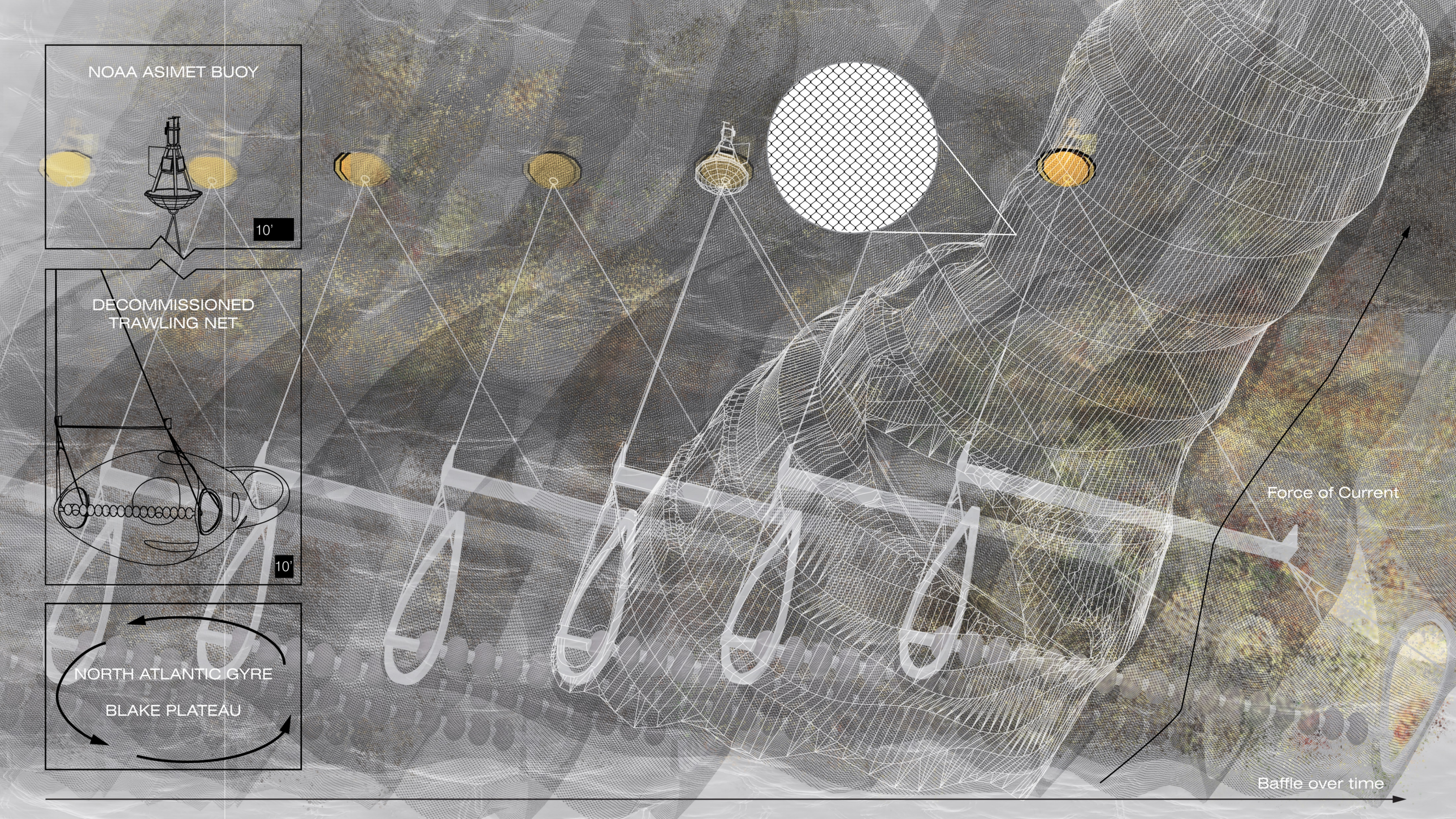
Narration:

“The net structure is attached to a buoy, about 200 ft’ above. The net is made of a flexible nylon mesh modified to let fish pass through the net rather than get caught in it. The net deforms with the currents and waves of the ocean, in a constant state of motion. Over time, biofoul organisms such as barnacles and films of bacteria build on the net surface, rendering it a hybrid mineral—organic state. Nets that have been in circulation for a particularly long time look almost completely geological.”


SL
-20m
-40m
-60m
-80m
Bahamas Exclusive Economic Zone
24°53'34.9"N 77°41'38.3"W
Tongue of the Ocean

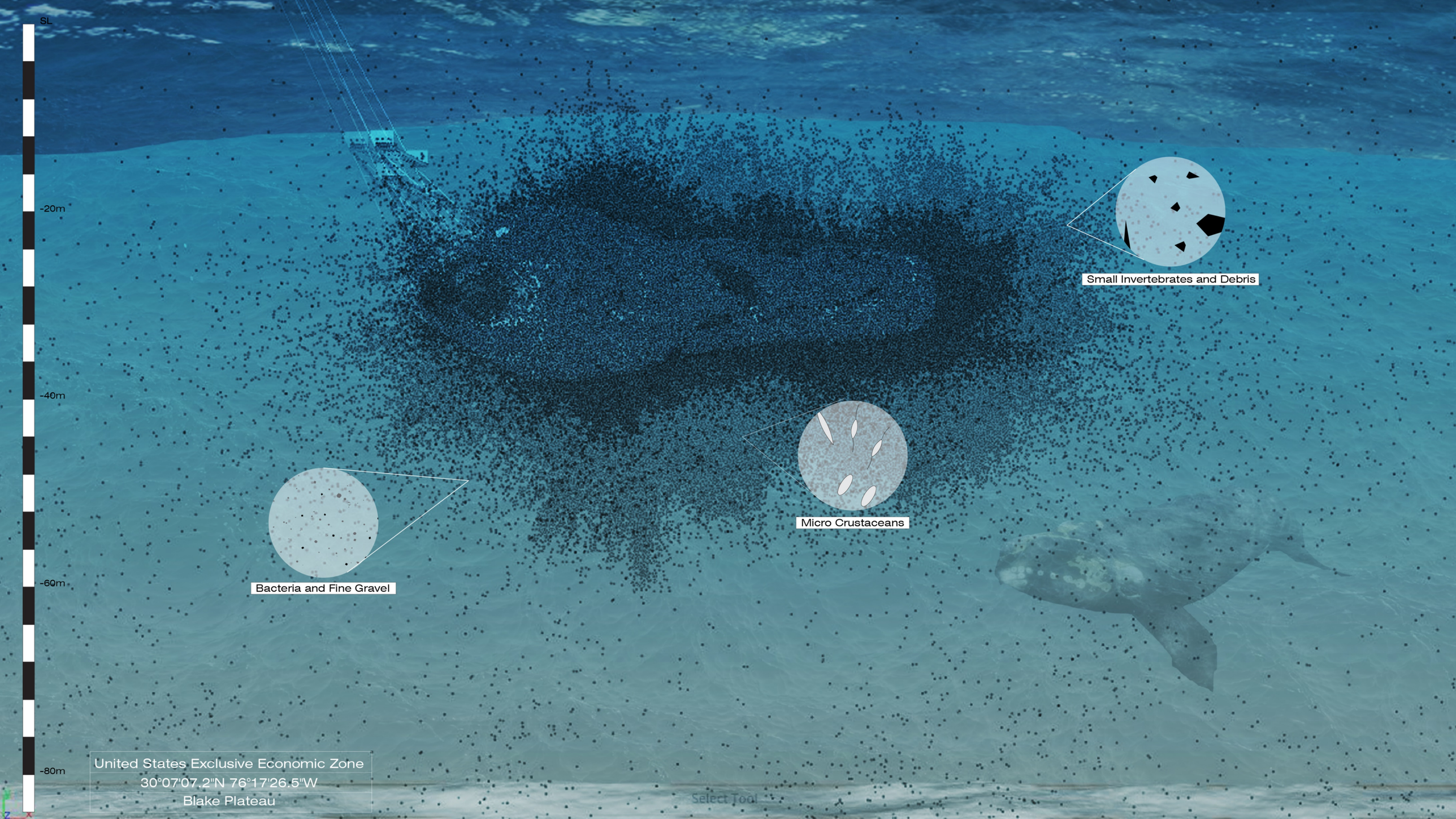
Slide 38 Narration:

“Pieces of basalt, various polymers, and plankton build up over time, overtaking the net until it turns into a new habitat. Its variegated surface provides a microtopography for seastars, urchins, and a variety of slimes.”


NOAA ASIMET BUOY
10’
DECOMMISSIONED
TRAWLING NET
10’
NORTH ATLANTIC GYRE
BLAKE PLATEAU
Force of Current
Baffle over time

Slide 39 Narration:

“In one instance, a baffle travels along the North Atlantic current, providing a platform for invertebrates and fish. The net formally responds to the ocean’s flows at multiple timescales, deforming with waves and gradually becoming geological.”


SL
-20m
-40m
-60m
-80m
Small Invertebrates and Debris
Micro Crustaceans
Bacteria and Fine Gravel
United States Exclusive Economic Zone
30°07'07.2"N 76°17'26.5"W
Blake Plateau
Select Tool

Slide 40

Narration:

“The decommissioned hardware builds up with crusty organisms. Here, the baffle helps a right whale communicate with others at a vast distance while, inside the net, there is a vibrant world of mussels, algae, ship worms, and seaweed.”


SL
-5m
-10m
-15m
-20m
Canada Exclusive Economic Zone
40°38'07.5"N 50°40'38.2"W
Montagny Peak

Slide 41 Narration:

“Florida Pompano fish snack on small surf clams, amphipods, shrimp, and mussels, inhabiting the net.”

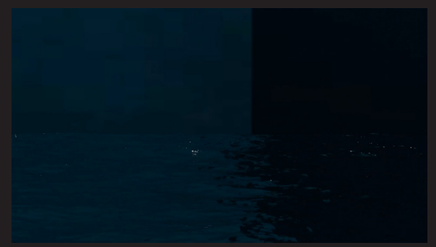
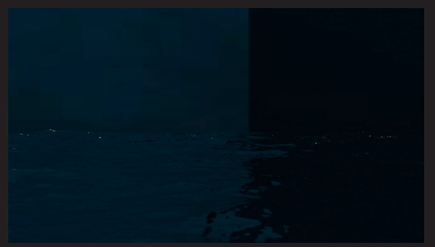
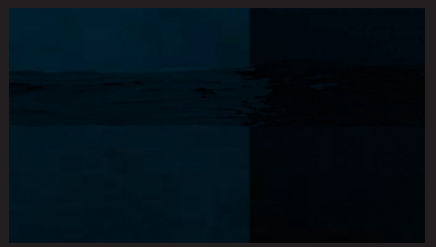
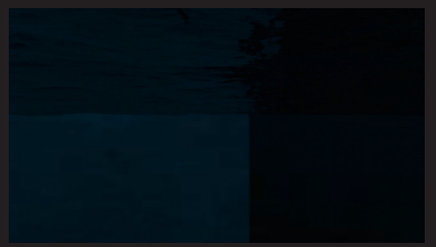
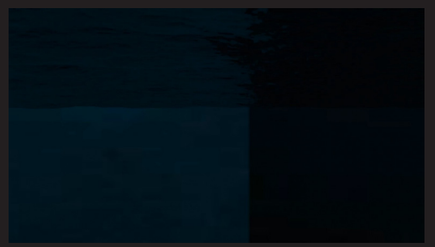
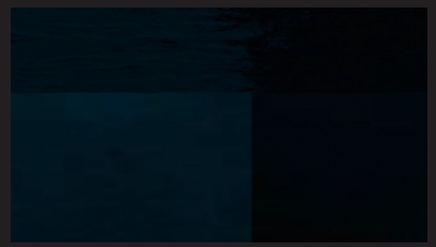
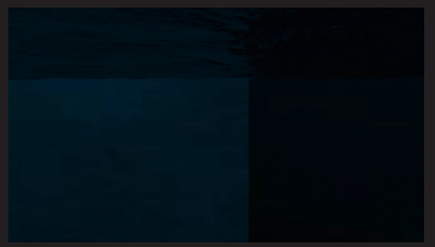
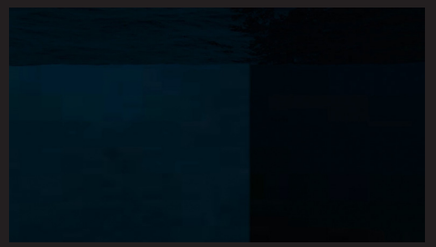
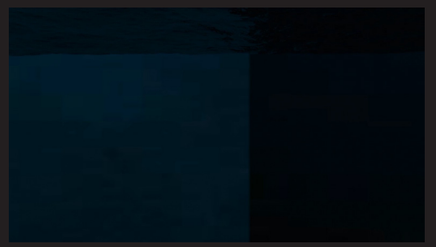
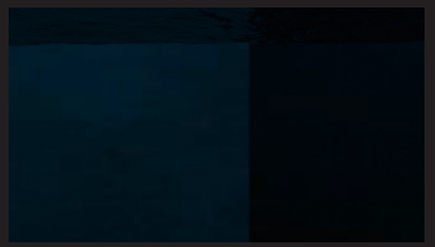
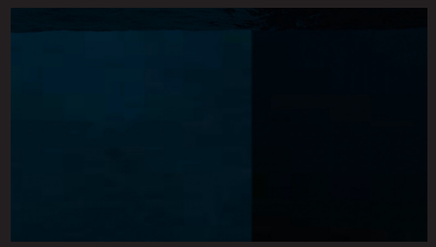
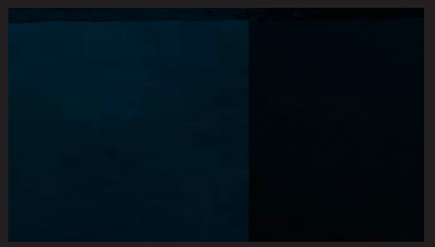
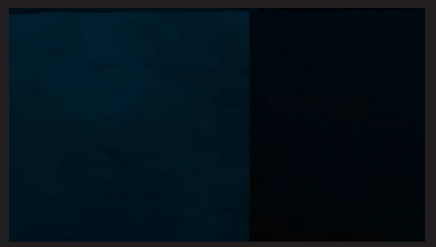
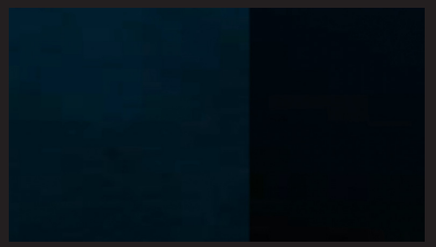
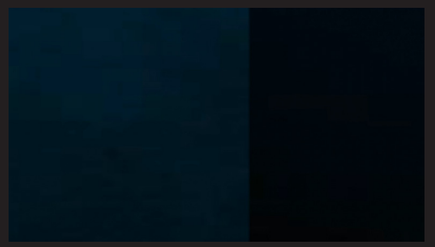










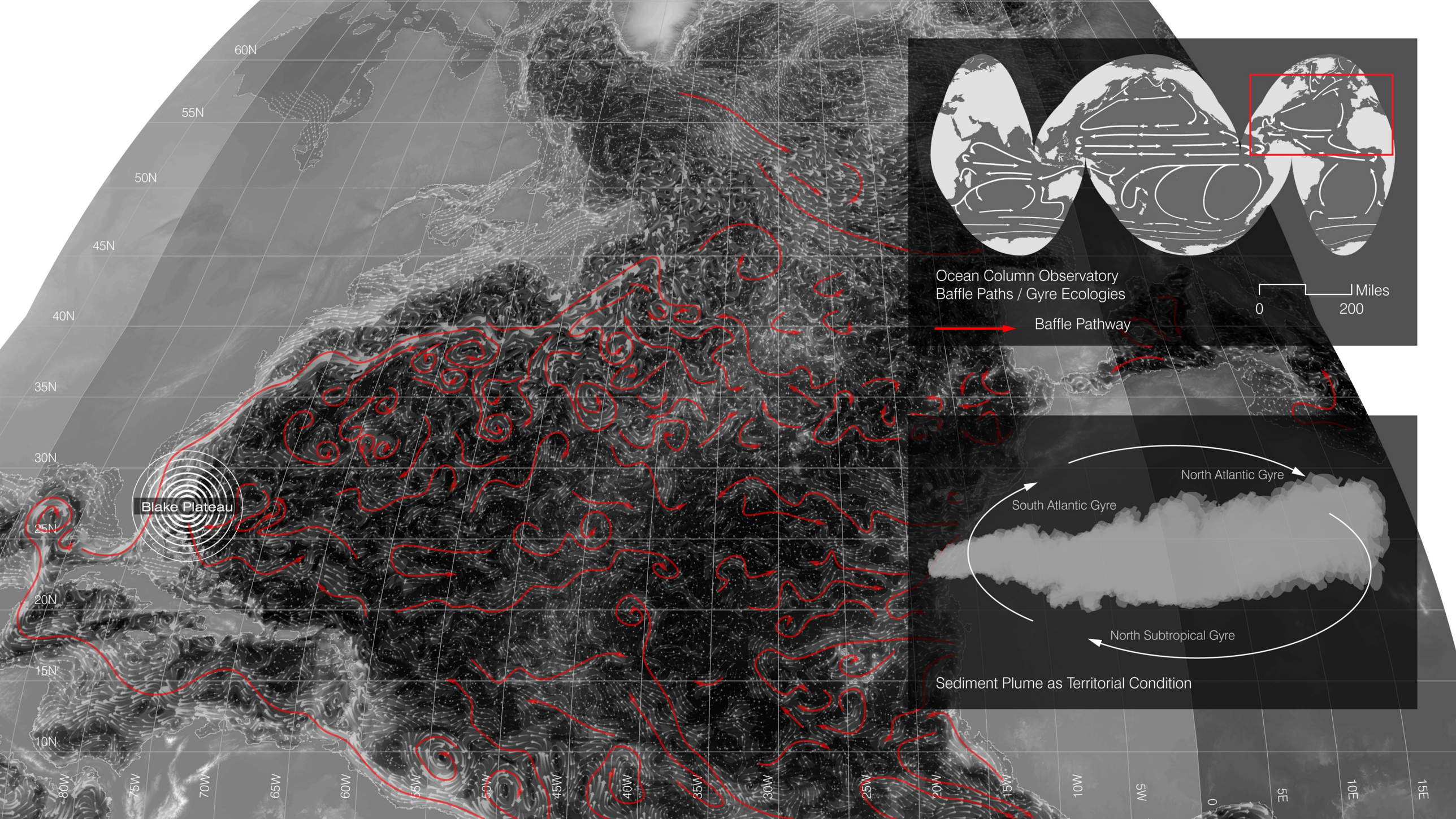
















Slide 42 Narration:

“You take a day trip to descend to the bottom observation deck in order to see what the ocean floor looks like.”

Slide 43 Narration:

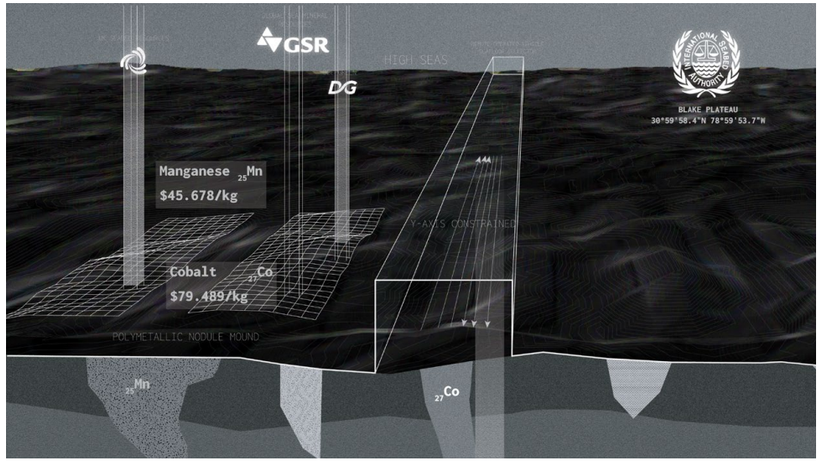
“It is almost imperceptibly dark but, in the distance, you get a rare glimpse of an angler fish. The fish emerges through the rocky growths at the very bottom of observatory. In the distance, you can barely make out the individual polymetallic nodules on the ground of the Blake Plateau that made the site the subject of mapping and extraction as early as the late nineteenth century.”


60N
55N
50N
45N
40N
35N
30N
25N
20N
15N
10N
80W
75W
70W
65W
60W
55W
50W
45W
40W
35W
30W
25W
20W
15W
10W
5W
0
5E
10E
15E
Blake Plateau
Ocean Column Observatory
Baffle Paths / Gyre Ecologies
Baffle Pathway
0
200
Miles
North Atlantic Gyre
South Atlantic Gyre
North Subtropical Gyre
Sediment Plume as Territorial Condition

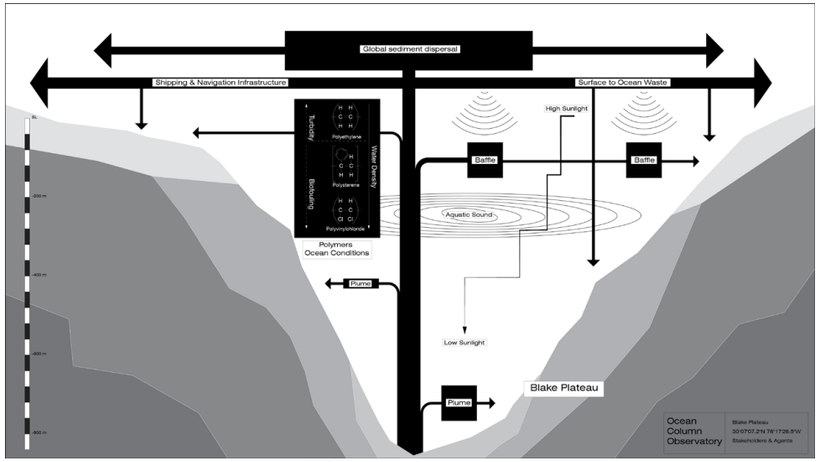
Slide 44

Narration:

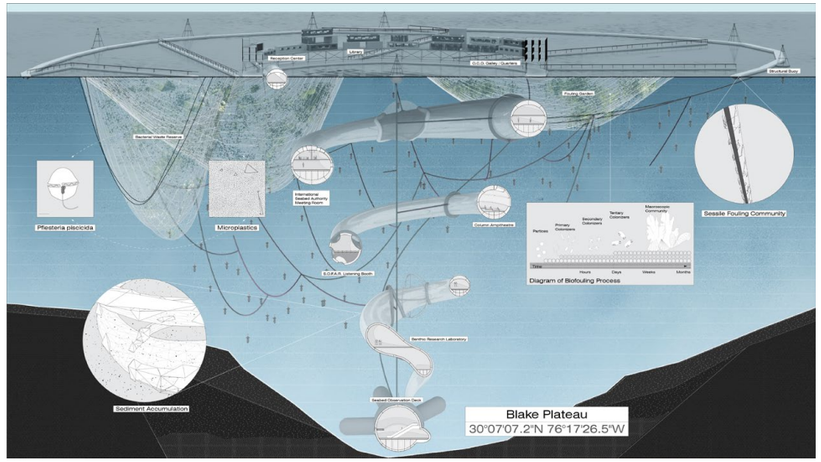
“The same forces that animate the Blake Plateau, also apply at other sites of marine extraction throughout the world. In the process of realizing the ocean-as-commons, the International Seabed Authority employs similar initiatives as undertaken at the Blake Plateau at the edges of exclusive economic zones globally. In doing so, we move beyond merely submitting ecological flows to an extractive notion of the commons.”



1
Aqua Firma



2
Aqua Incognita



3
Aqua Communi

Slide 45 Narration:

“By thinking with the ocean – its fluidity, turbulence, and depth – my hope is to suggest a way of designing the spaces at the limits of our vision.”

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