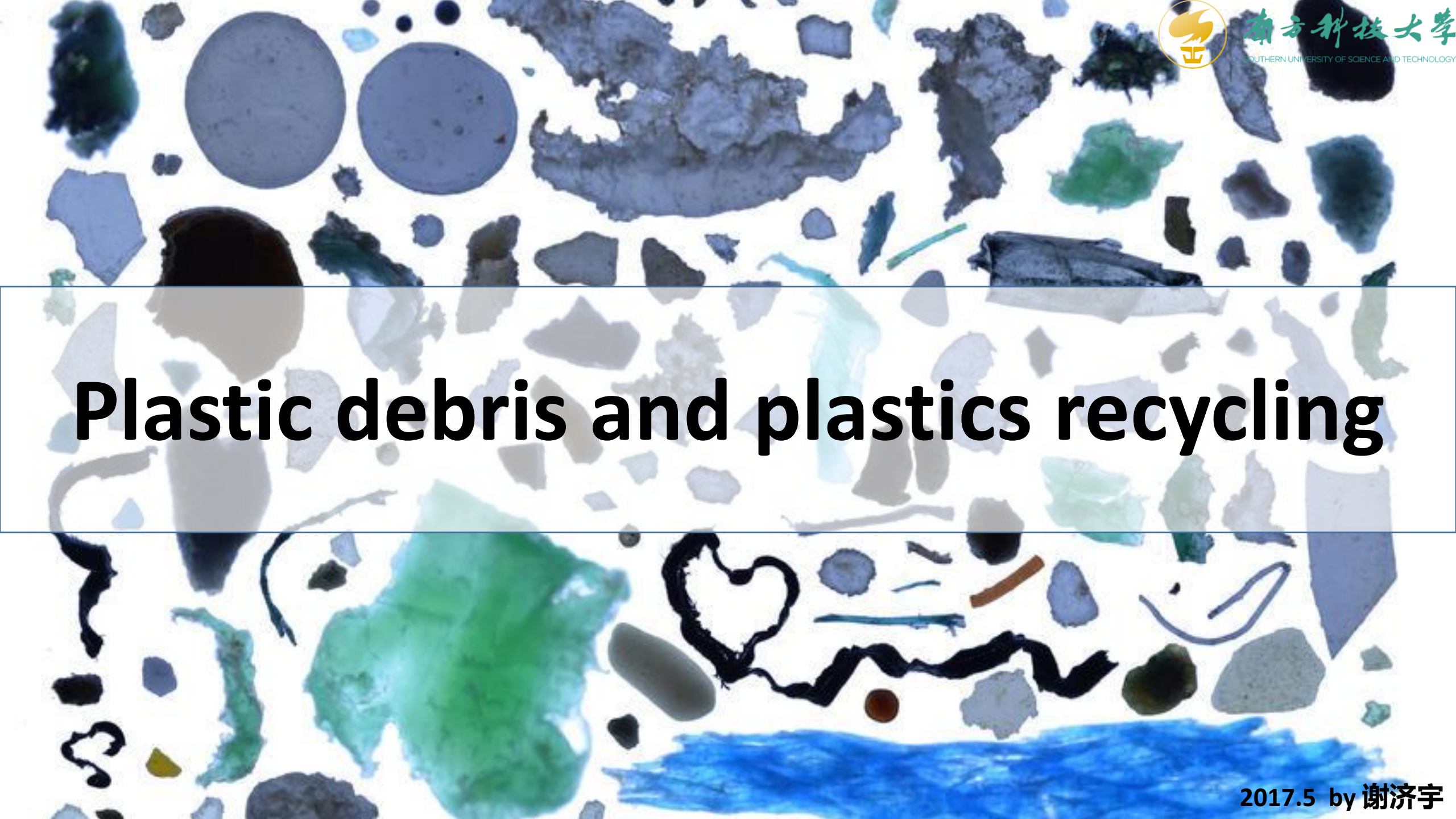

Plastic debris and plastics recycling

2017.5 by 谢济宇

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Types of plastic

Type		name	properties	common uses	burning
PET		polyethylene terephthalate	clear, tough, solvent resistant, barrier to gas and moisture, softens at 80°	Soft drink, water bottles, salad domes, bisquit trays, food containers	yellow flame little smoke
HDPE		high-density polyethylene	Hard to semi-flexible, resistant to chemicals and moisture, waxy surface, softens at 75°	Shopping bags, freezer bags, milk bottles, juice bottles, iceacream containers, shampoo, crates	difficult to ignite smells like candle
PVC		polyvinyl chloride	Strong, tough, can be clear and solvent, softens at 60°	Cosmetic containers, electrical condult, plumbing pipes, blister packs, roof sheeting, garden hose	yellow flame green spurts
LDPE		low-density polyethylene	Soft, flexible, waxy surface, scratches easily, softens at 70°	Cling wrap, garbage bags, squeeze bottles, refuse bags, mulch film	difficult to ignite smells like candle
PP		polypropylene	Hard but still flexible, waxy surface, translu-cent, withstands solvents, softens at 140°	Bottles, icecream tubes, straws, flower-pots, dishes, garden furniture, food containers	blue yellow tipped flame
PS		polystyrene	Clear, glassy, opaque, semi tough, softens at 95°	CD cases, plastic cutlery, imitation glass, foamed meat trays, brittle toys,	dense smoke
OTHER		all other plastics	Properties depend on the type of plastic	automotive, electron-ics, packaging	all other plastics

Visual properties of plastic

Plastic Class	Specific Gravity	Percentage production*	Products and typical origin
Low-density polyethylene (LDPE LLDPE)	0.91–0.93	21%	Plastic bags, six-pack rings, bottles, netting, drinking straws
High-density polyethylene (HDPE)	0.94	17%	Milk and juice jugs
Polypropylene (PP)	0.85–0.83	24%	Rope, bottle caps, netting
Polystyrene (PS)	1.05	6%	Plastic utensils, food containers
Foamed Polystyrene			Floats, bait boxes, foam cups
Nylon (PA)		<3%	Netting and traps
Polyethylene terephthalate (PET)	1.37	7%	Plastic beverage bottles
Polyvinyl chloride (PVC)	1.38	19%	Plastic film, bottles, cups
Cellulose Acetate (CA)			Cigarette filters

* Fraction of the global plastics production in 2007

95 foamed meat trays, brittle toys,

OTHER 7 all other plastics Properties depend on the type of plastic automotive, electron-ics, packaging all other plastics

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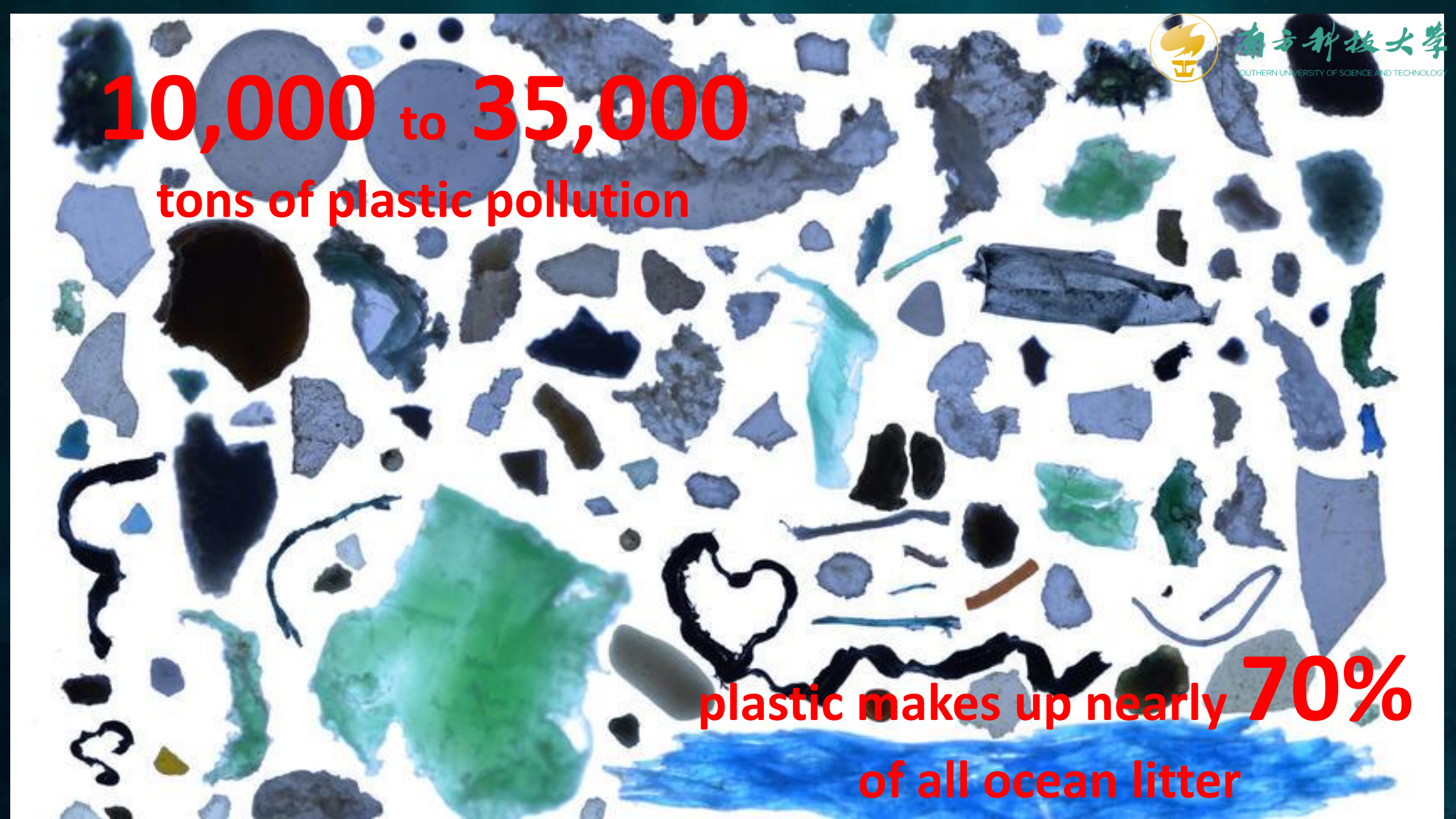

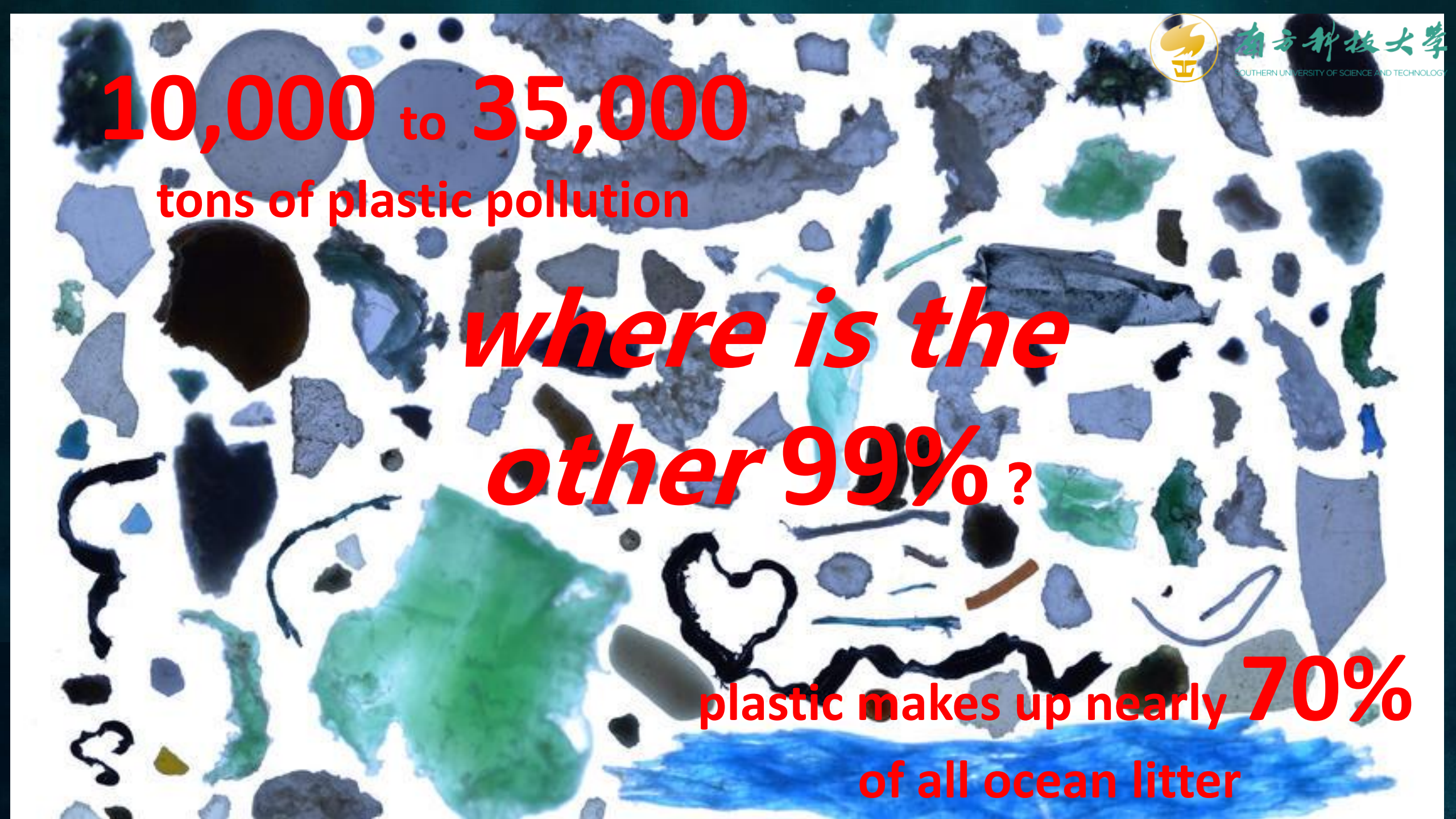
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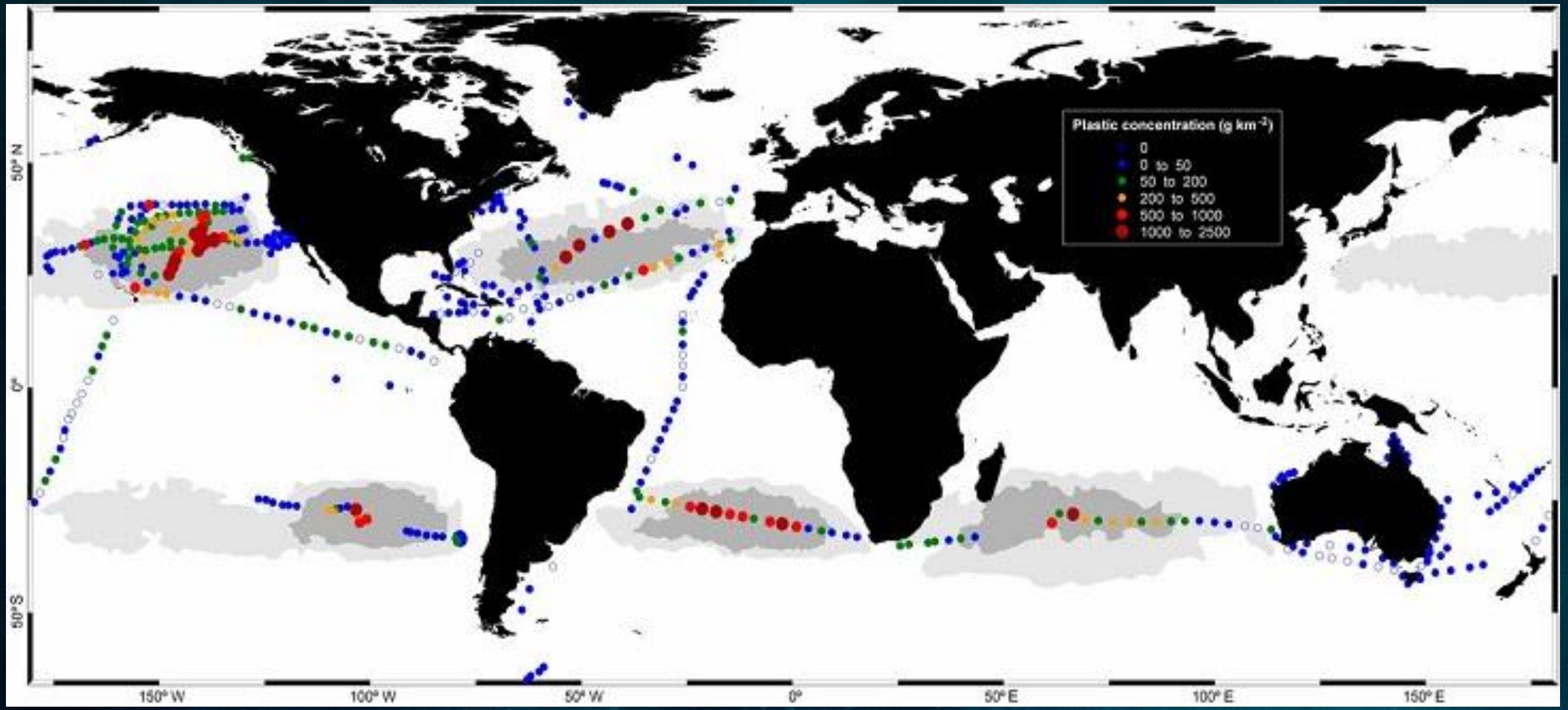
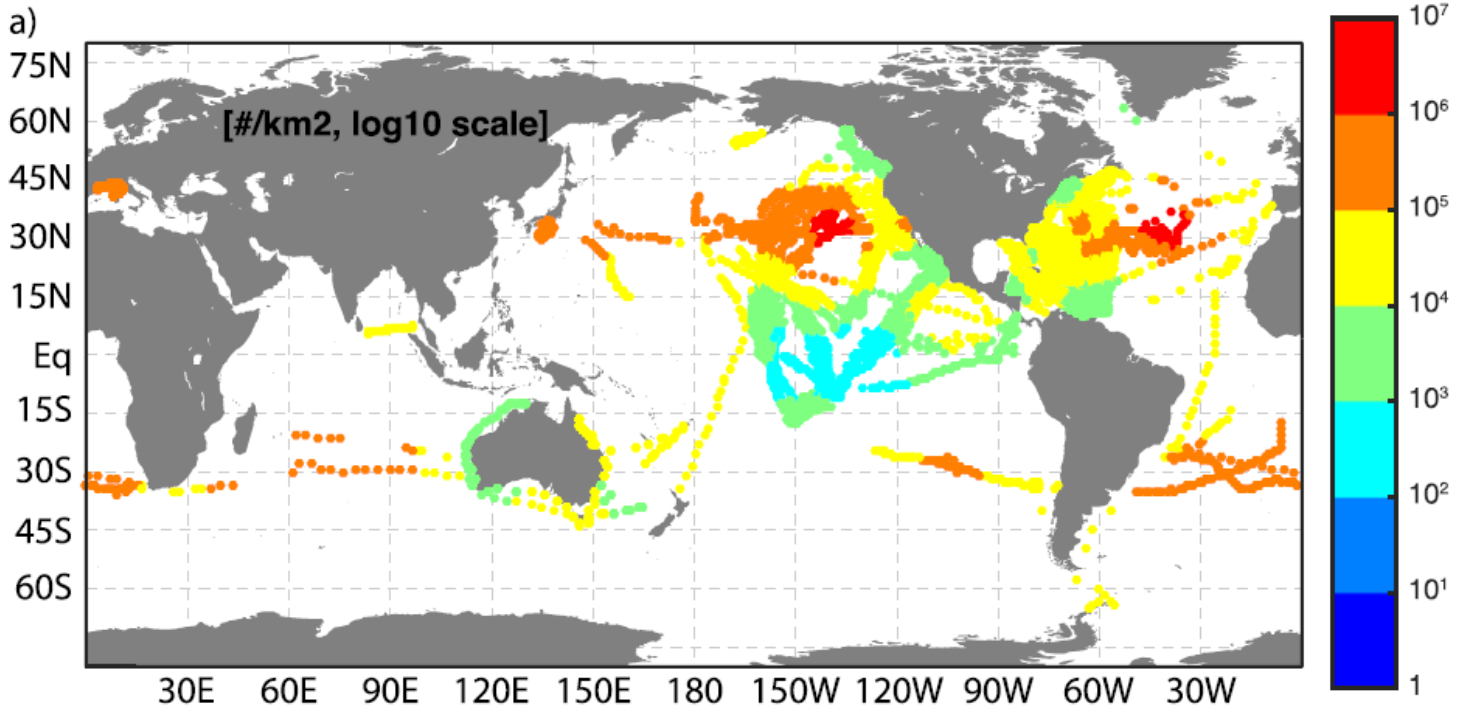
10,000 to 35,000
tons of plastic pollution
where is the other 99% ?
plastic makes up nearly 70%
of all ocean litter

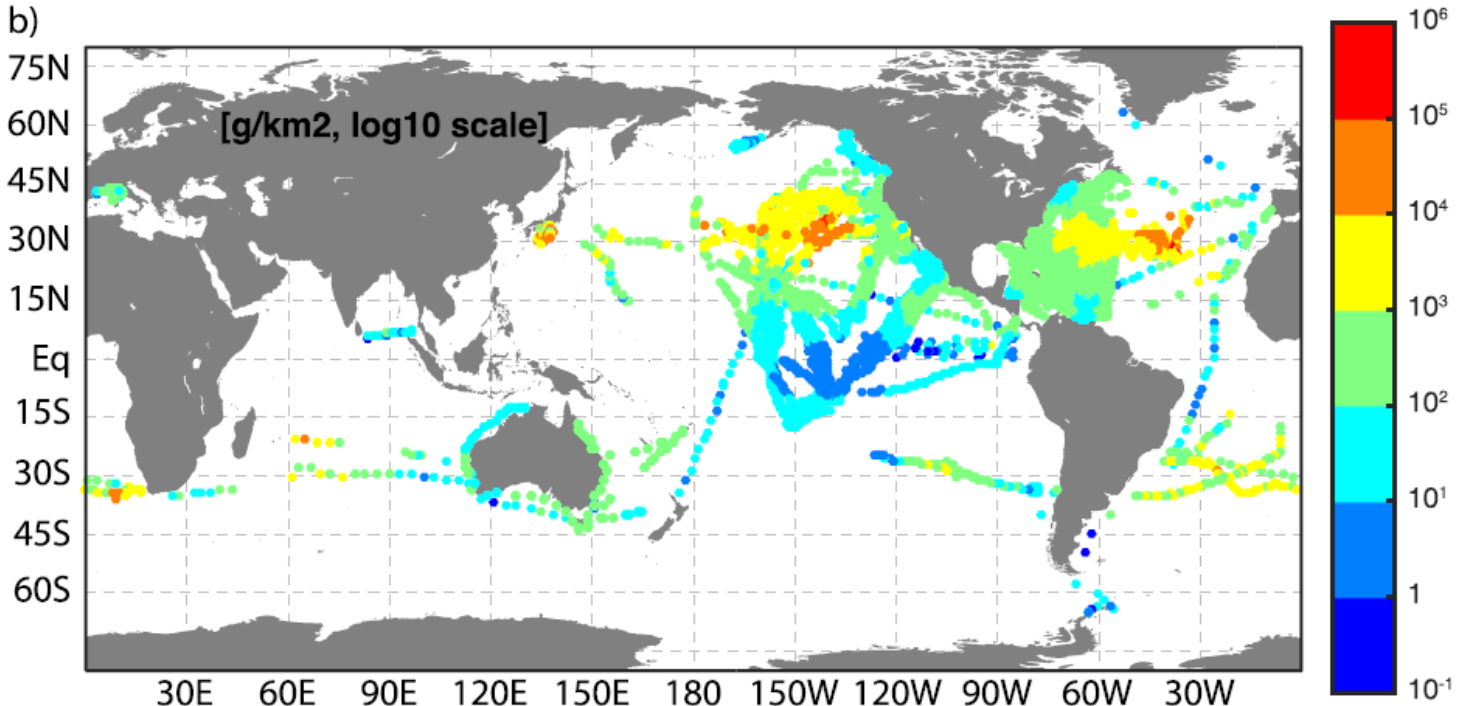
Pieces of plastic float here in ocean water. This pollution is a growing problem, and not just because it's ugly: Plastic can kill many kinds of marine life.
NOAA



Almost every sample of ocean water collected by a Spanish team contained at least a few small pieces of plastic. On this map, the dots show the average concentration of plastic in hundreds of locations. Red dots mark highest concentrations. The gray areas denote gyres, where plastics accumulate.

CÓZAR ET AL/PNAS 2014





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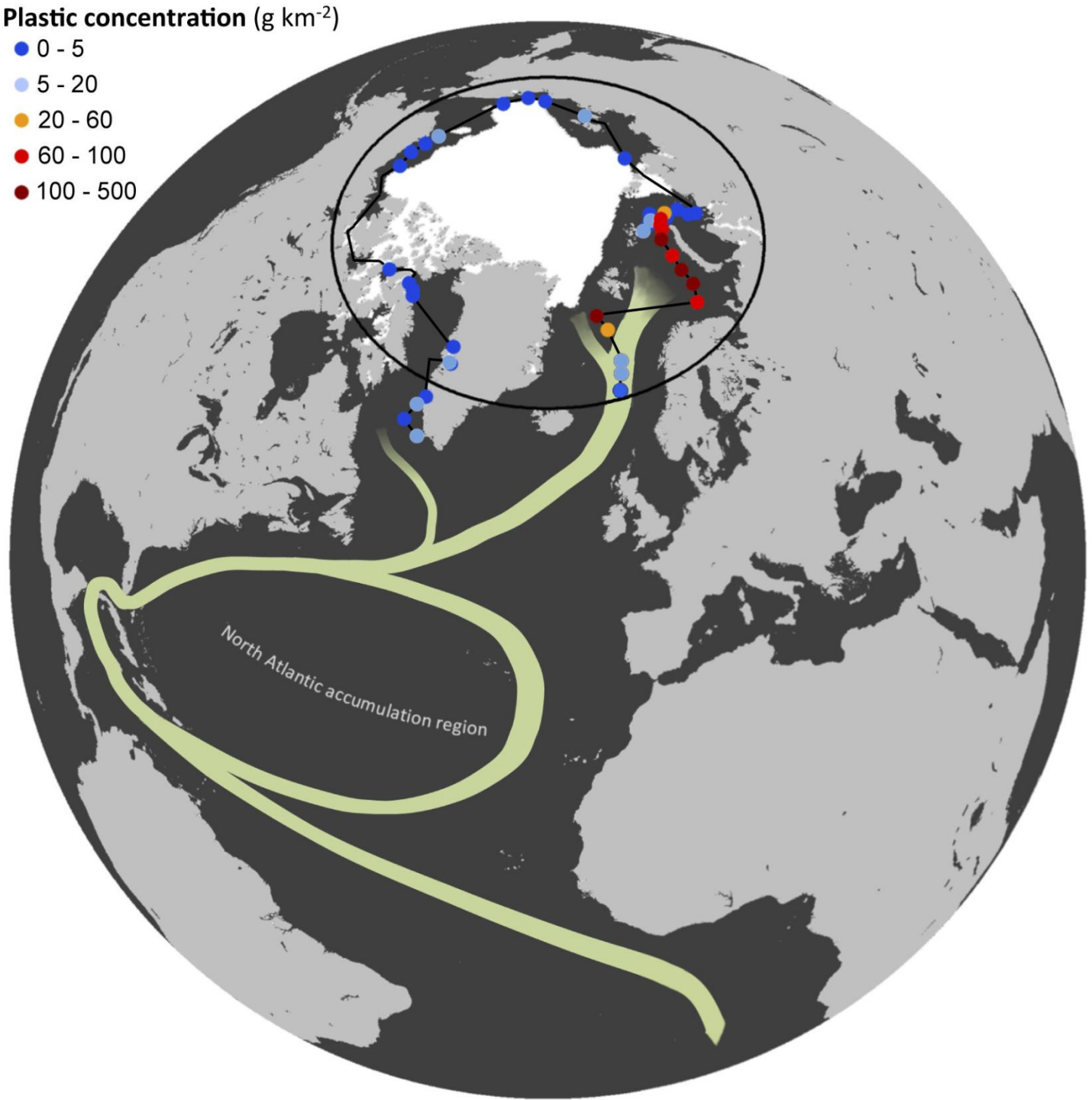
The location and standardized (a) microplastic count and (b) microplastic mass of all surface trawl data used in this analysis, on a log10 scale. Standardization is done with respect to year of study, geographic location, and wind speed. The spatial term includes a discontinuity at the Americas to allow for differences between the Caribbean Sea and tropical Pacific Ocean. Compare to figure S1 for the raw, un-standardized data.(van Sebille et al., 2015)



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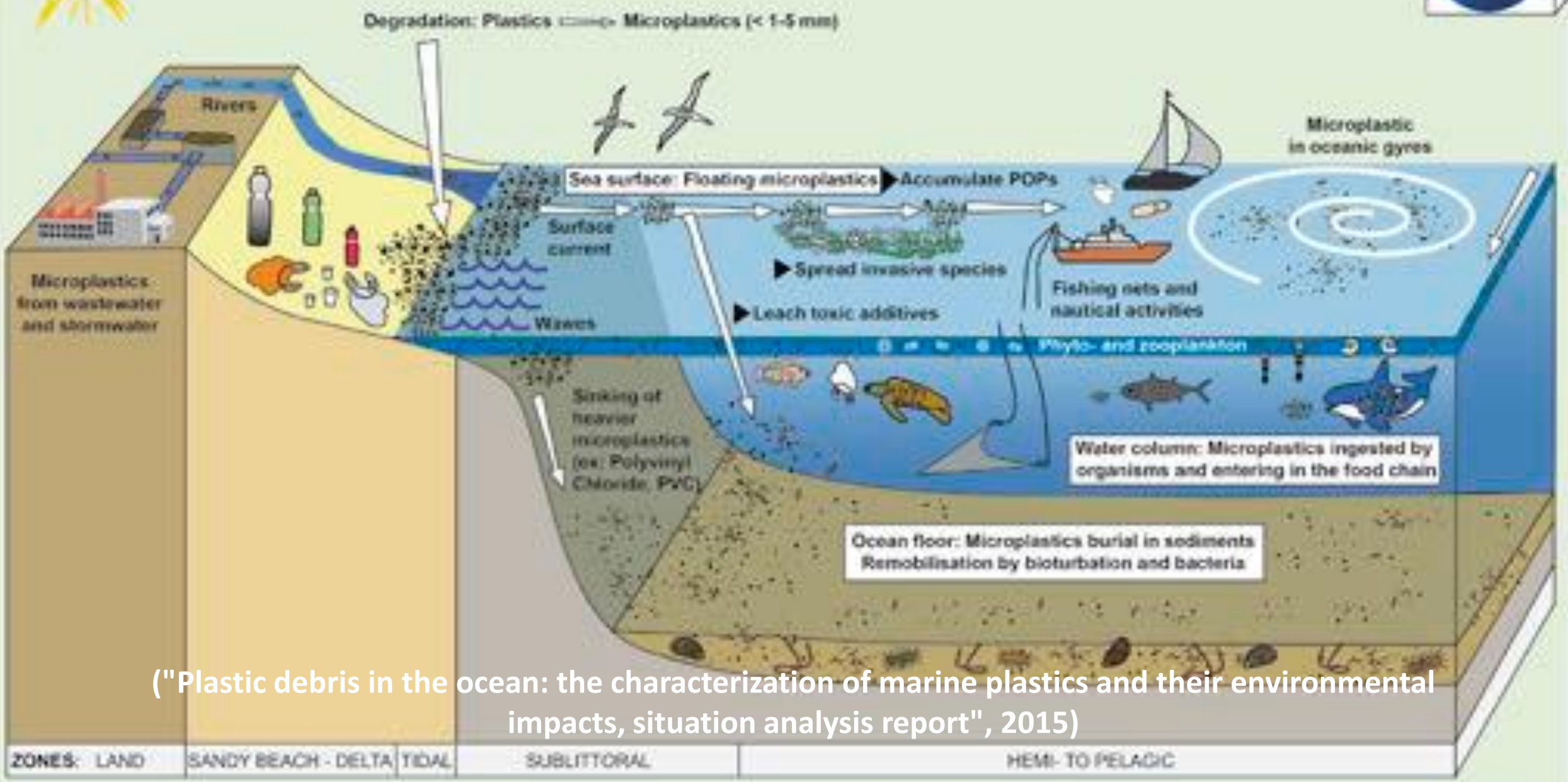
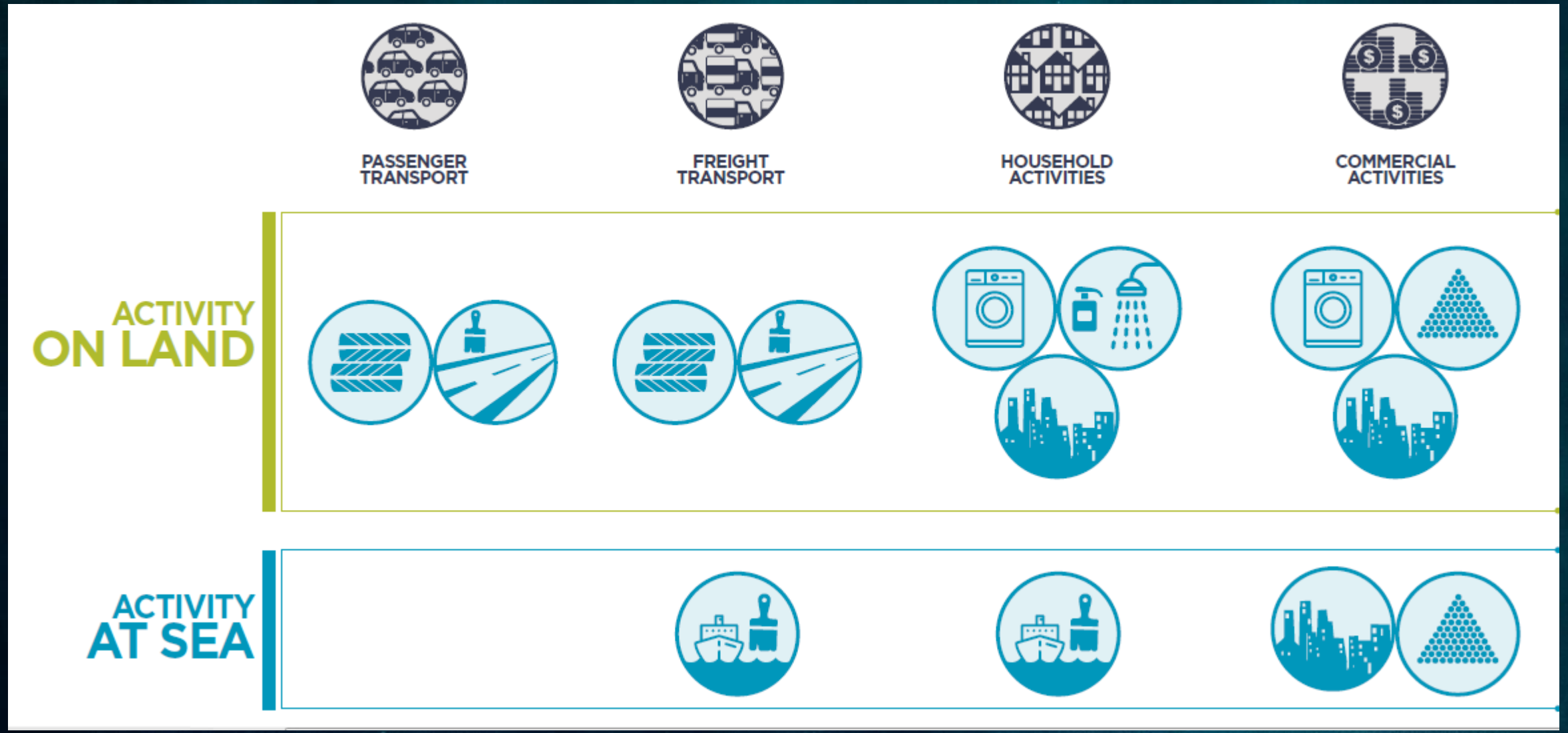
Locations and plastic concentrations of the sites sampled. The white area shows the extension of the polar ice cap in August 2013, and green curves represent the North Atlantic Subtropical Ocean Gyres and the Global Thermohaline Circulation poleward branch. (Andres Cózar)

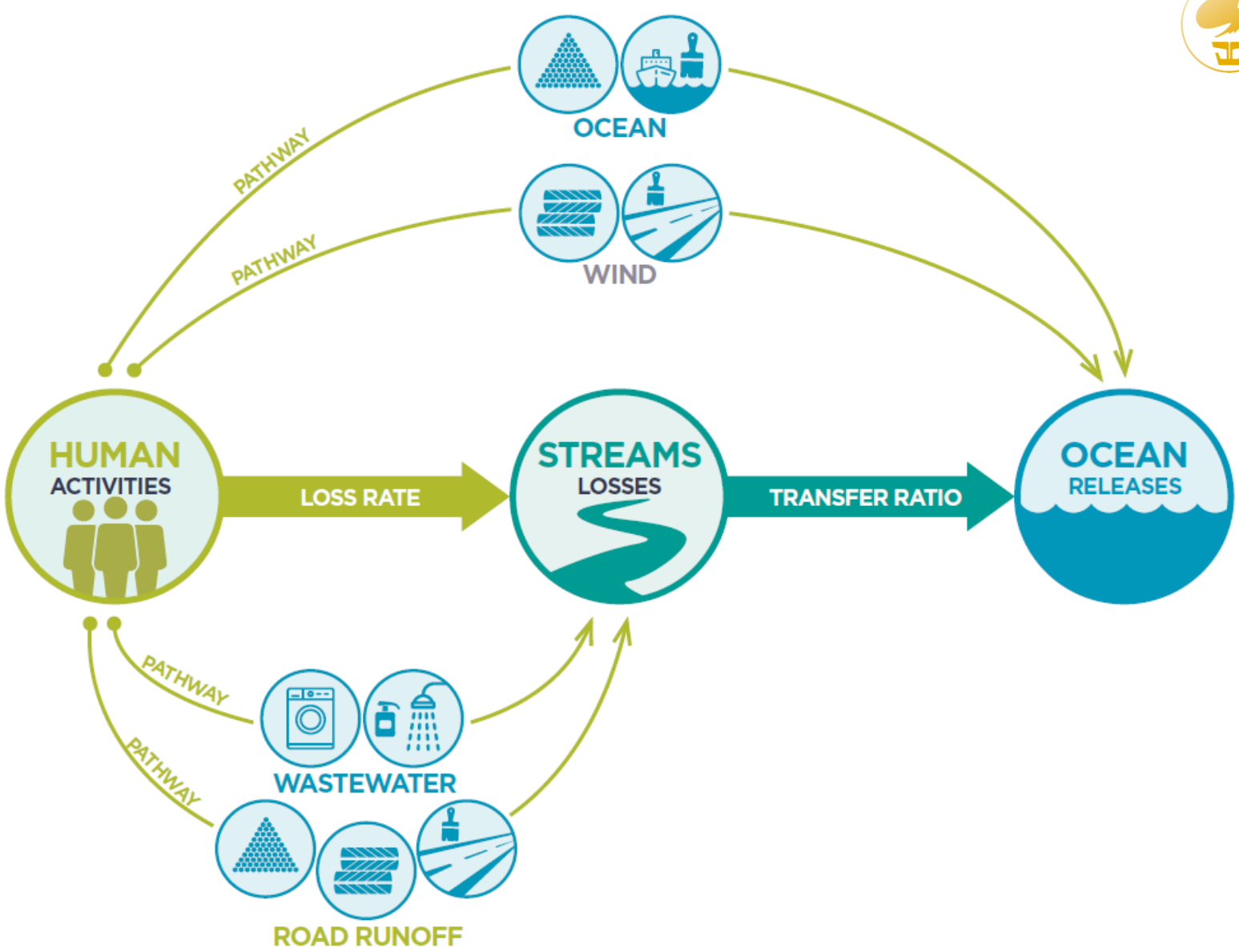
Microplastics in the oceans



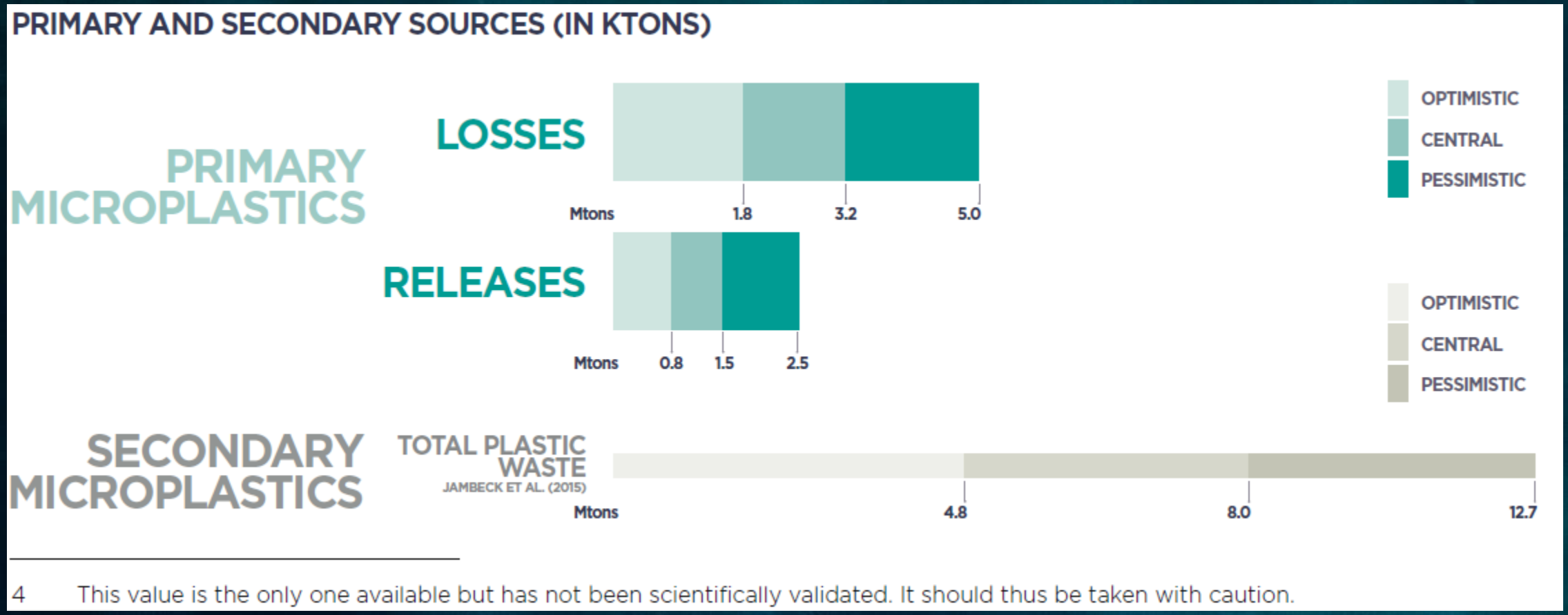
("Plastic debris in the ocean: the characterization of marine plastics and their environmental impacts, situation analysis report", 2015)



Main sources of primary microplastic (IUCN)

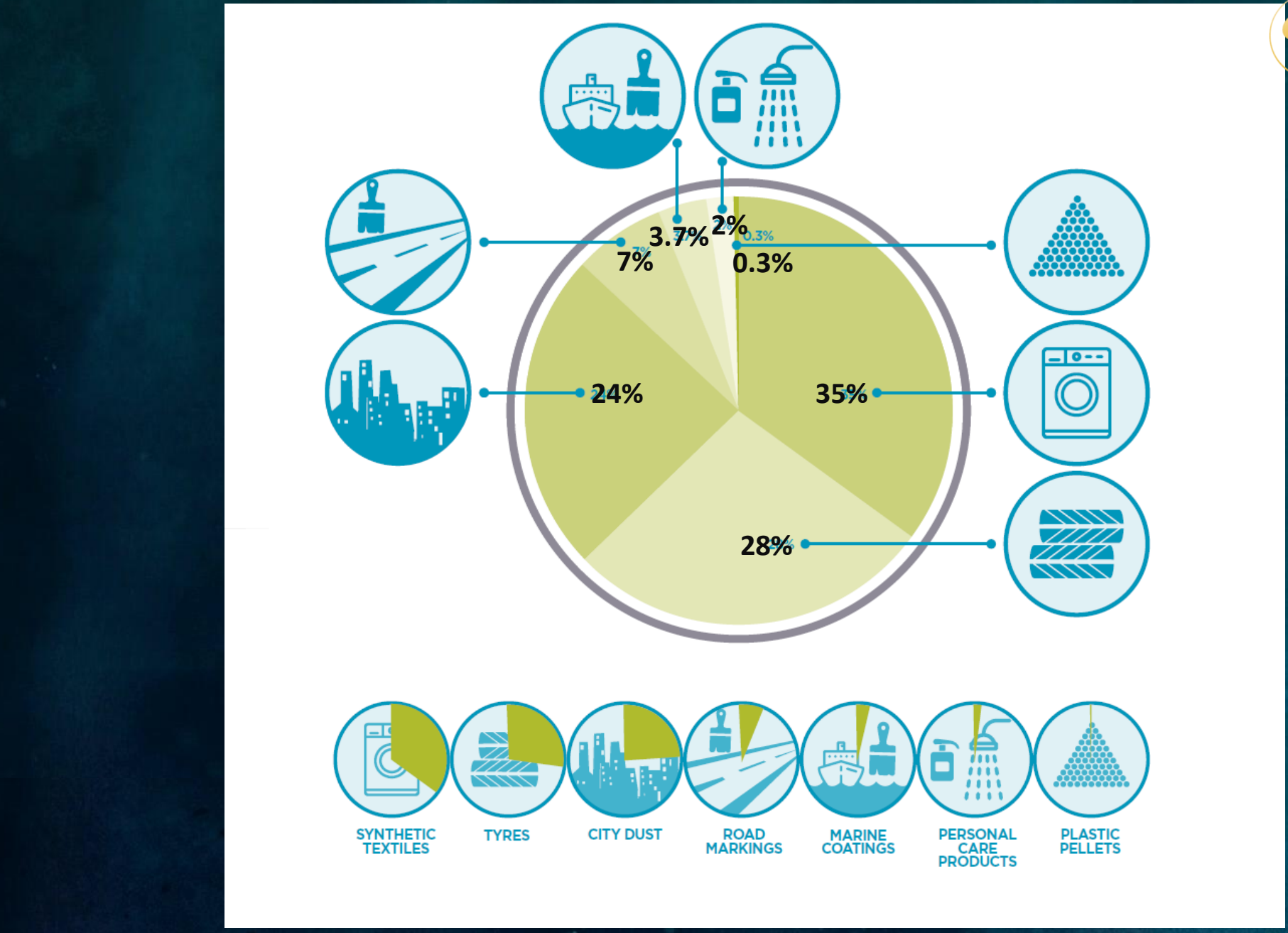


General description of the modelling of activities, losses and releases of primary microplastic (IUCN)



4 This value is the only one available but has not been scientifically validated. It should thus be taken with caution.

Global releases of microplastics to the world oceans (IUCN)

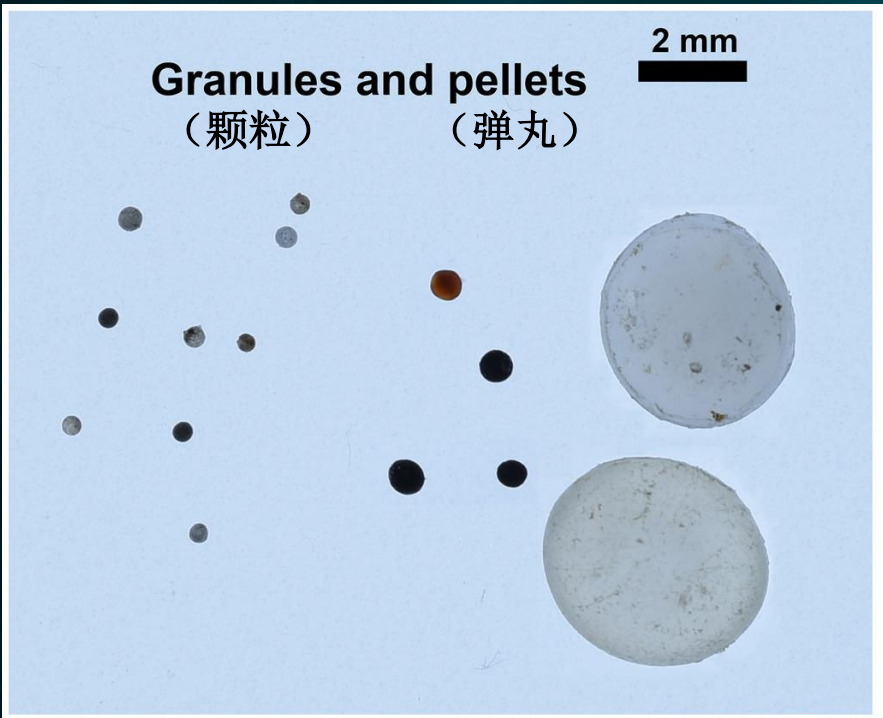


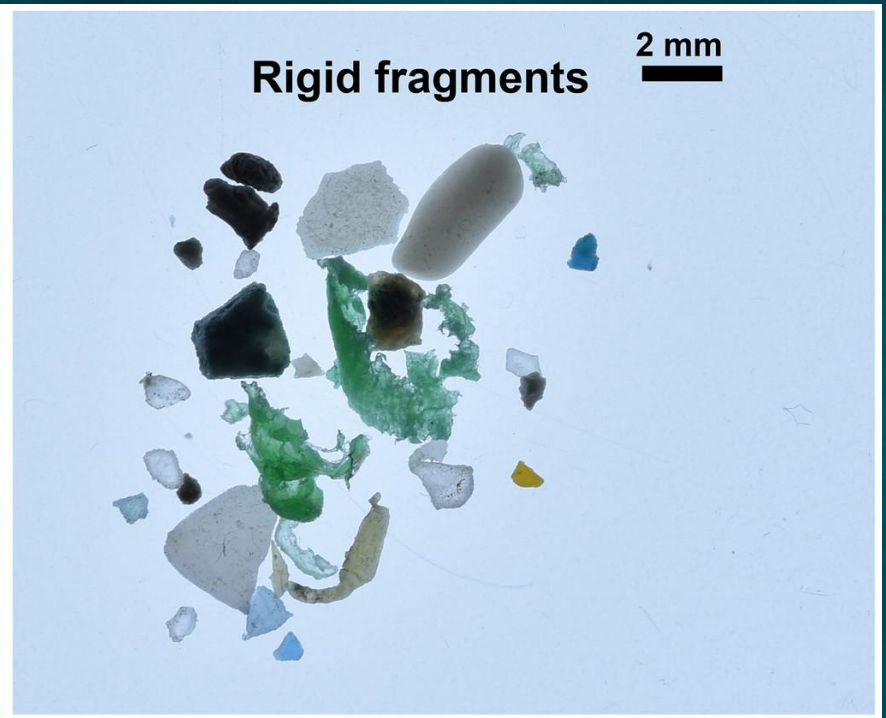
Global releases of microplastics to the world oceans (Boucher, & Friot, 2017)

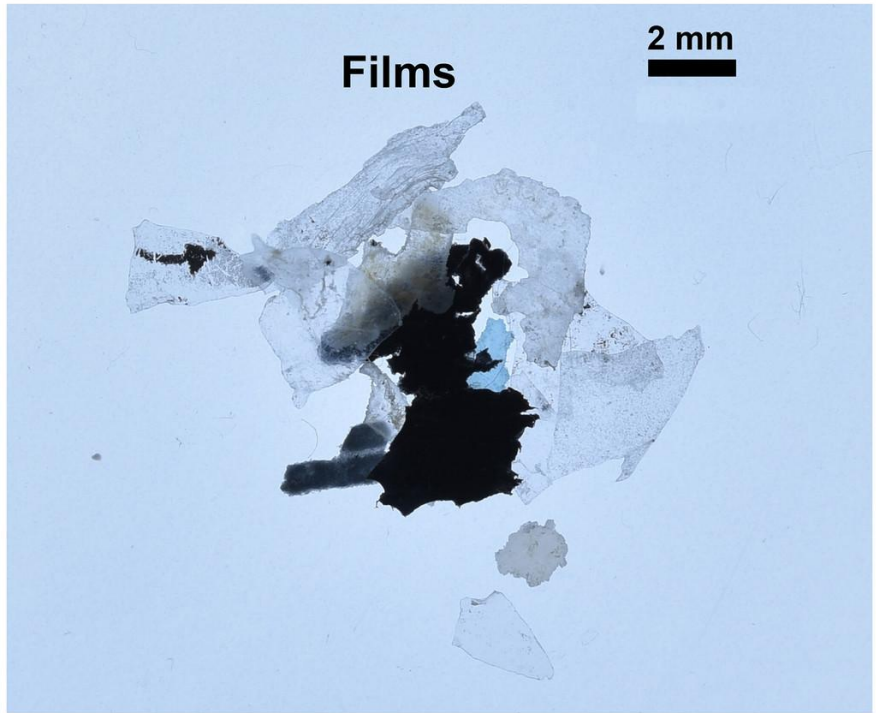
Primary microplastic

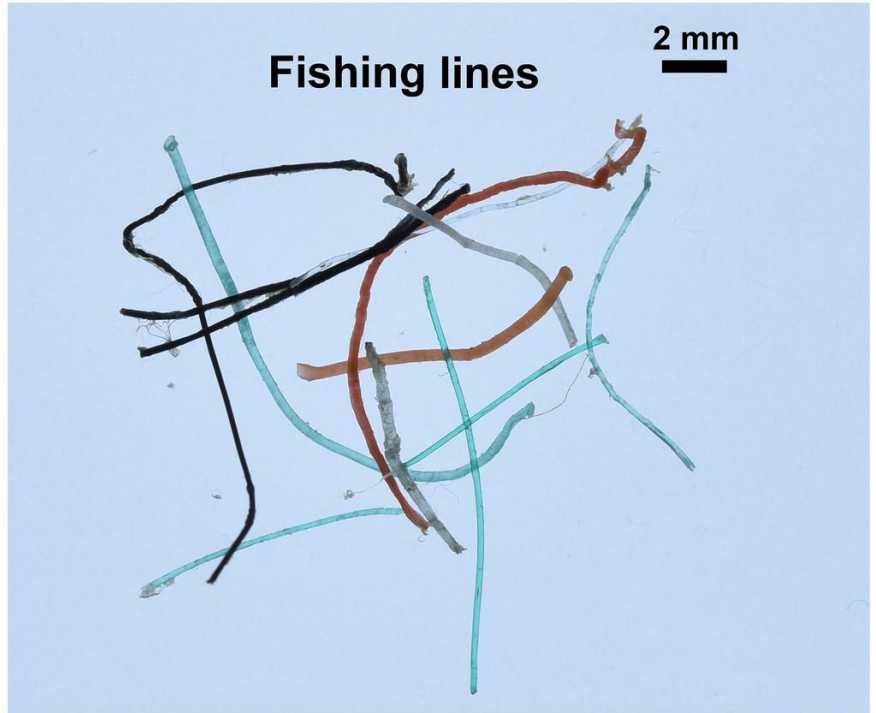
Secondary microplastic

These tiny plastic fragments broke off of larger items that had washed into the ocean.
GIORA PROSKUROWSKI/SEA EDUCATION ASSOCIATION









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The different categories of microplastics found in the Arctic Ocean. (Andres Cózar)

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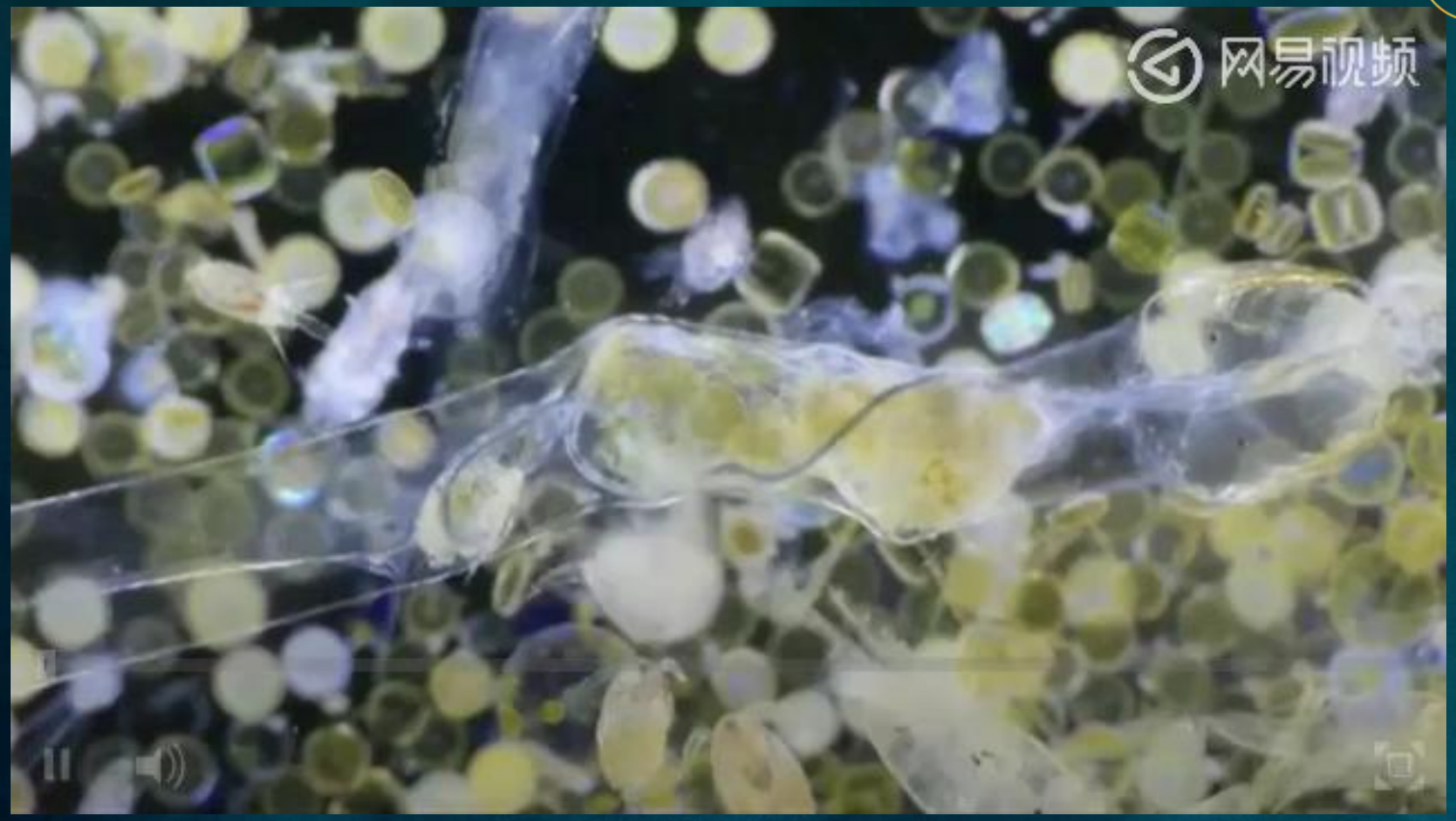
Plankton and microplastics. (Anna Deniaud / Tara Expeditions Foundation)

This image shows zooplankton that has swallowed polystyrene (PS) beads.
The beads glow green.
MATTHEW COLE/UNIVERSITY OF EXETER



Plankton and microplastics.
(Anna Deniaud / Tara Expeditions Foundation)

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Plastic Contaminates Table Salt in China

Supermarket products have tiny plastic particles, probably from ocean pollution attached to sea salt

By Sarah Everts, Chemical & Engineering News on October 29, 2015 3

Microplastic Pollution in Table Salts from China

Dongqi Yang,[†] Huahong Shi,[*,†] Lan Li,[‡] Jiana Li,[†] Khalida Jabeen,[†] and Prabhu Kolandhasamy[†]

[†]State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai 200062, China
[‡]Research Center for Analysis and Measurement, Donghua University, Shanghai 201620, China

Supporting Information

Credit: ©iStock.com

LATEST NEWS

Supermarket products have tiny plastic particles, probably from ocean pollution attached to sea salt(Yang et al., 2015; Sarah Everts, 2017)

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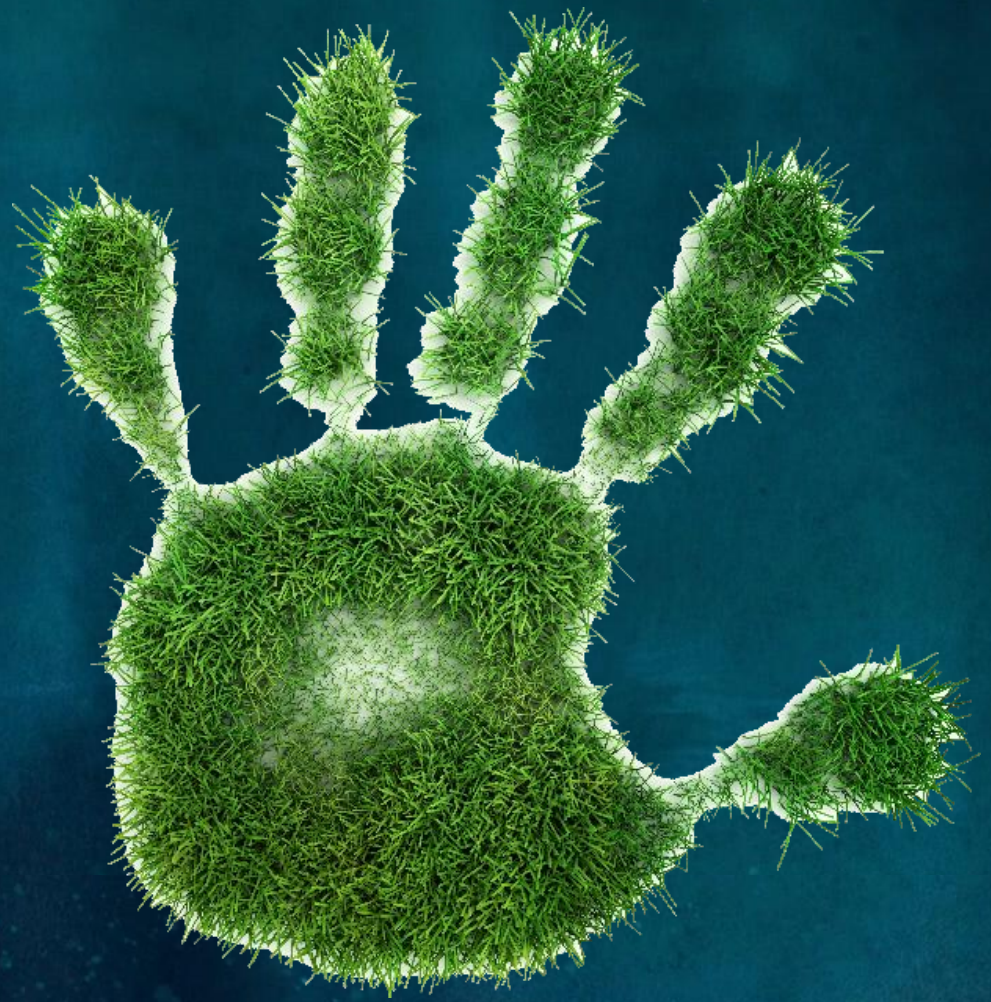
The three R's of the environment

Reuse

Reduce

Recycle



Plastic recycle machine

Injection

Extrusion

Shredder

Compression

(Precious Plastic)

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(Precious Plastic)

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Turn your plastic waste into new things

We need HELP to plastic recycling all over the world!

(Precious Plastic)

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Thank you for listening

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Q&A

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