

MICROPLASTIC IN THE GLOBAL OCEAN



5GYRES

PICES

**Yesou,
South Korea**

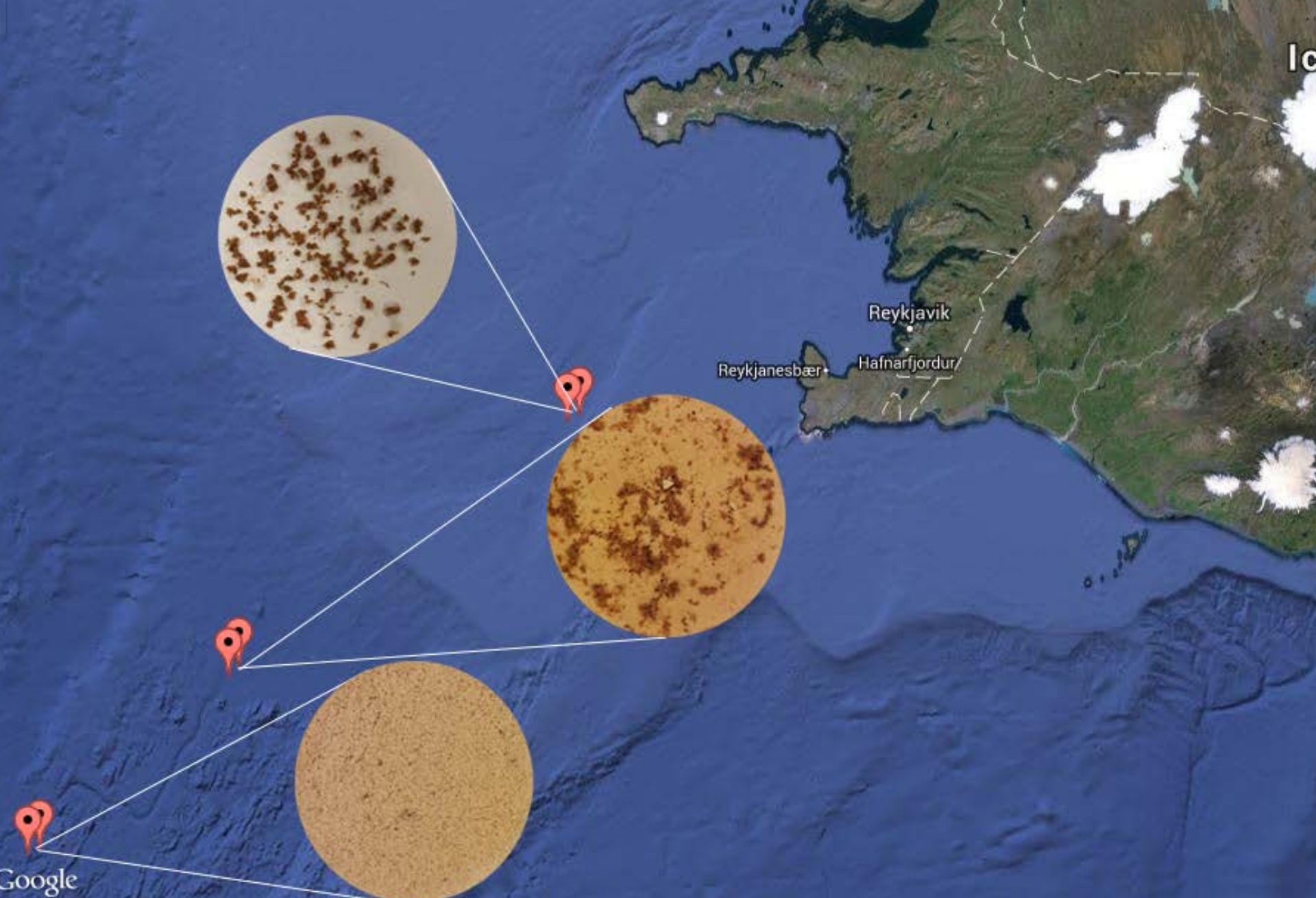
Oct. 2014

MARCUS ERIKSEN marcus@5gyres.org

N. ATLANTIC

Bermuda to Iceland
2400 miles, 31 net tows





SPARSE MICROPLASTIC

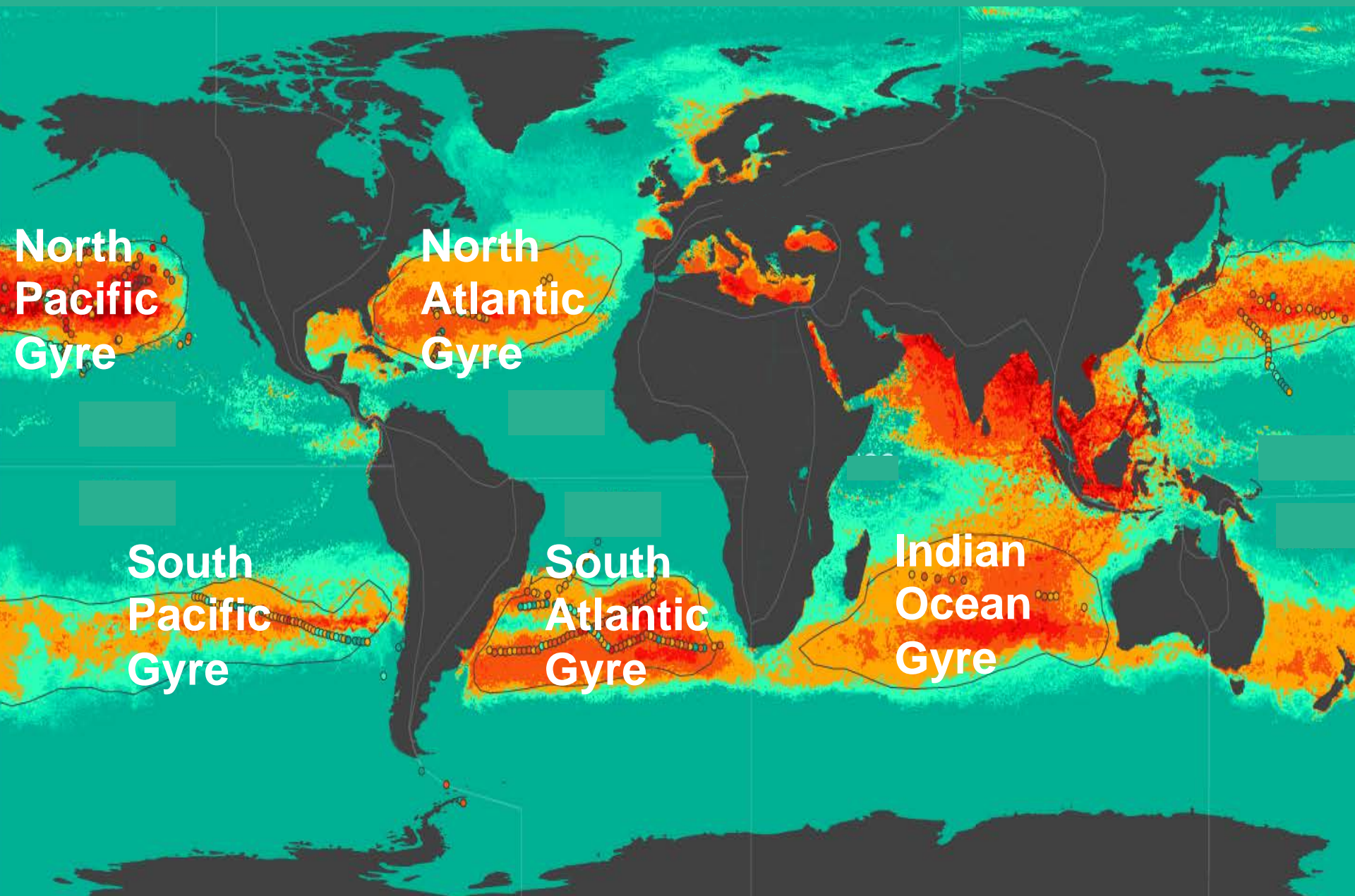
INDIAN OCEAN

Bali, Indonesia to
Christmas Island, Australia



ABUNDANT MACROPLASTIC

MICROPLASTICS GLOBALLY



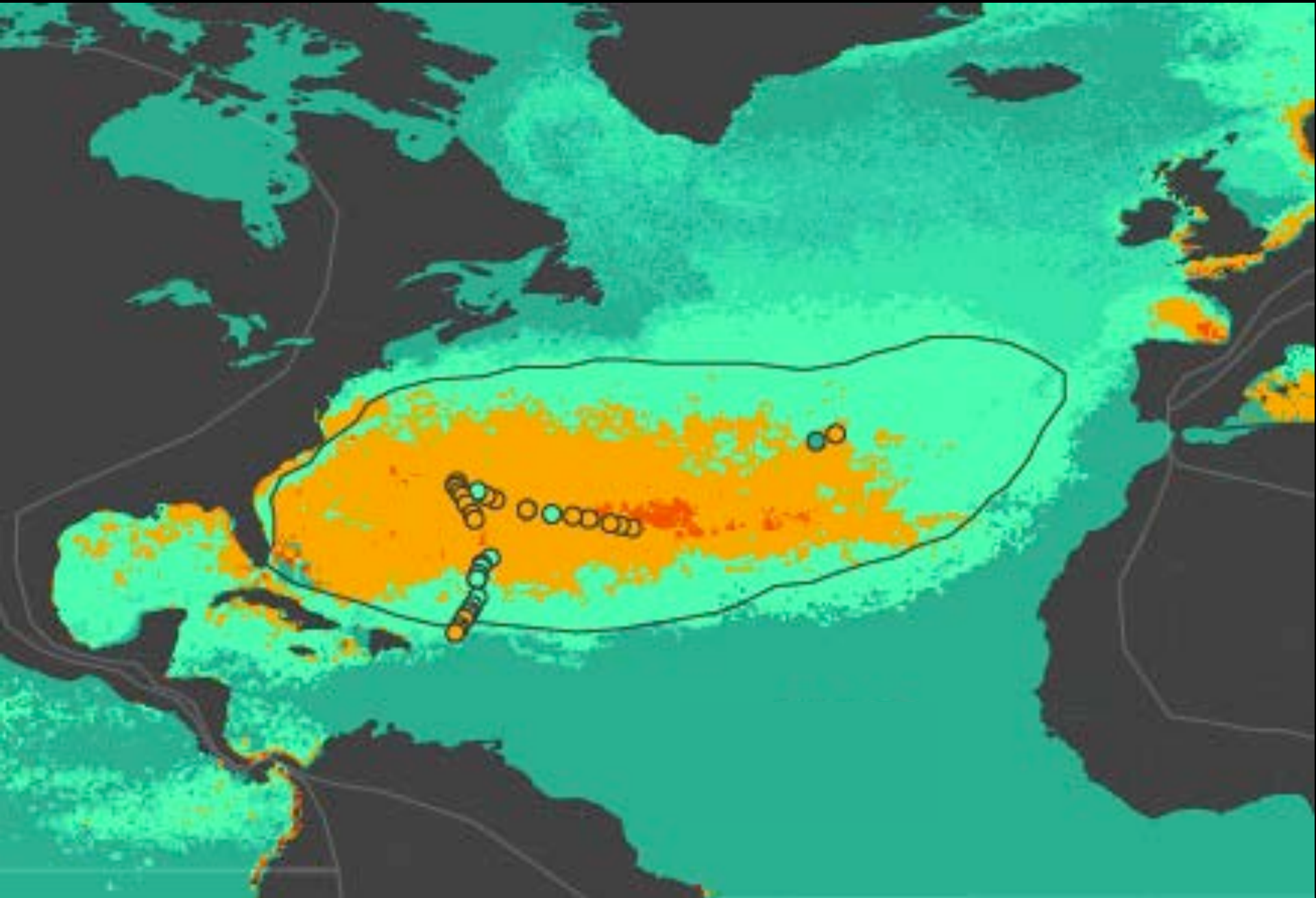
Plastic Pollution Accumulation Zones

(Lebreton et al., Mar. Pol. Bul., 2012)



5GYRES

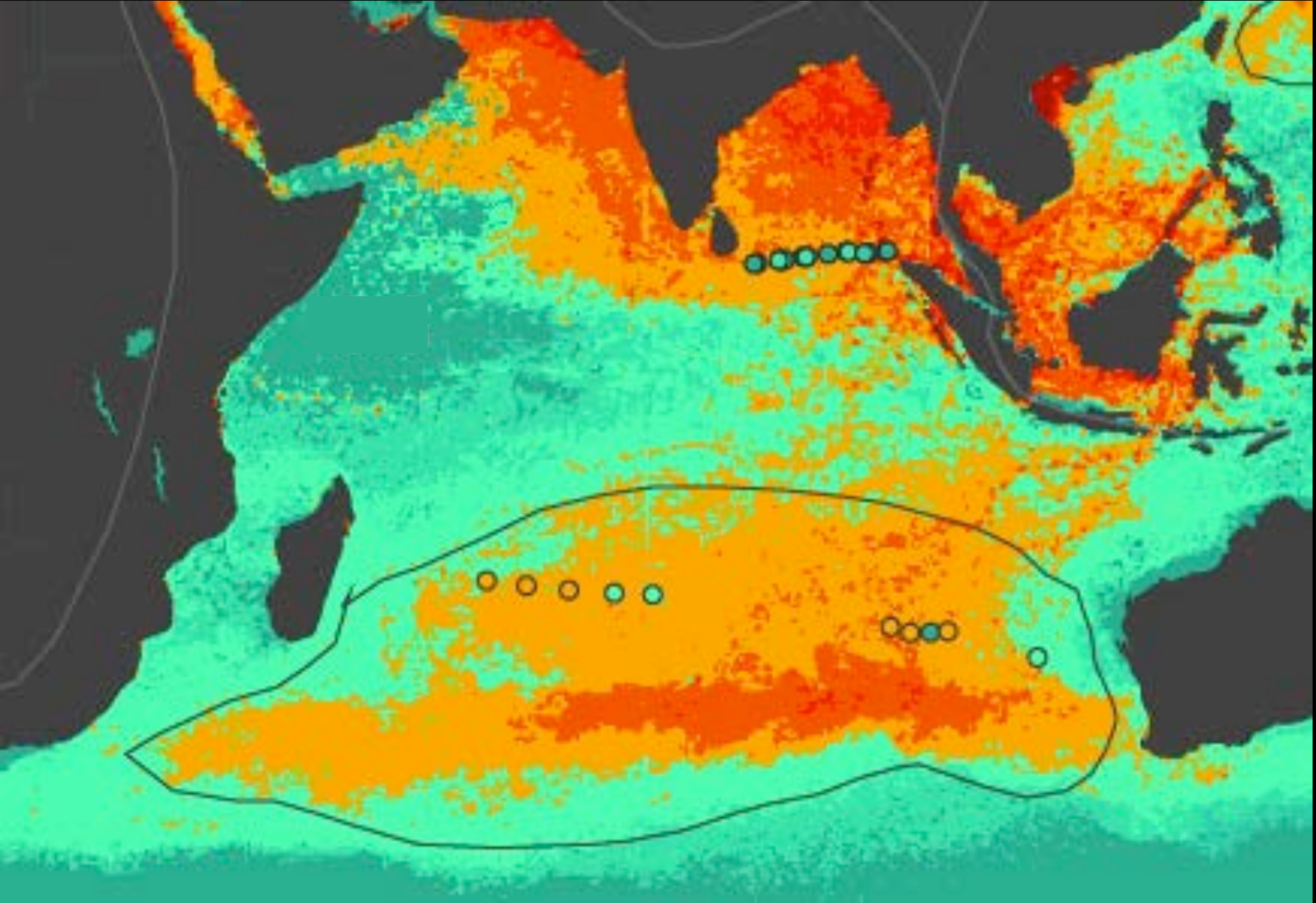




NORTH ATLANTIC GYRE



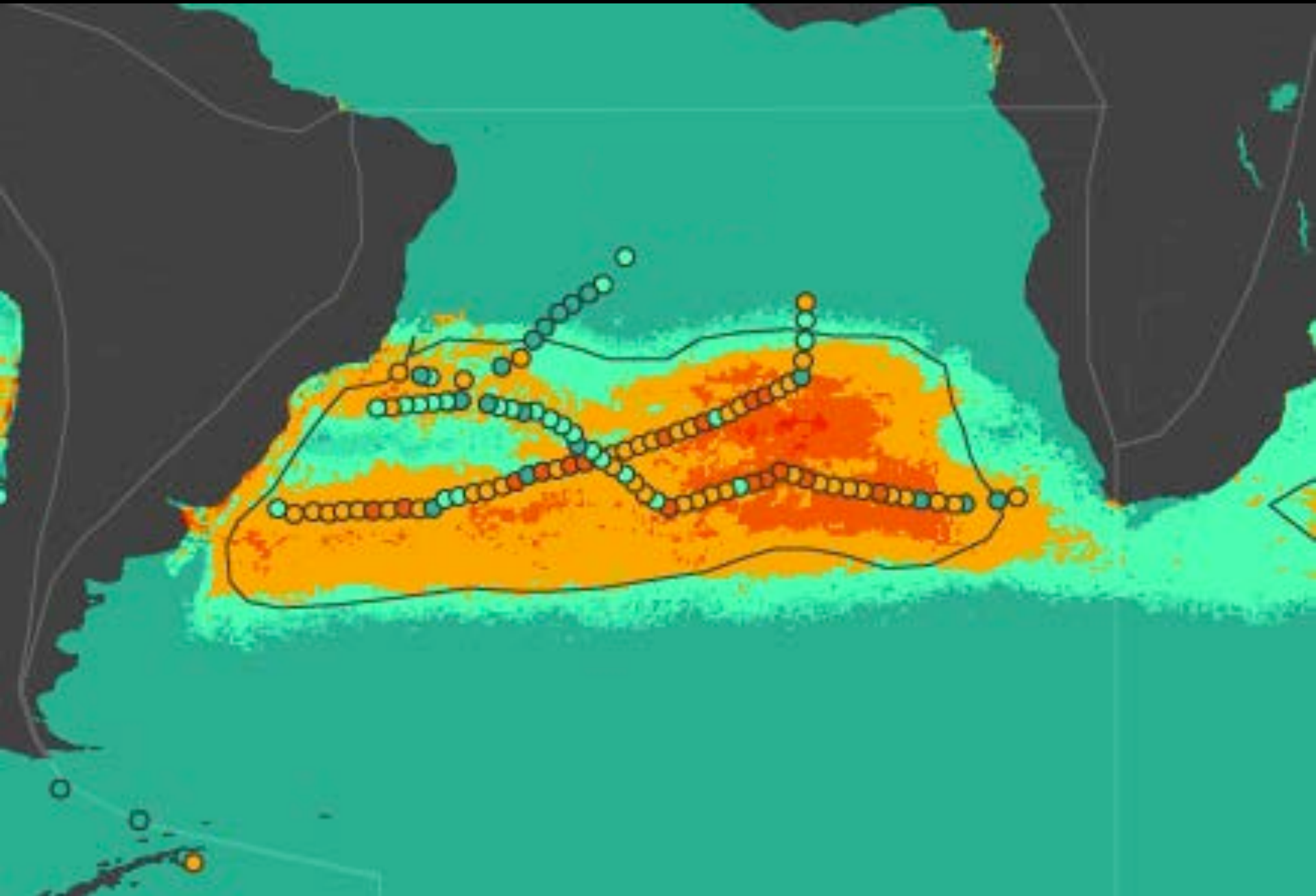
NORTH ATLANTIC GYRE



INDIAN OCEAN GYRE



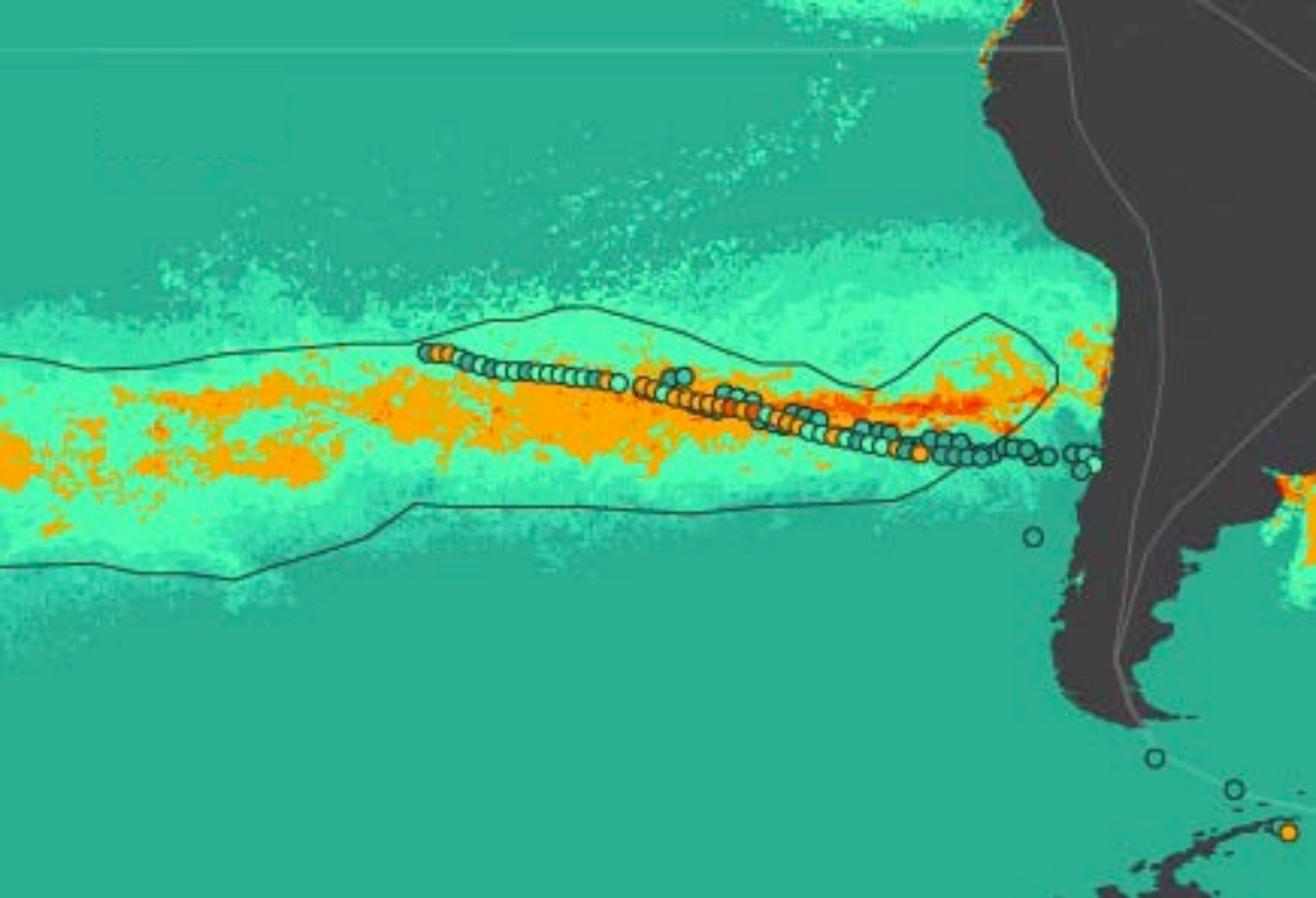
INDIAN OCEAN GYRE



SOUTH ATLANTIC GYRE



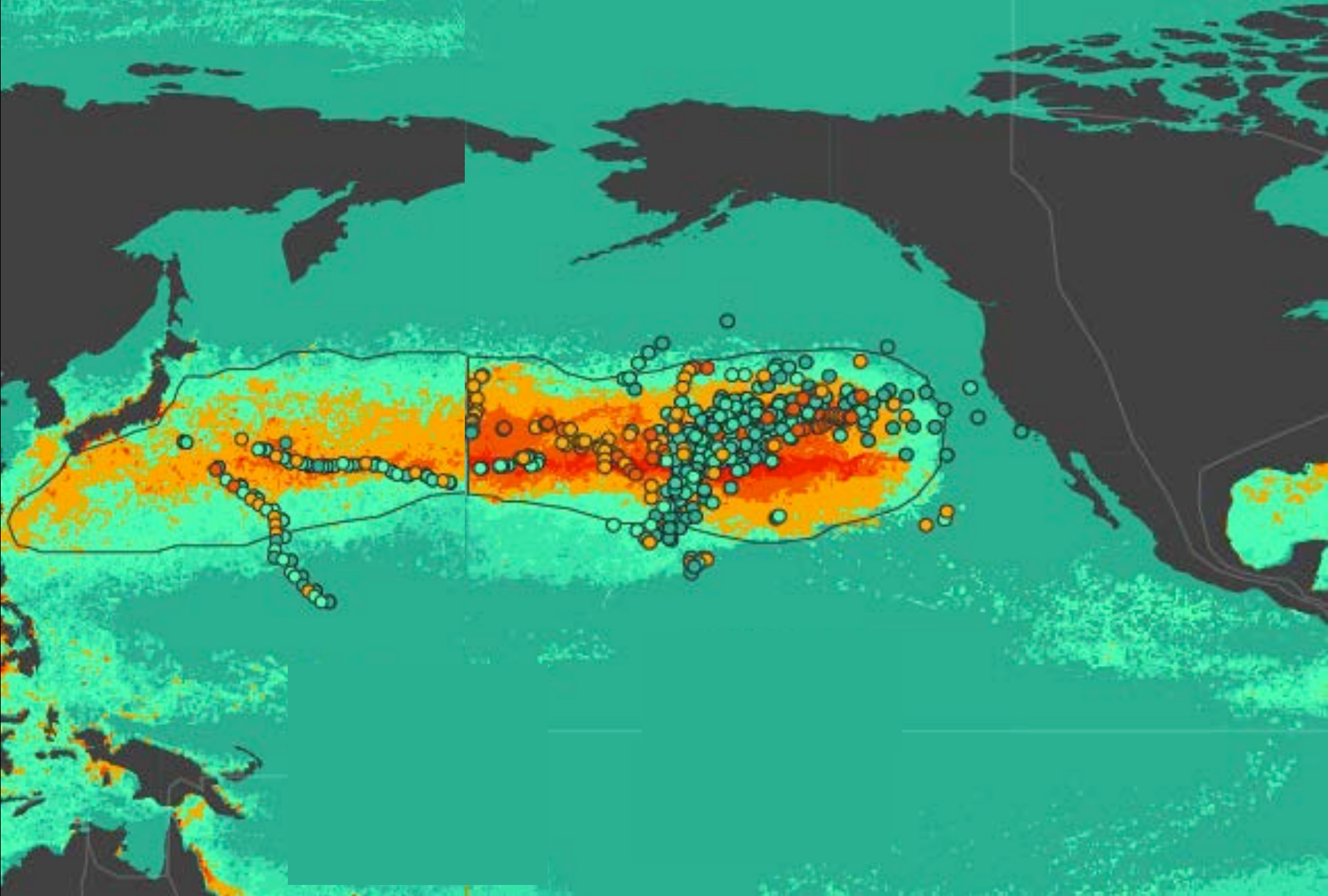
SOUTH ATLANTIC GYRE



SOUTH PACIFIC GYRE



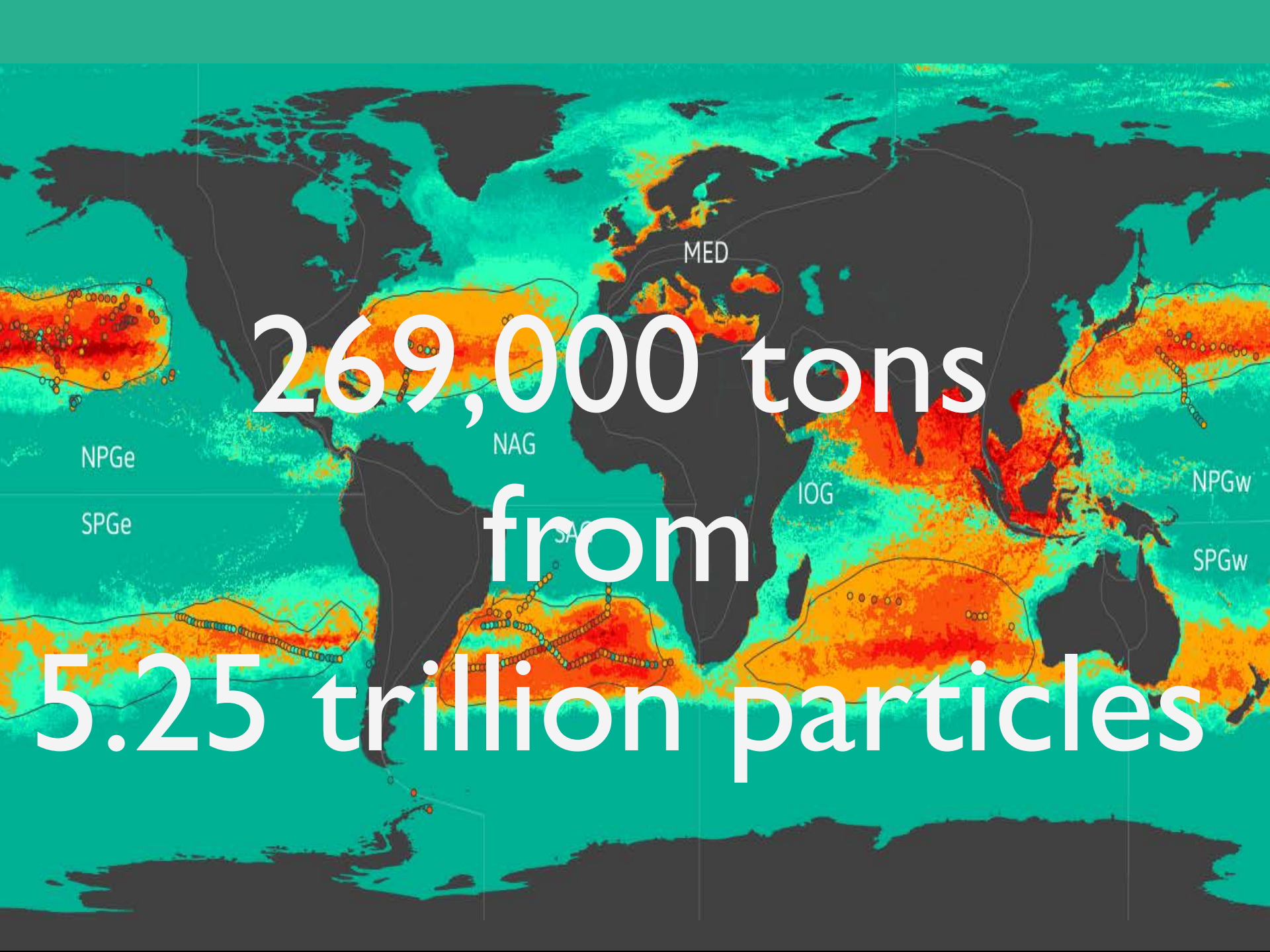
SOUTH PACIFIC GYRE



NORTH PACIFIC GYRE



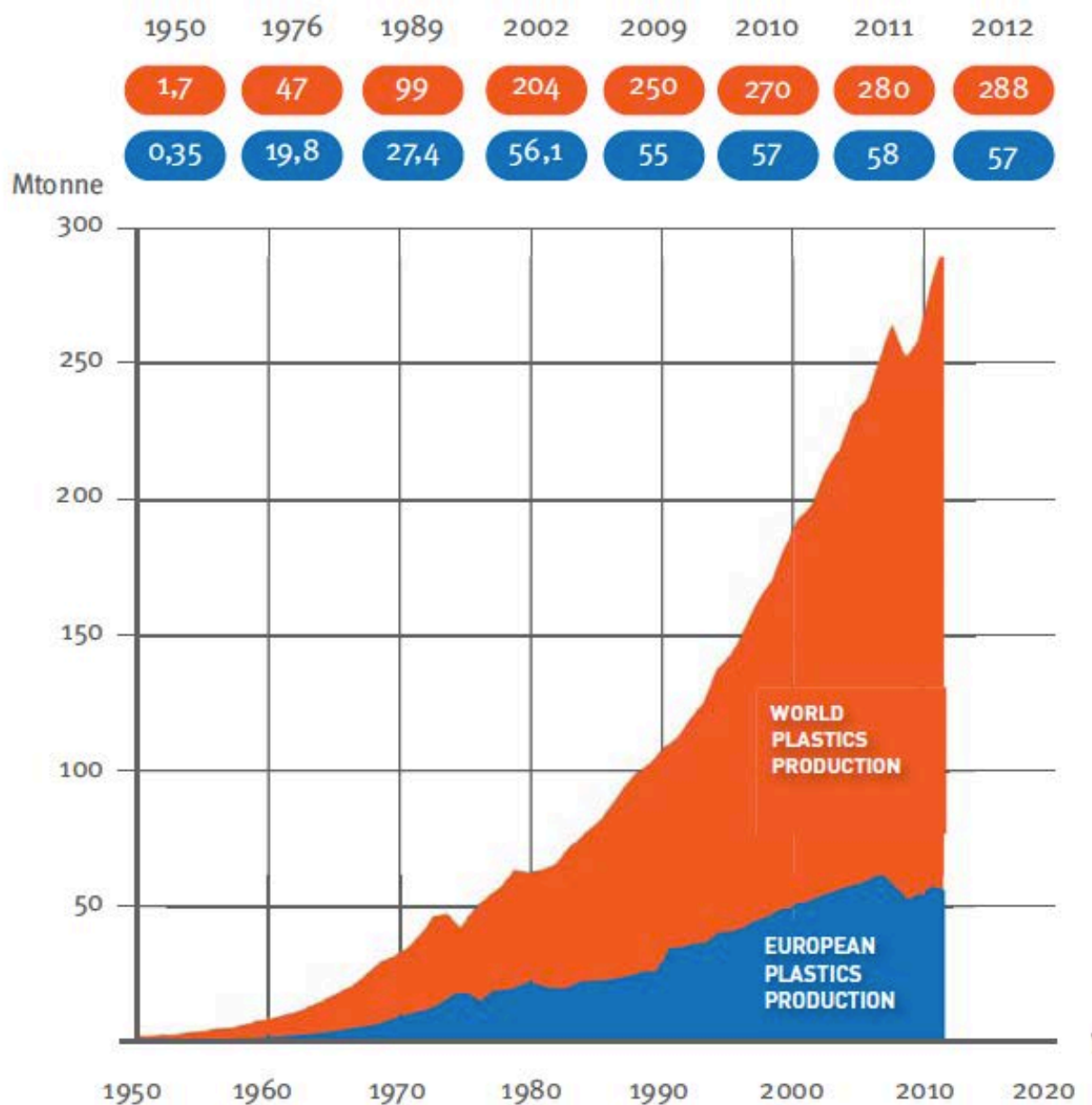
NORTH PACIFIC GYRE



269,000 tons

from

5.25 trillion particles



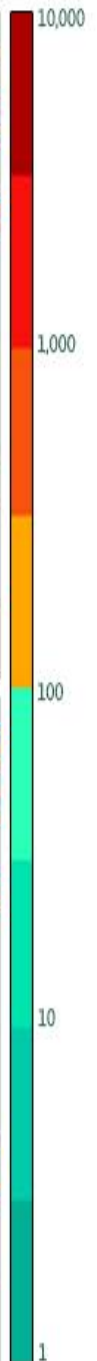
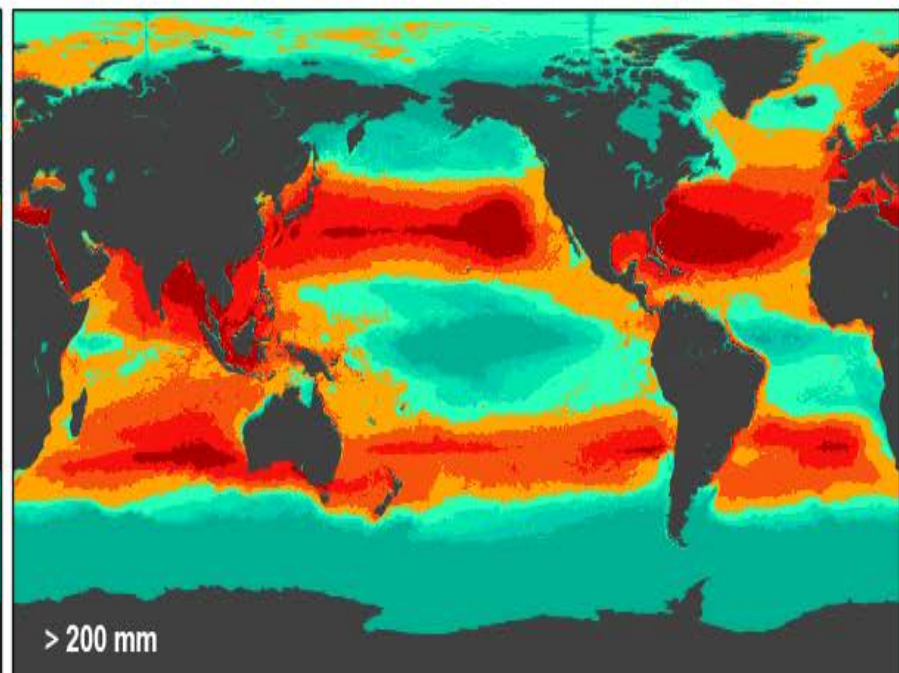
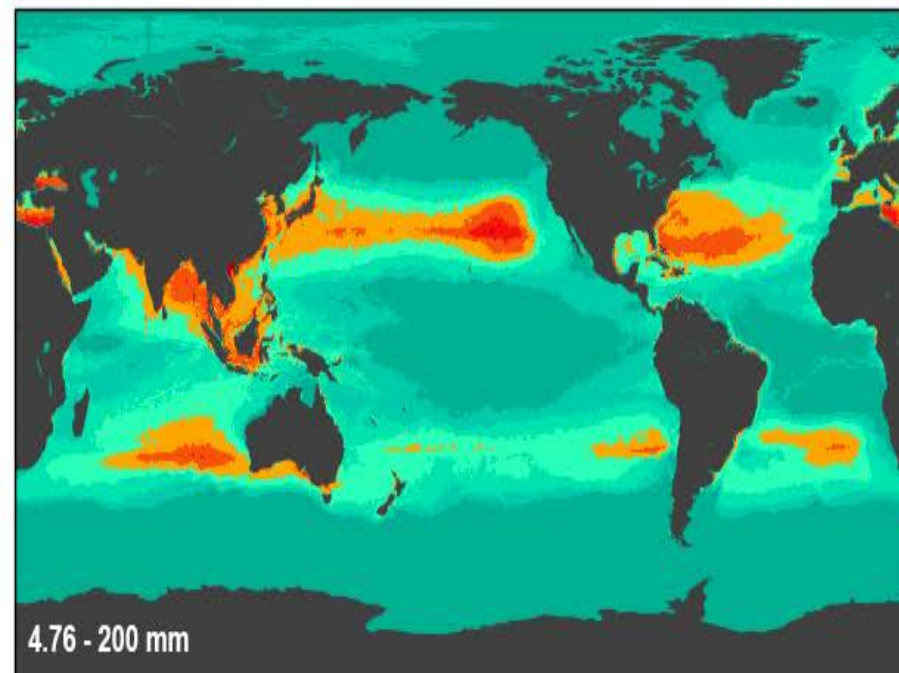
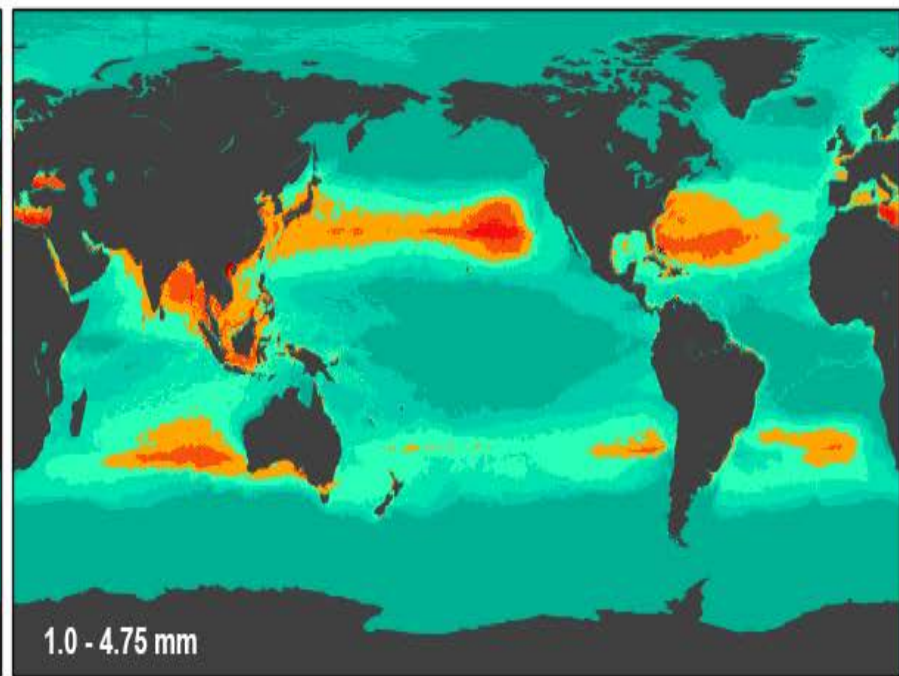
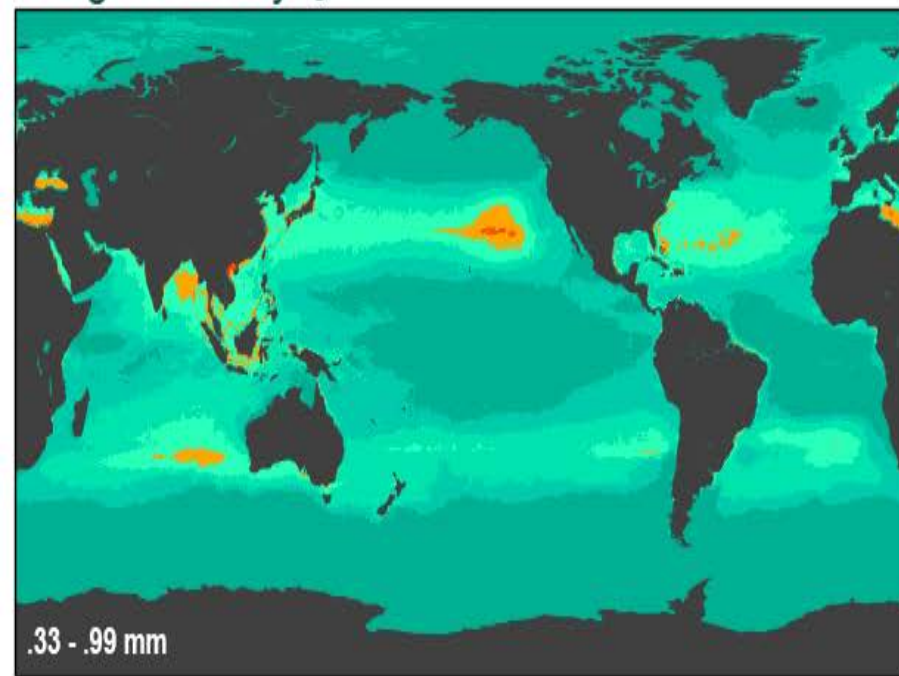
The plastics industry has benefited from 50 years of growth with a year on year expansion of 8.7% and a 2012 global production of **288 million tons.**

Figure 2: World plastics production 1950-2012

Includes thermoplastics, polyurethanes, thermosets, elastomers, adhesives, coatings and sealants and PP-fibers. Not included PET-, PA- and polyacryl-fibers

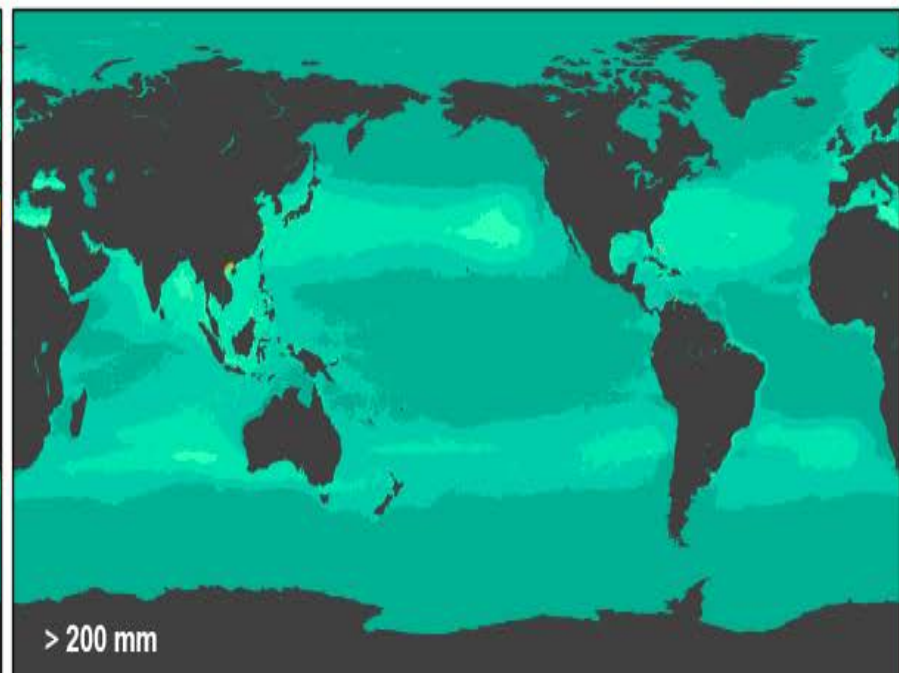
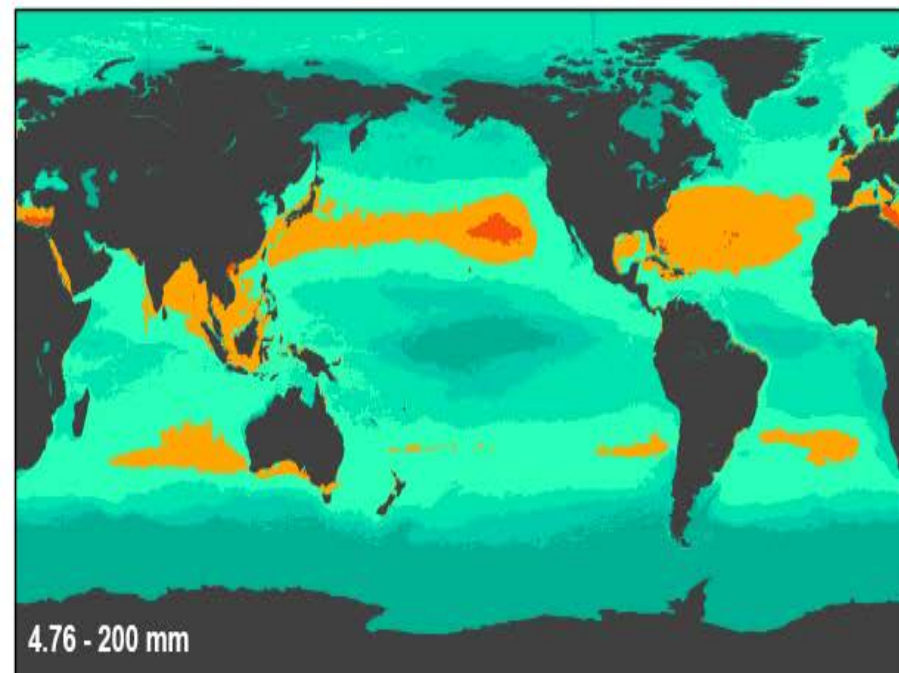
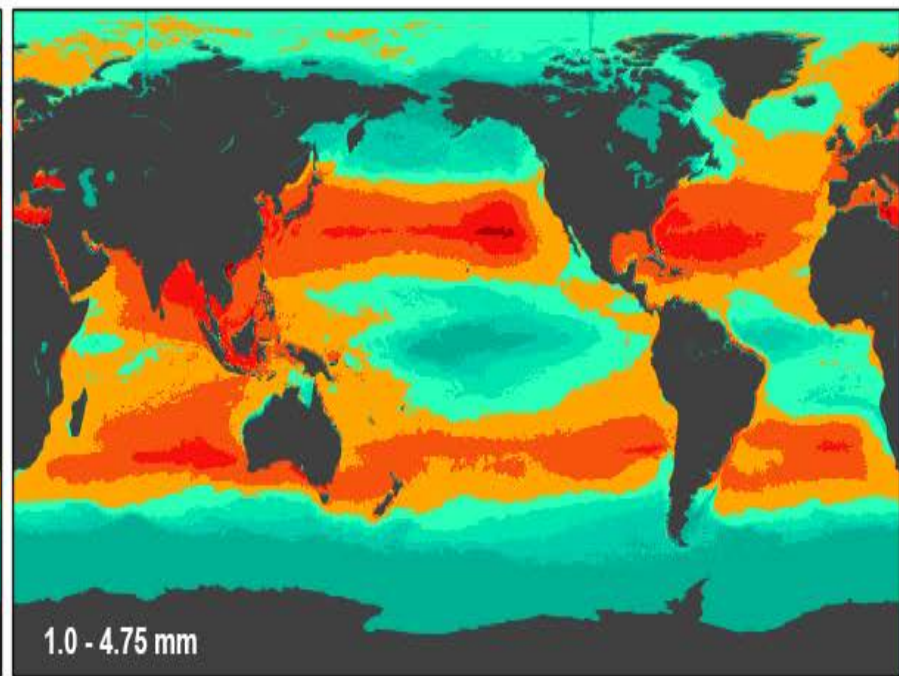
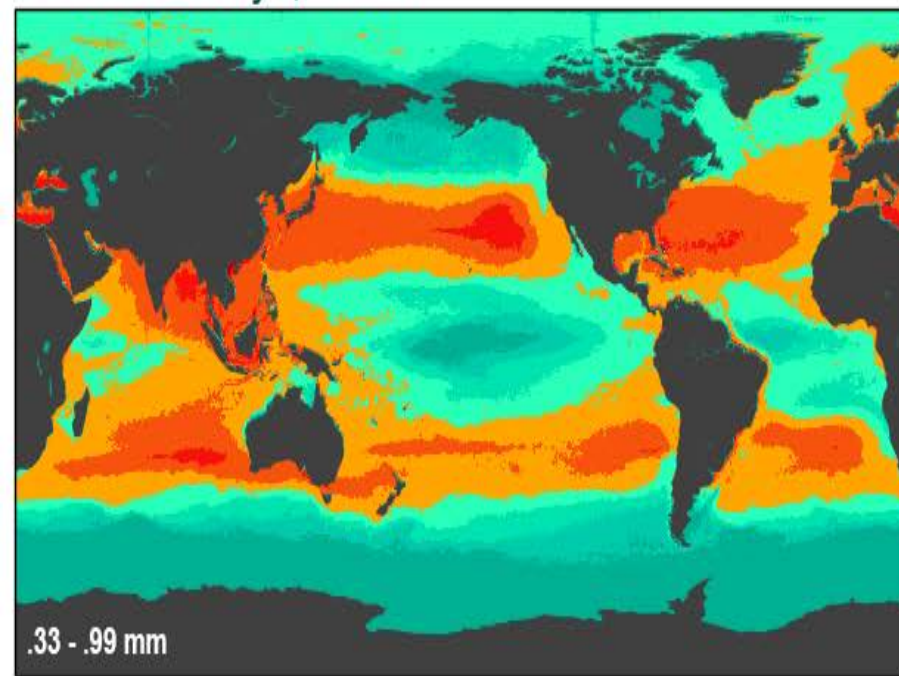
Source: PlasticsEurope (PEMRG) / Consultic

Weight Density - g.km^{-2}



Category	Subcategory	Items	%Count	%Weight
Plastic Fishing Gear	Buoy	319	7.4	58.3
	Line	369	8.6	11.1
	Net	102	2.4	0.9
	Other fishing gear	70	1.6	0.1
Other Plastics	Bucket	180	4.2	15.0
	Bottle	791	18.4	4.9
	Foamed polystyrene	1,116	26.0	8.0
	Plastic bag/film	420	9.8	0.8
	Misc. plastics	924	21.5	0.8
Total		4,291	100	100

Count Density - pieces.km⁻²



	Size class	NP	NA	SP	SA	IO	MED	Total
Count	0.33-1.00mm	68.8	32.4	17.6	10.6	45.5	8.5	183.0
	1.01-4.75mm	116.0	53.2	26.9	16.7	74.9	14.6	302.0
	4.76-200mm	13.2	7.3	4.4	2.4	9.2	1.6	38.1
	>200mm	0.3	0.2	0.1	0.05	0.2	0.04	0.9
	Total	199.0	93.0	49.1	29.7	130.0	24.7	525.0
Weight	0.33-1.00mm	21.0	10.4	6.5	3.7	14.6	14.1	70.4
	1.01-4.75mm	100.0	42.1	16.9	11.7	60.1	53.8	285.0
	4.76-200mm	109.0	45.2	17.8	12.4	64.6	57.6	306.0
	>200mm	734.0	467.0	169.0	100.0	452.0	106.0	2028.0
	Total	964.0	564.7	210.2	127.8	591.3	231.5	2689.4

38%

36%

SOURCE



POOR
WASTE
MANAGEMENT



00076 10KV 50U



DERELICT FISHING GEAR

CATASTROPHIC EVENTS



SINK

PHOTODEGRADATION

OXIDATION

MECHANICAL DEGRADATION



BIODEGRADATION

(Zettler et al., 2013)

2 μm

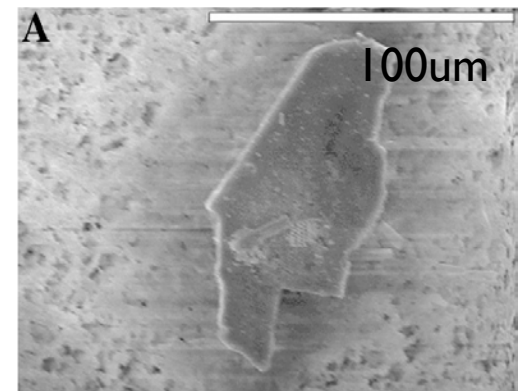
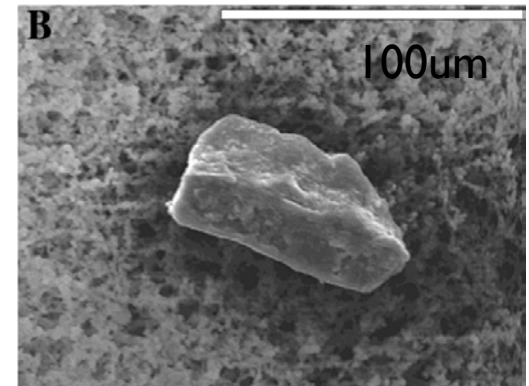
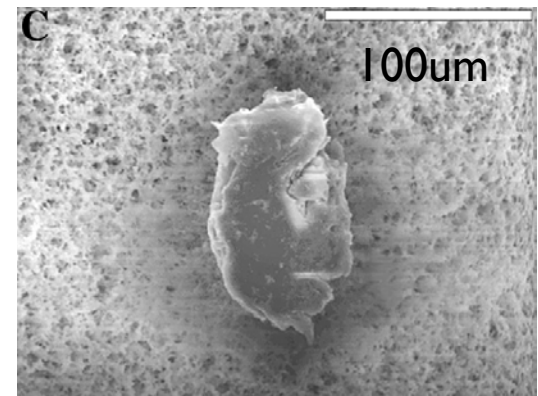
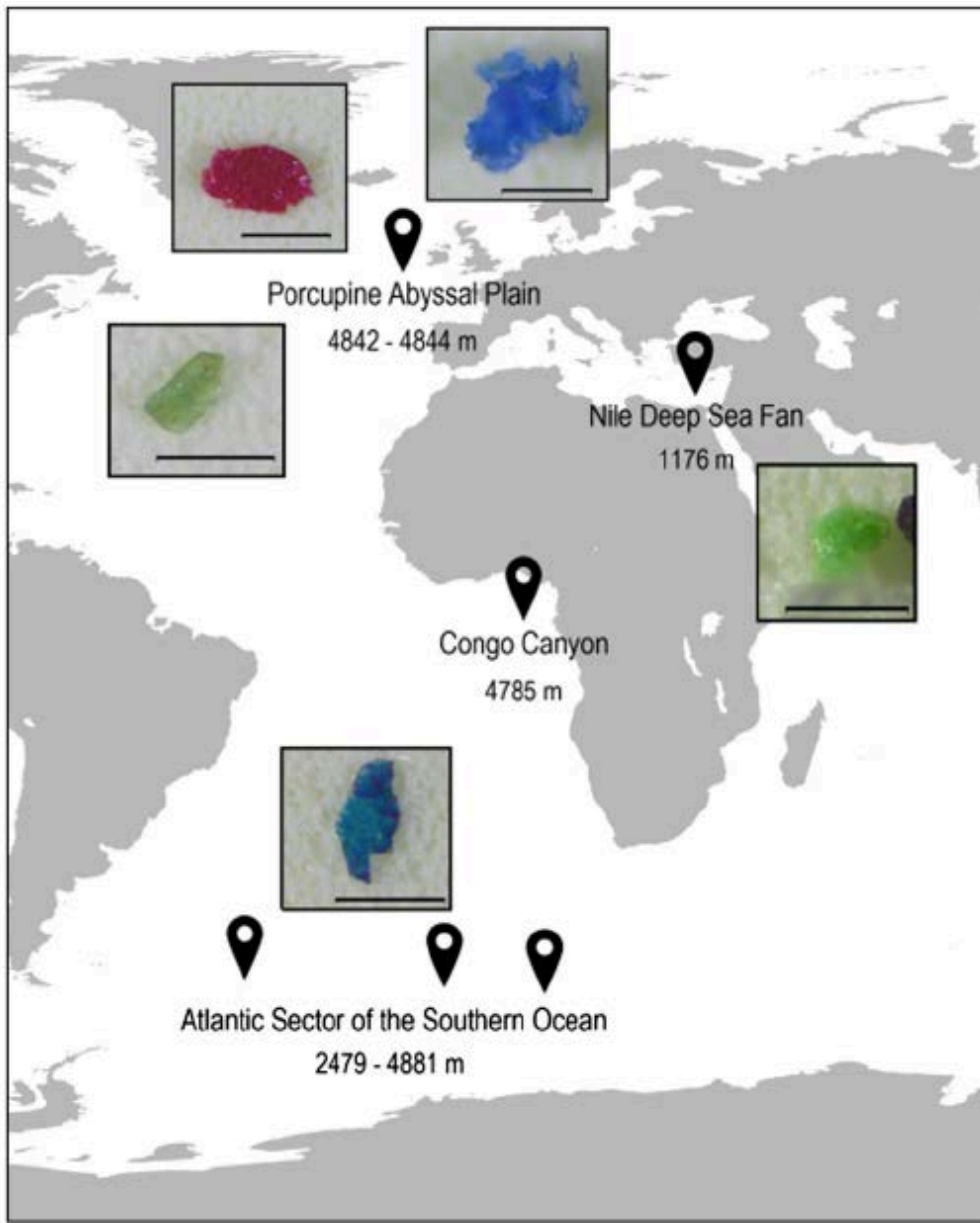




**FRAGMENTATION
BY GRAZING**

A photograph of a rocky coastline. In the foreground, a large pile of debris is scattered across dark, jagged rocks. The debris includes various pieces of plastic, such as a blue bucket, a green container, a yellow bucket, a white bucket, and a white plastic bottle. There are also pieces of wood, twigs, and some yellowish fibrous material. In the background, the ocean is visible with waves crashing against the rocks. A small town with white buildings is visible on a hillside in the distance. The sky is overcast. The text "SHORELINE DEPOSITION" is overlaid in white, bold, sans-serif font across the middle of the image.

SHORELINE DEPOSITION

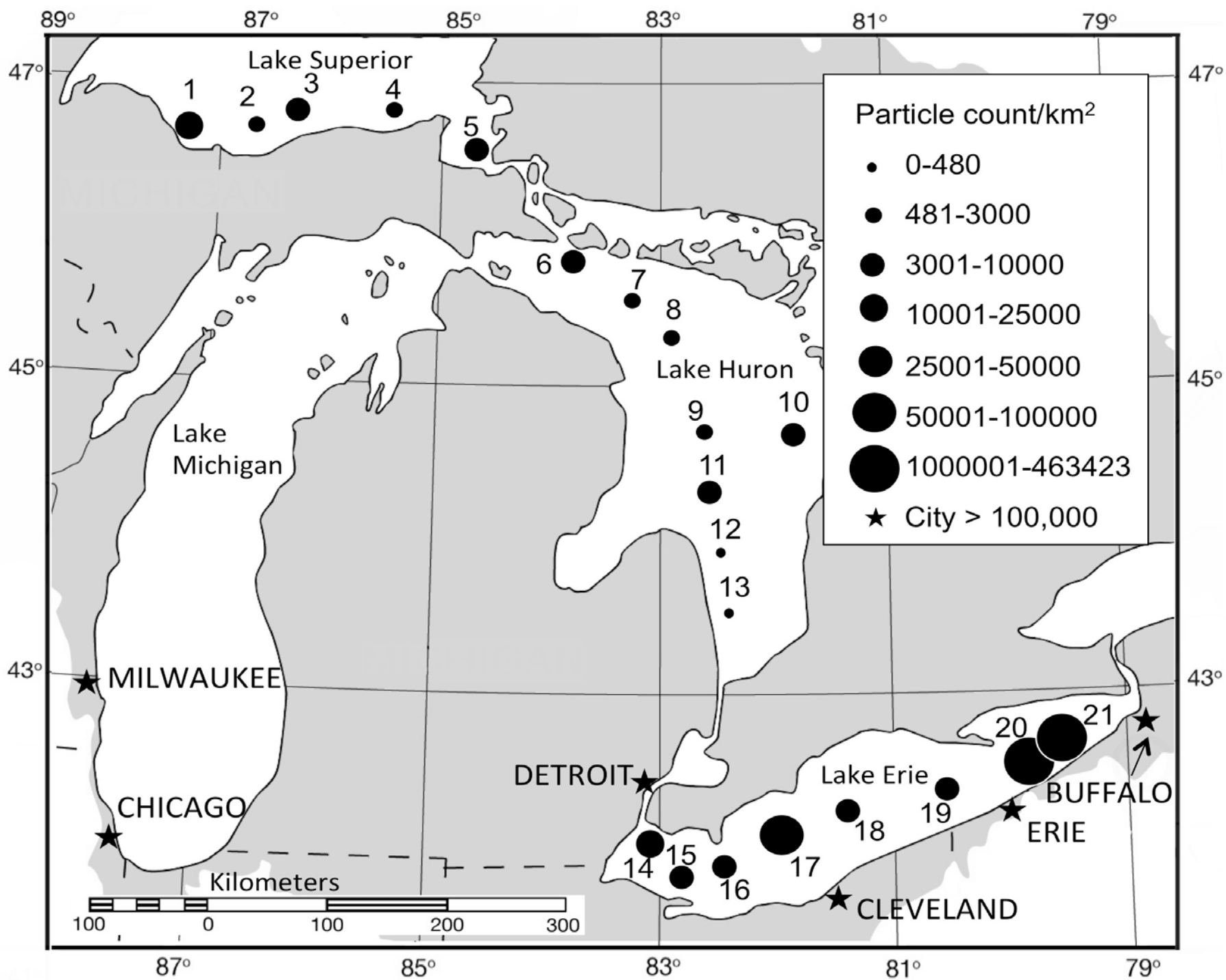


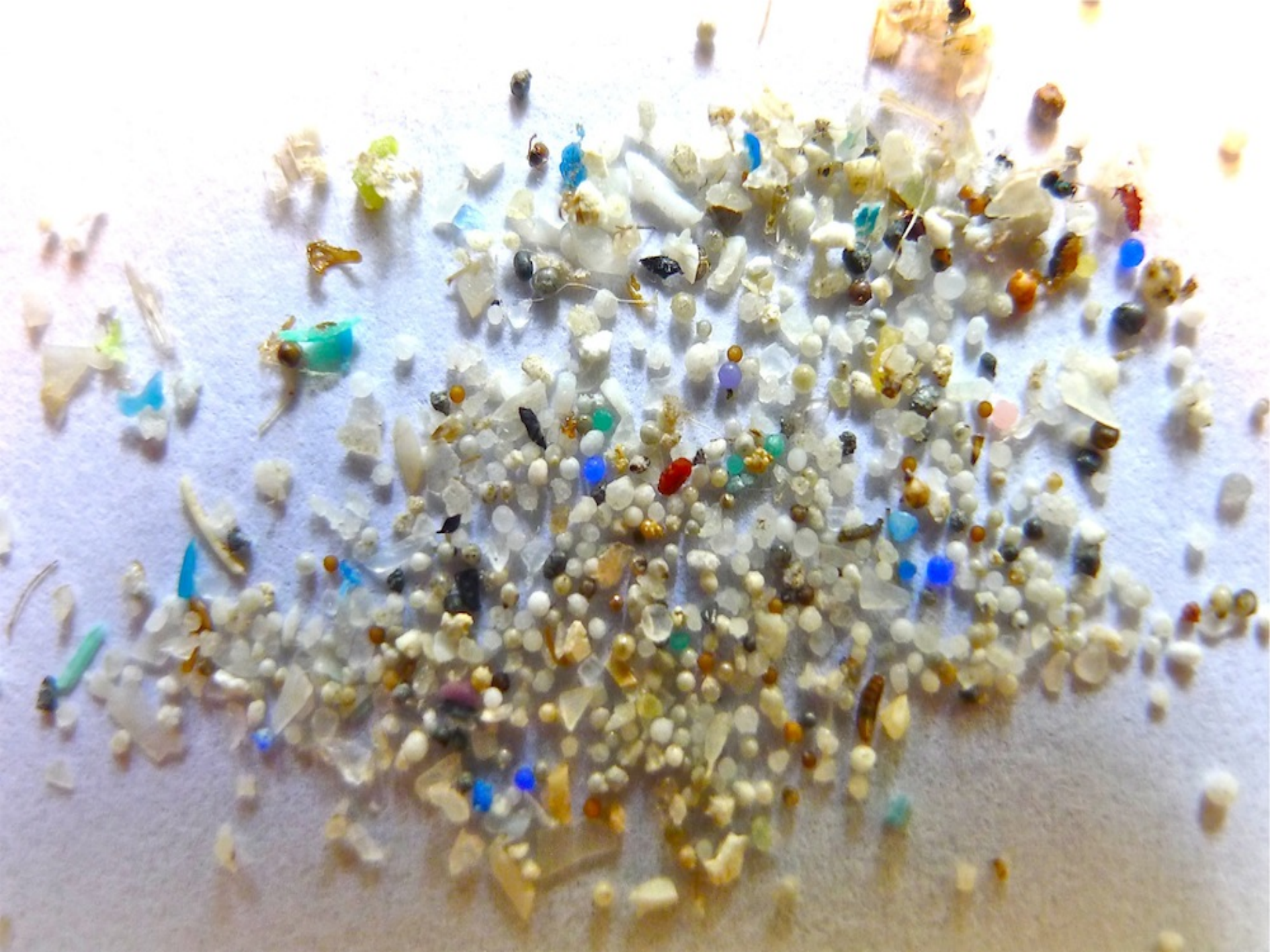
DEEP SEA DEPOSITION

NEAR SHORE SOLUTIONS

A three-masted sailing ship with white sails is shown on a blue sea under a clear sky. The ship has a dark hull and a yellow stripe. An American flag is visible on the left mast. The text "GREAT LAKES EXPEDITIONS 2012-13" is overlaid in white.

GREAT LAKES EXPEDITIONS 2012-13





GENTLE

SCRUB

g the day.
laurate, Polyethylene, Glycerin
sulfuric Acid, Acrylates/C10

oil free

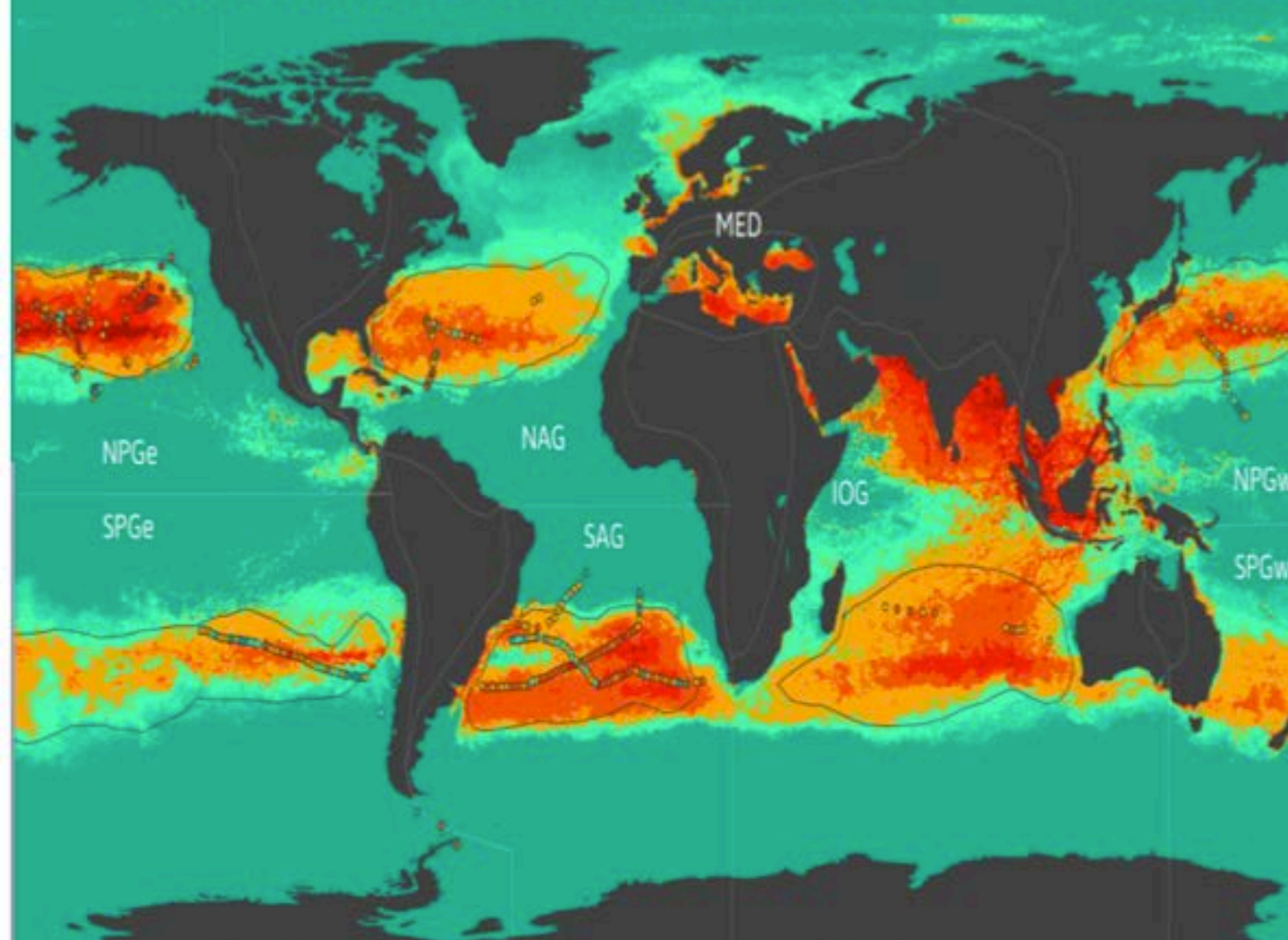
microbeads gently exfoliate,
Beta Hydroxy cleans deep into
pores for soft, smooth skin

Neutrogena®



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FUTURE WORK



Choose time interval:

- <1970
- 1970's
- 1980's
- 1990's
- 2000-2006
- 2007-2013

Choose Gyre:

- NAG
- NPG
- SPG
- SAG
- IOG
- All Gyres

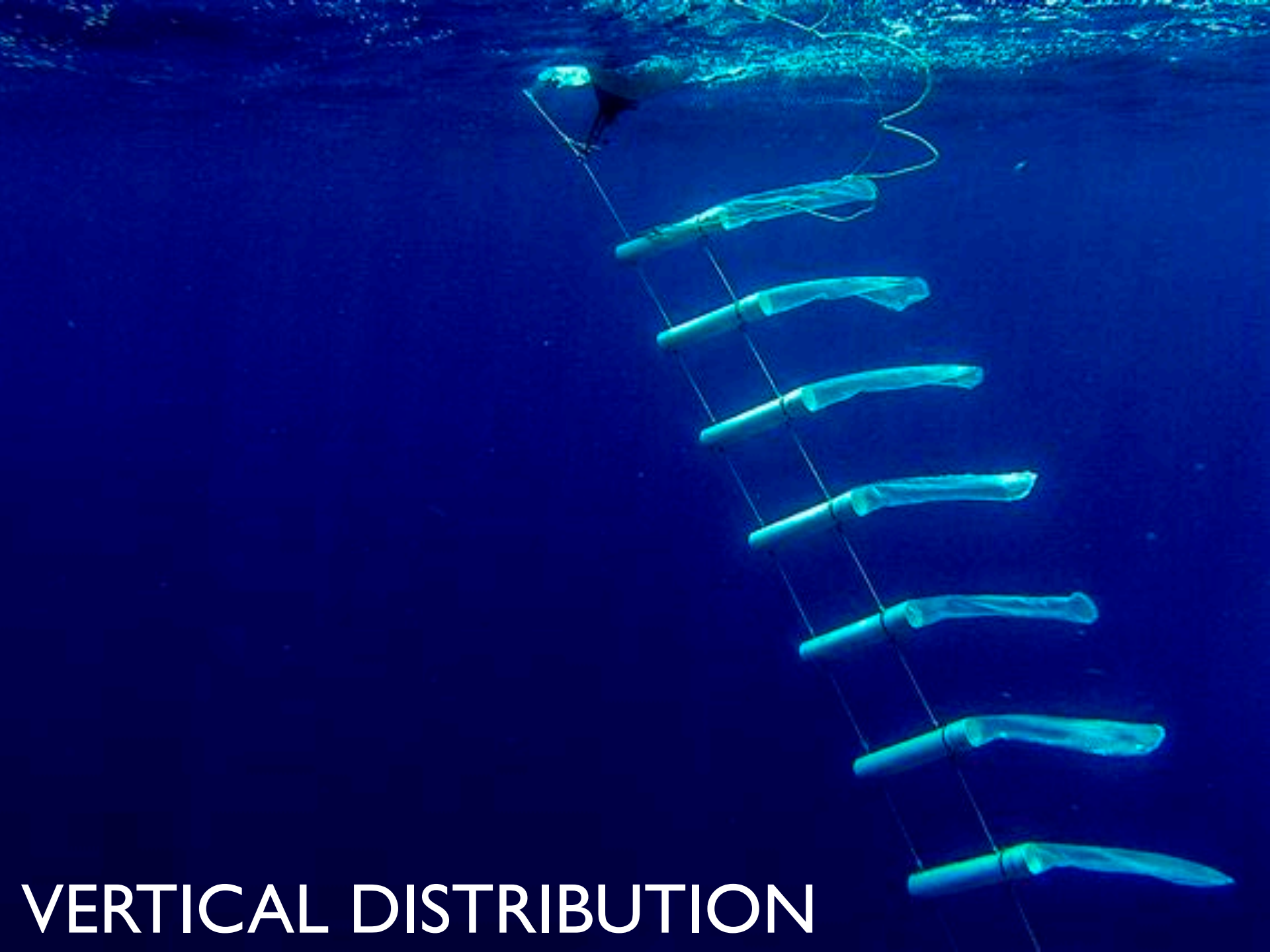
Choose the particle size:

- .335-1mm
- 1-5mm
- 5-200mm
- >200mm
- All combined

TOTAL WEIGHT 1.76 billion kg TOTAL COUNT: 3.3 trillion particles

ADD YOUR DATA. BECOME A CITIZEN SCIENTIST

CITIZEN SCIENCE



VERTICAL DISTRIBUTION



WASTE PREVENTION & RECOVERY



DEFINING THE ANTHROPOCENE



5GYRES

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