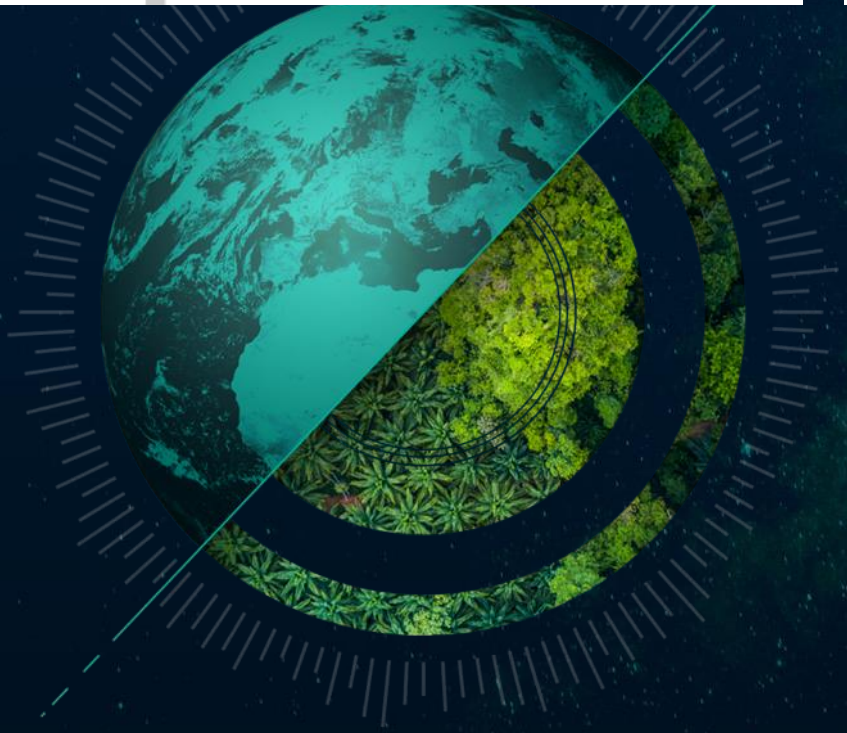


Plastic-Less Society

Webinar

17/06/2020 16:15 CEST

Liz Barrow

WELCOME TO THE WEBINAR!

Before we start...

- Due to the number of attendees, please keep your microphones muted at all times and switch off the webcam function

- You can use the conversation function anytime to submit your questions. They will be addressed during the Q&A at the end of the webinar

AGENDA

- ESA Welcome and introduction

- David Katz - Plastic Bank
- Robin De Vries - The Ocean Cleanup
- Yannick Lerat -The Sea Cleaners

- ESA Closing remarks

- Open Questions & Answers session

Davide Coppola

THE EUROPEAN SPACE AGENCY

Purpose of ESA

To provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications.

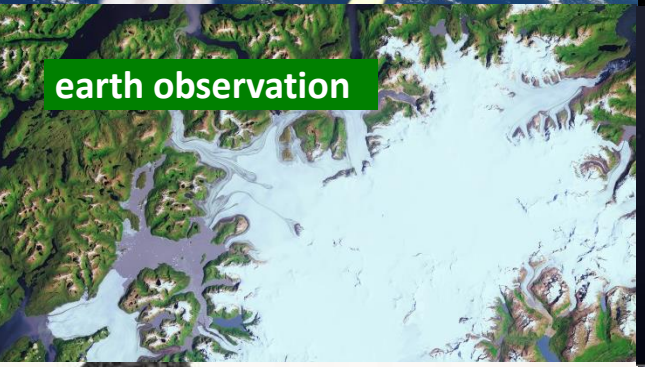
Facts and figures

- Over 50 years of experience
- 22 Member States
- 8 sites across Europe and a spaceport in French Guiana
- Over 80 satellites designed, tested and operated in flight


space transportation


science


human spaceflight


earth observation


telecommunications
and applications


navigation

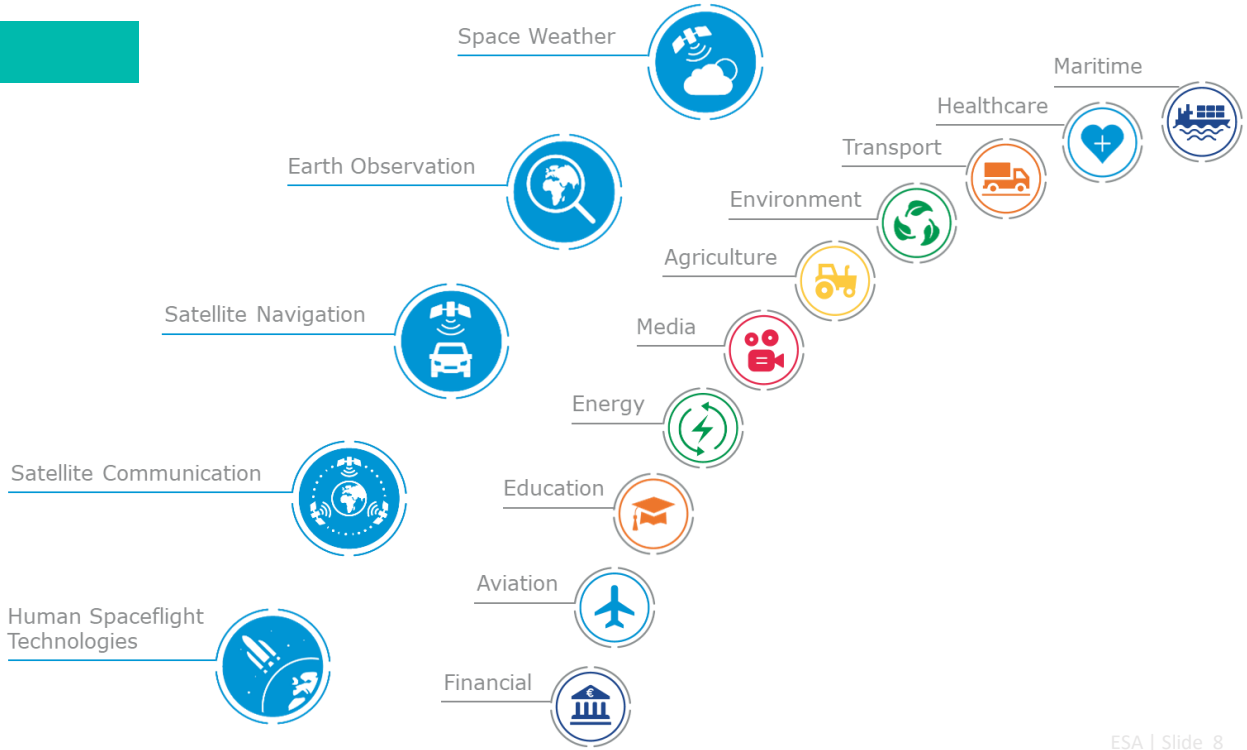

exploration


operations


technology

ESA SPACE SOLUTIONS

Could you be leveraging Space technology and data for the benefit of life on Earth?



PLASTIC-LESS SOCIETY

ESA's Planned feasibility study

esa
space solutions

plasticbank

David Katz

Founder and CEO, Plastic Bank


SKOLSTREJK
FÖR
KLIMATET


plasticbank


OFF
OFF
RINSE & HOLD
POTS & PANS
NORMAL CYCLE
LIGHT / CHINA
DRY
RINSE
plasticbank


plasticbank


MILLION
CHANCES
An initiative by Schwarzkopf
EMPOWERING WOMEN
Henkel
plasticbank
plasticbank


plasticbank


PLASTIC BANK


Schwarzkopf


plasticbank


plasticbank
Collection Center
CITY OF NAGA
OFFICIAL SEAL
Balatas ang
Lakas at Tatag
ng Samahan -
Kadamay
plasticbank


plasticbank

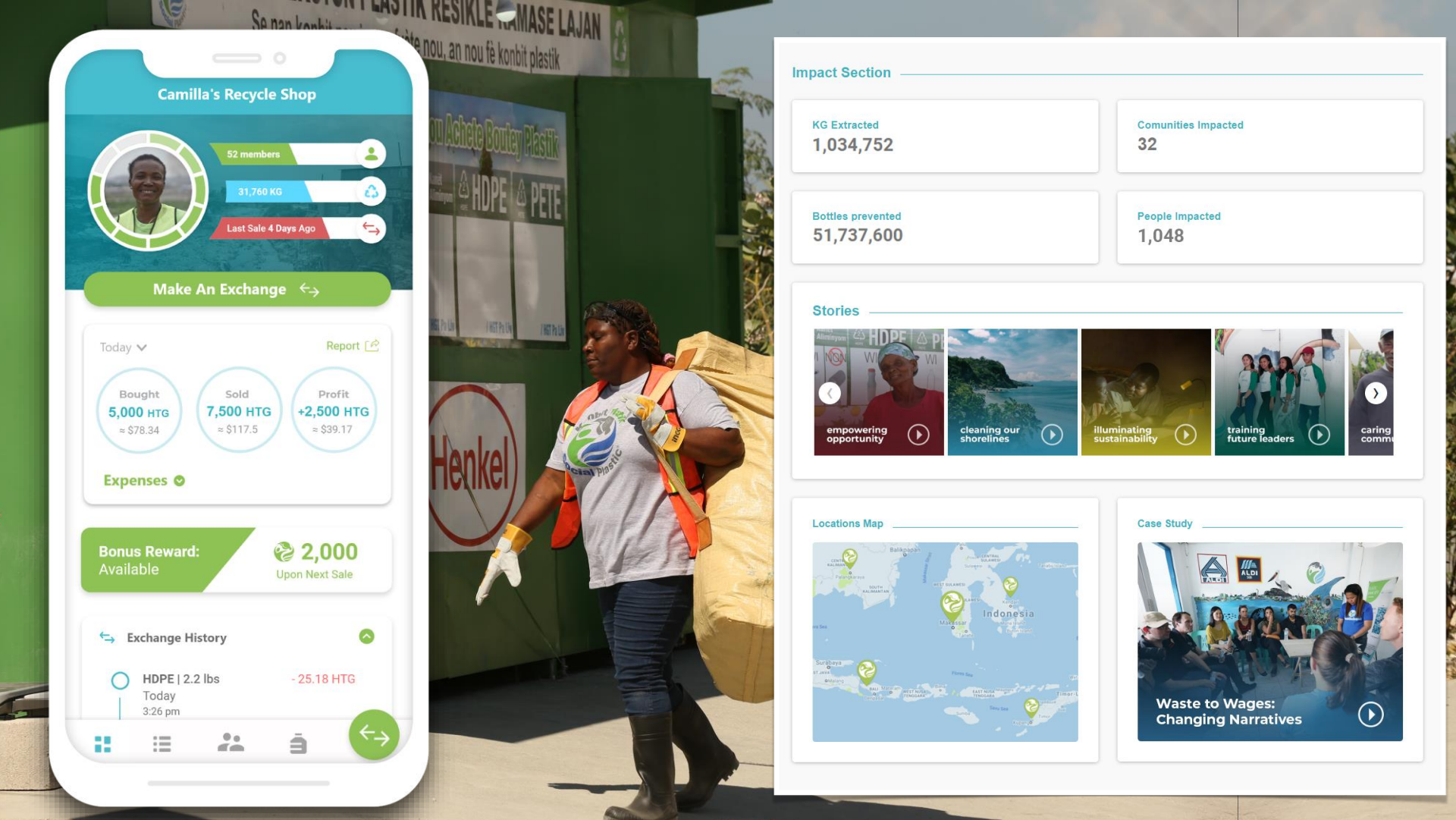

plasticbank
PHILIPPINES
plasticbank
STOPPING
OCEAN
plasticbank


plasticbank
INDONESIA
POWERED BY
scjohnson
Yuni Spa
Yuni Spa
KUTUS KUTUS


STOPPING
OCEAN PLASTIC


plasticbank


TOGETHER
WE FIGHT
PLASTIC
WASTE
AND
POVERTY.
100% RECYCLED PLASTIC
OUR PRO NATURE AND VERNEL BOTTLES NOT ONLY CONSIST COMPLETELY OUT OF RECYCLED PLASTIC, BUT ALSO 25% OF IT SOCIAL PLASTIC. HEREWITH WE SUPPORT THE ORGANIZATION PLASTIC BANK IN ITS FIGHT AGAINST PLASTIC WASTE IN OUR OCEANS AND AGAINST POVERTY. LEARN MORE:
HENKEL.COM/PLASTICBANK
Henkel
plasticbank
Aktiv-Momente
bis zu 100 Tage*
Pril
pronature
Hohe Fettlösekraft
Fa
Meeres Liebe
Limited Edition
Frische Duschgel
Nature Box
Meeres Glück
Limited Edition
Frische-Duschgel
Pflege Shampoo
100% RECYCLED PLASTIC
schauma
OCEAN PASSION
LIMITED EDITION
Bottle body made from 100% recycled plastic, thereof 50% so called Social Plastic, collected at the beach and land.
REPAIR
SHAMPOO
without silicones and parabens
eco-friendly formula
Schwarzkopf
Reduces Ocean Plastic & fights poverty
European Space Agency


Camilla's Recycle Shop
52 members
31,760 KG
Last Sale 4 Days Ago
Make An Exchange
Today
Report
Bought
5,000 HTG
≈ $78.34
Sold
7,500 HTG
≈ $117.5
Profit
+2,500 HTG
≈ $39.17
Expenses
Bonus Reward:
Available
2,000
Upon Next Sale
Exchange History
HDPE | 2.2 lbs
Today
3:26 pm
- 25.18 HTG
Impact Section
KG Extracted
1,034,752
Comunities Impacted
32
Bottles prevented
51,737,600
People Impacted
1,048
Stories
empowering opportunity
cleaning our shorelines
illuminating sustainability
training future leaders
Locations Map
Indonesia
Case Study
Waste to Wages: Changing Narratives


plasticbank

THE OCEAN CLEANUP

Robin de Vries

The Ocean Cleanup

The Ocean Cleanup

For ESA Webinar 'A plastic-less society' 17th June 2020

THE OCEAN CLEANUP

The Ocean Cleanup Interceptor™

Rivers – scale of the problem

By satellite

Latest addition: Interceptor 004 in the Dominican Republic

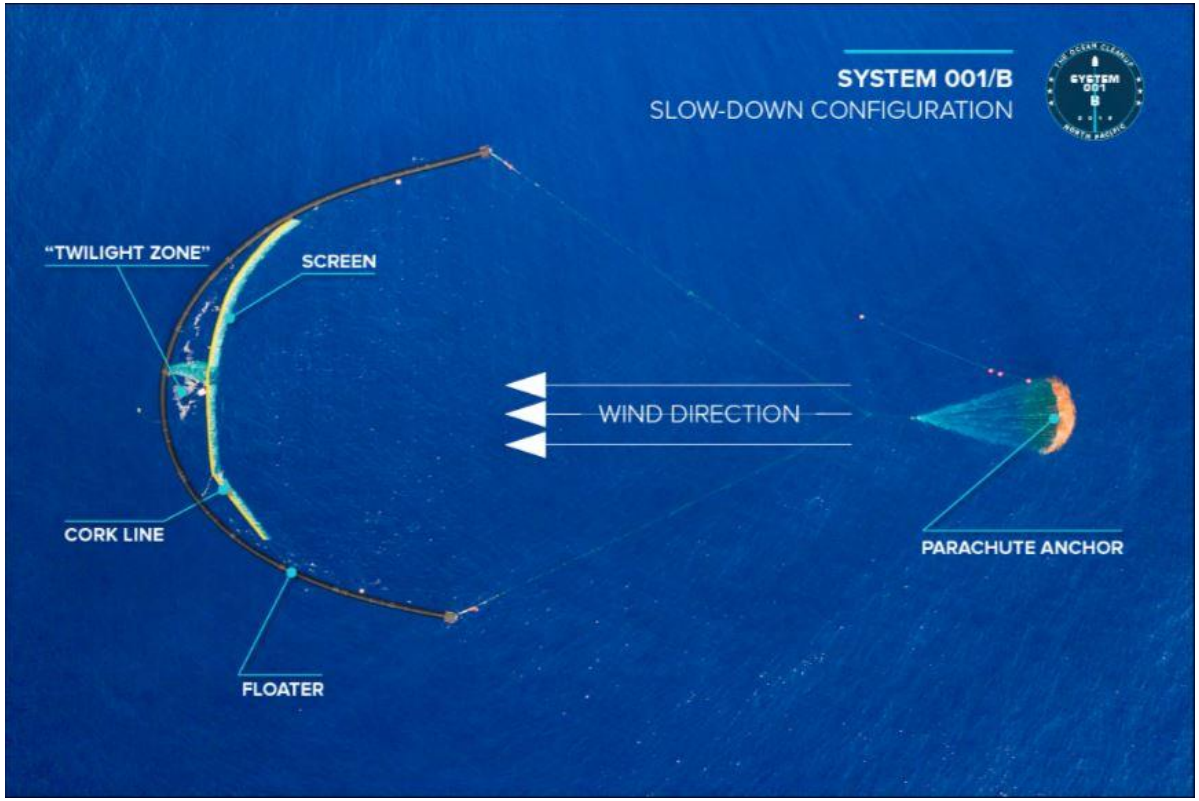

THE OCEAN CLEANUP
004
TEREX


203
004

The Ocean Cleanup

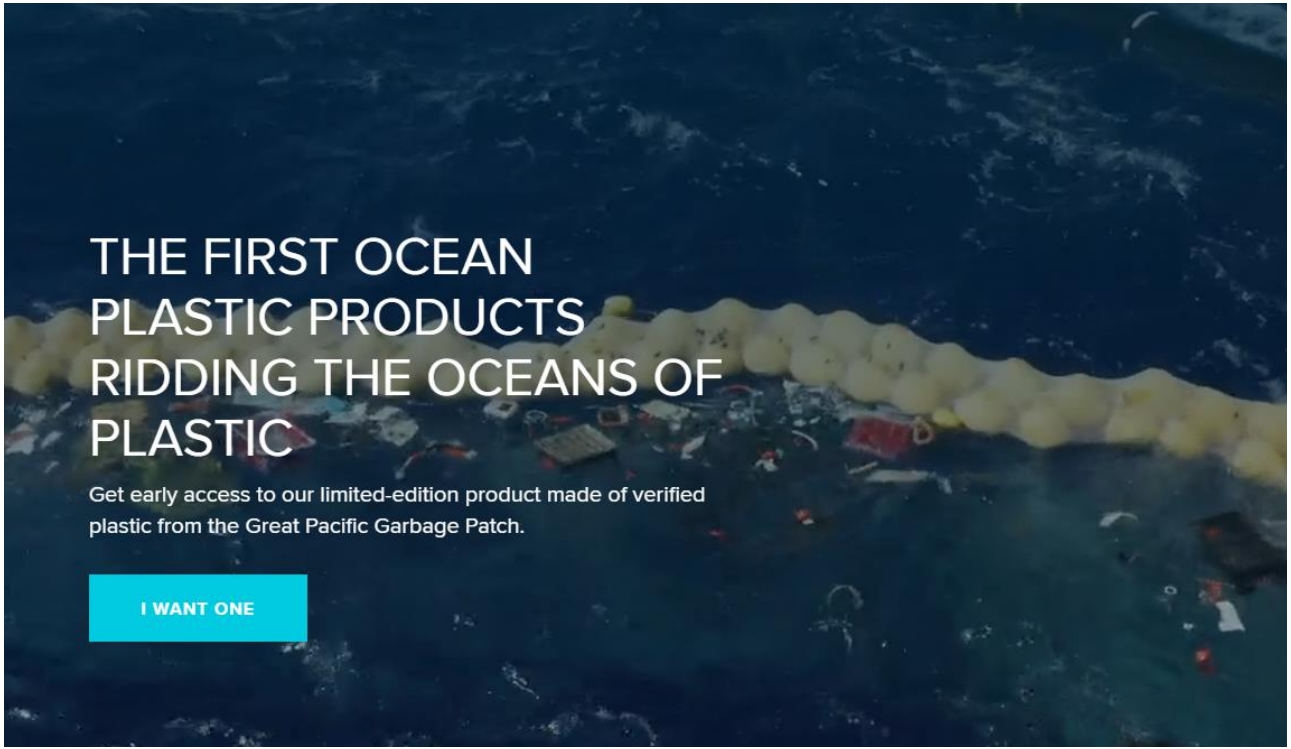
- ~100 employees
- Based in Rotterdam, The Netherlands
- Develop advanced technologies to rid the world's oceans of plastic

2019



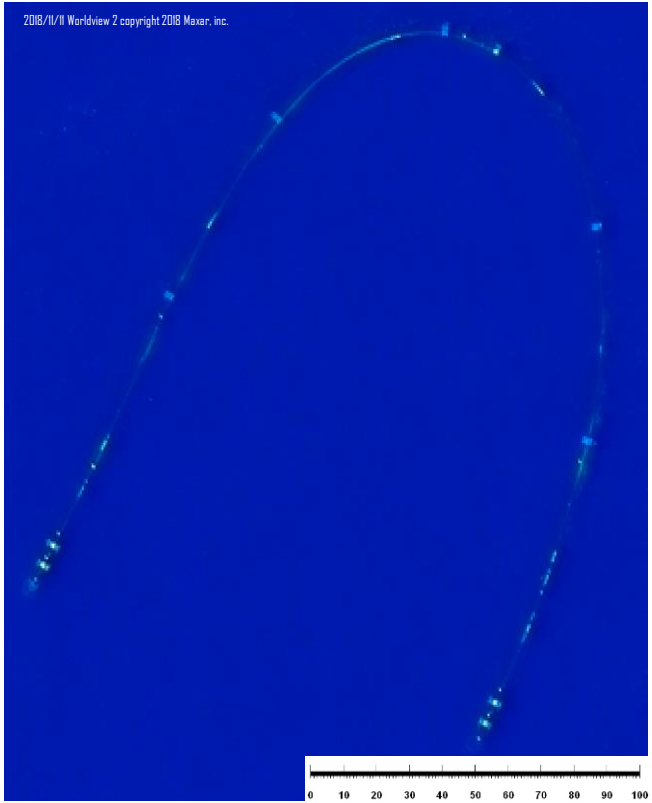
Harvested plastic

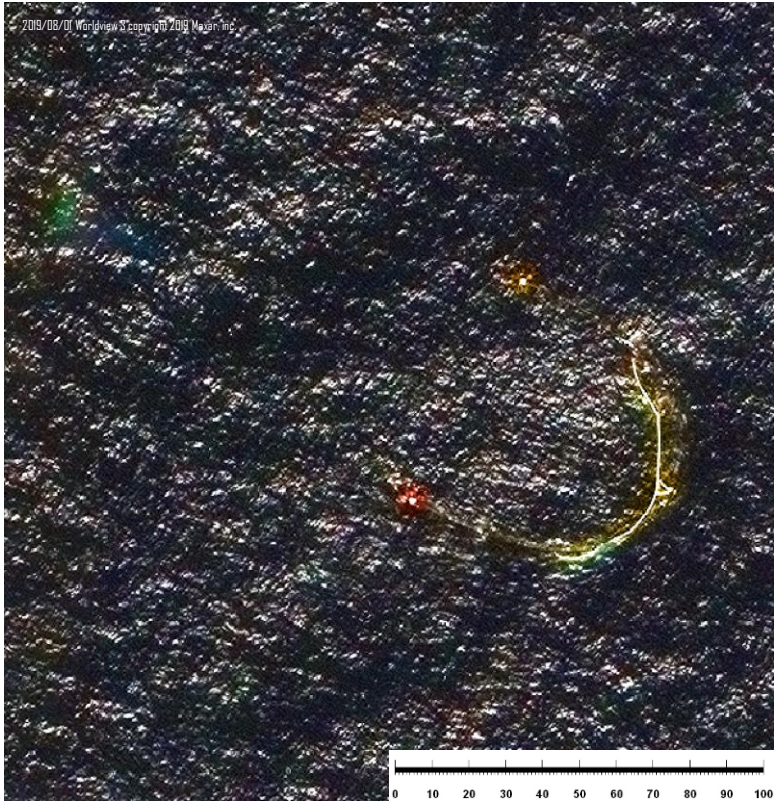
2020 product release



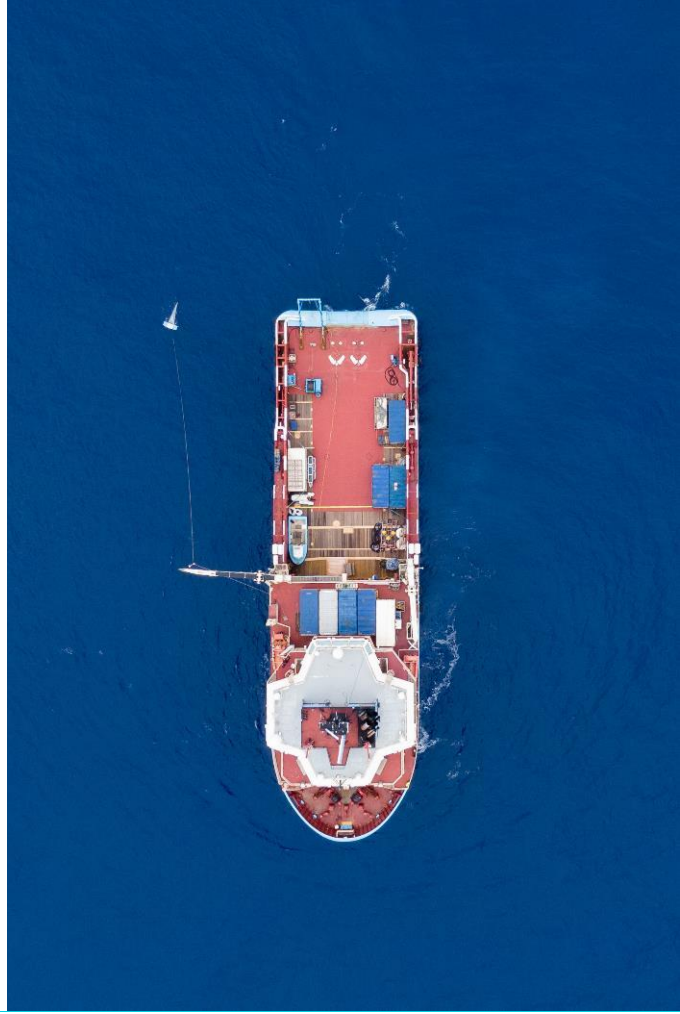
products-eu.theoceancleanup.com

The Ocean Cleanup and Space: System 001 and System 001/B



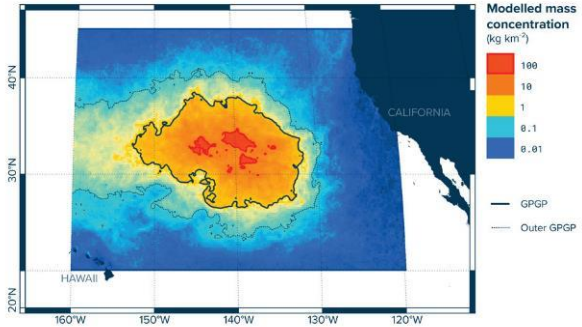


Oceanographic research data: hard work



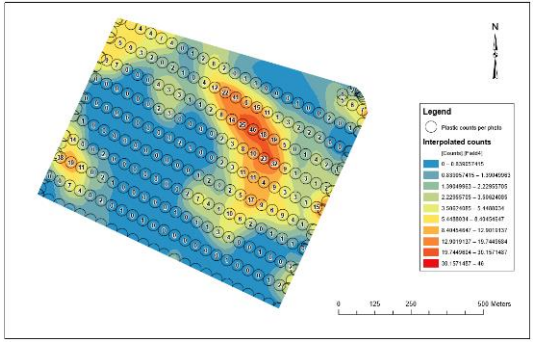
The Ocean Cleanup - Research

- Models

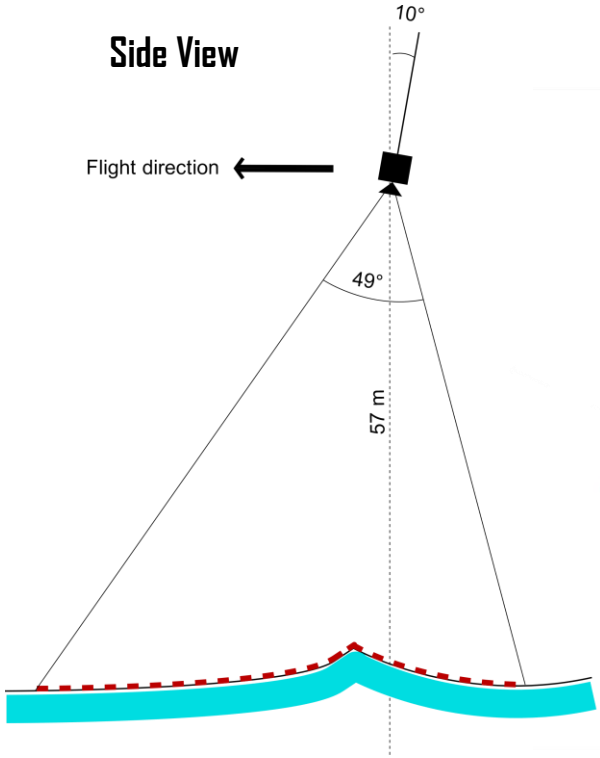


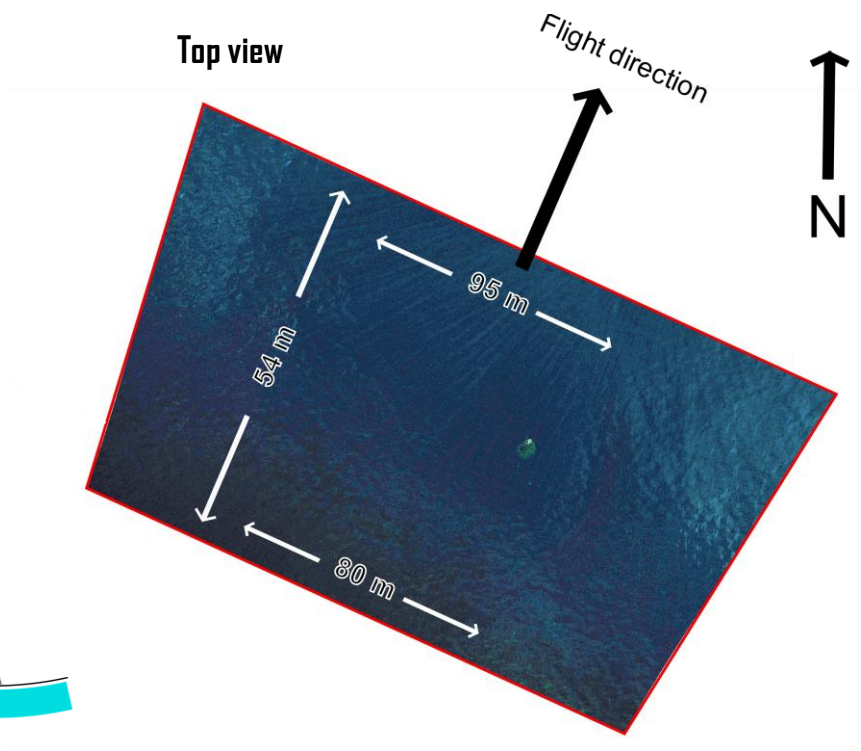
A visual showing where plastic waste leaks into the environment

- Observations



Detecting macroplastics; taking it higher





Spectral properties of submerged and biofouled litter

- During Wilson Mission 2 we found **specific multispectral features** for floating and submerged macroplastic debris in GPGP
- How much of the debris floats?
- How can we detect submerged debris by satellites and UAVs?
- What % of marine debris is windage-driven vs. current-driven?

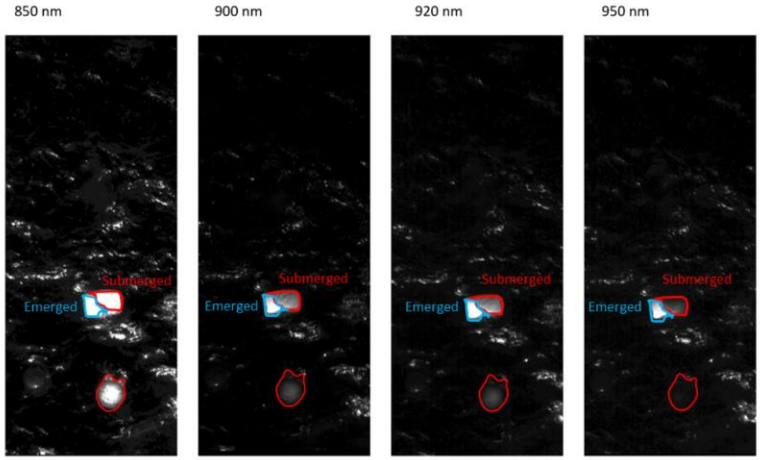
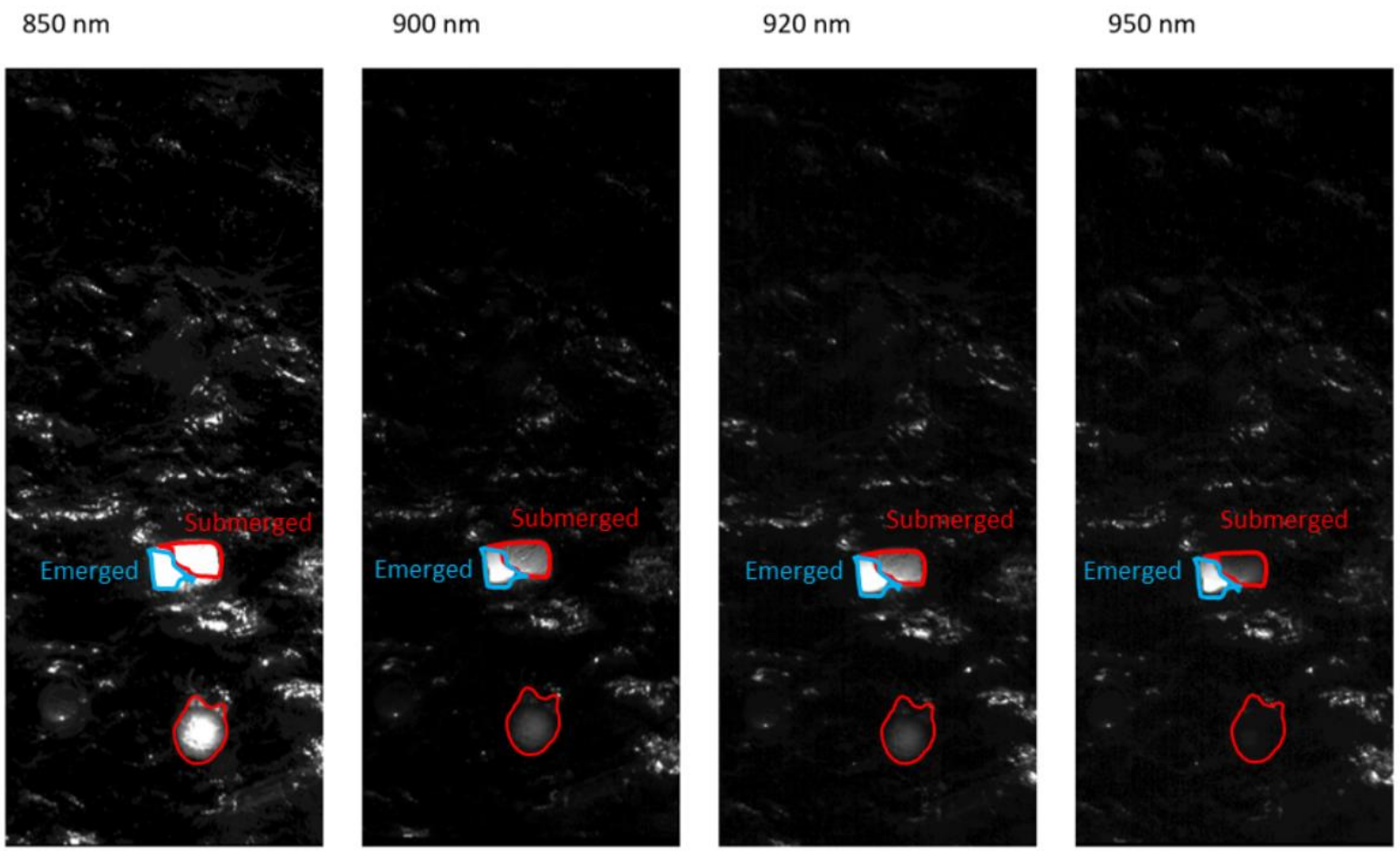


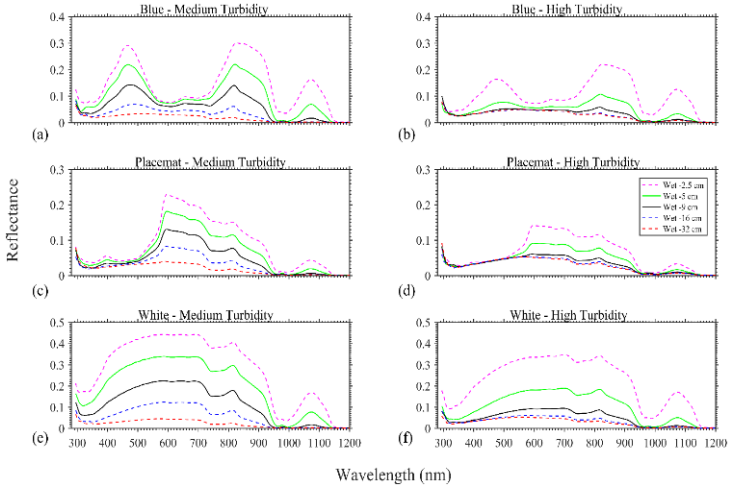
Figure 1 Group of MPL objects at the Great Pacific Garbage Patch seen through four different bands. Date: 8th of November during deployment of The Ocean Cleanup System 001. Platform: DJI M210, camera: customized Slantrange 3PX. Towards 950nm, submerged litter becomes invisible, whereas floating litter remains visible.



Test program:

MARINE REMOTE SENSING GROUP
DEPARTMENT OF MARINE SCIENCES UNIVERSITY OF THE AEGEAN

Lab tests (2020)



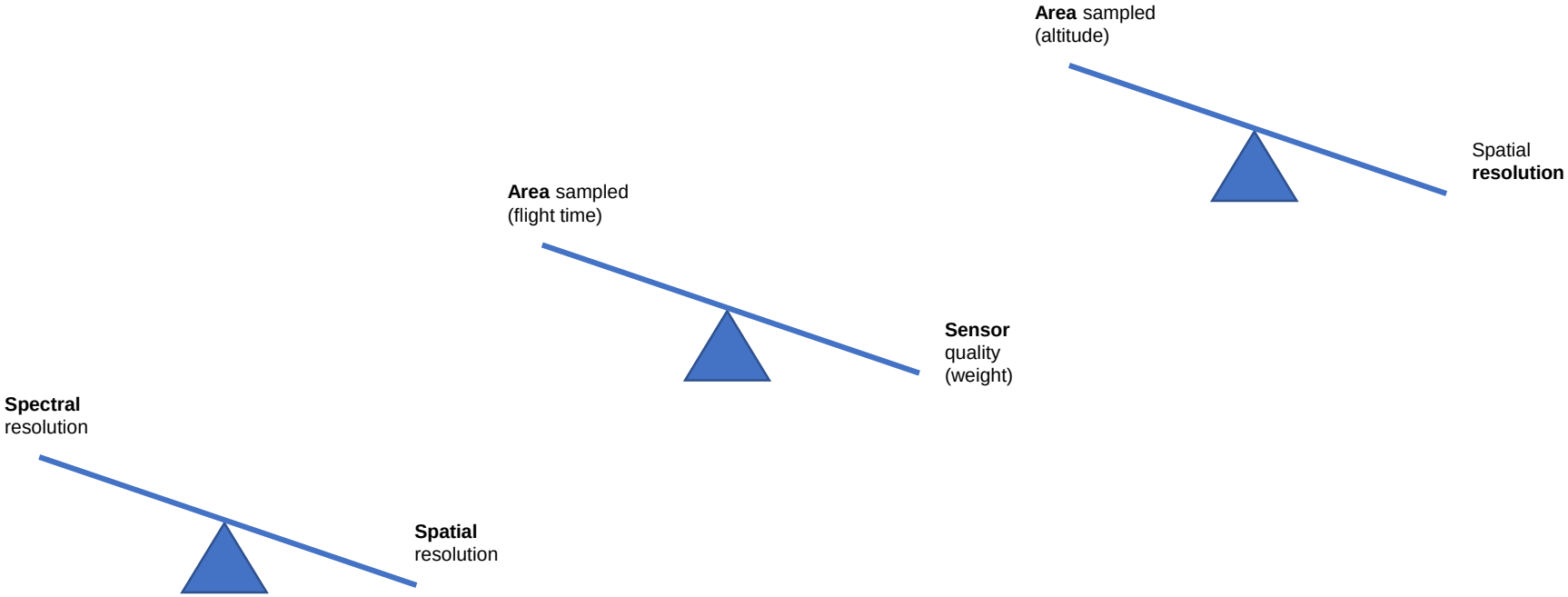
vito remote sensing

esa European Space Agency

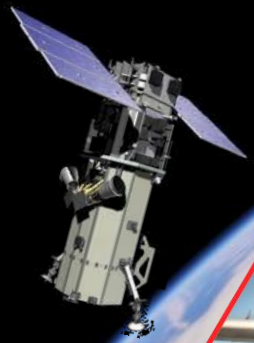
... and field experiments (2021)

THE OCEAN CLEANUP

Dilemma's in current remote sensing of plastic



What role can space play?



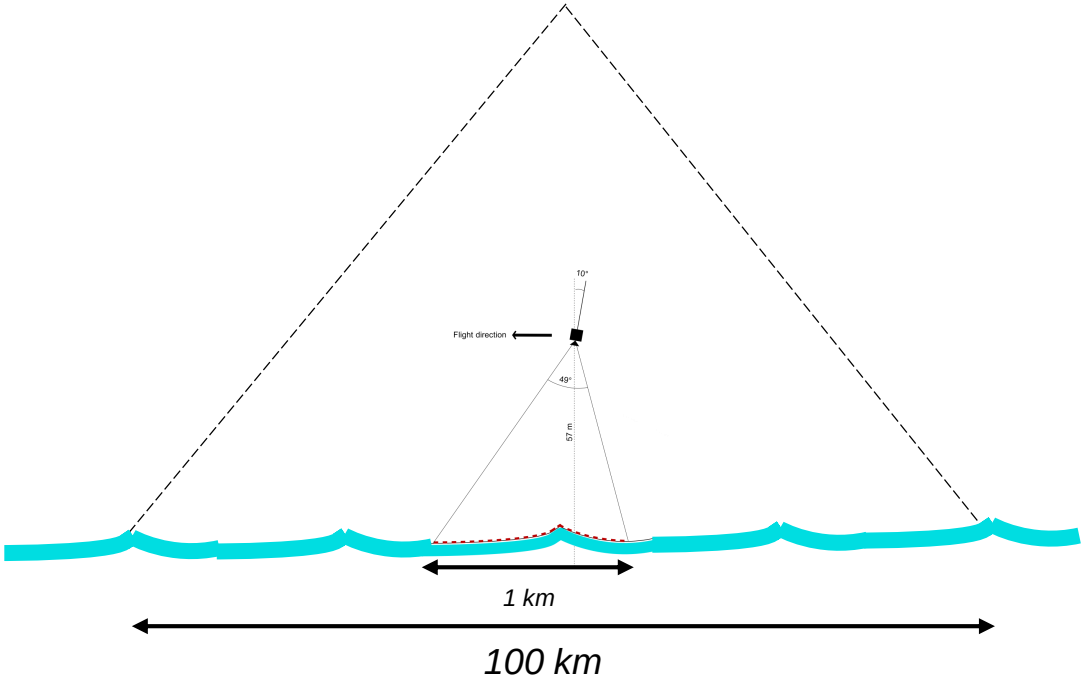
Rivers and Ocean cleaning have in common:

- Locations difficult to reach
- We want to monitor continuously and regularly
  - Technical Inspections
  - Monitoring of cleaning process
- Still a need for satellite observation ground truth

Use case 1: High-Altitude Platforms

- Versatility with cloud cover and wind conditions, area of interest

- Long endurance
- High payload capacity
- High resolution
- Stationary/regional station keeping
  → Continuous observation



Use case 2: Remote, autonomous UAVs

Automatic:

- Be long-term reliable without human intervention (e.g. on a remote buoy or rock)
- Landing (on a moving offshore structure) and docking, up to Bft 4 and moderate sea swell state
- Battery re-charging
- Mission planning
- Data transfer
- Basic cleaning (making sure no salt accumulates on the UAV and inside the dock)
- Protection against adverse weather conditions (automatic sea-fastening and release)

Space tech used:

- Satellite communications
- GNSS positioning

THE OCEAN CLEANUP

Yannick LERAT

The Sea Cleaners

Yannick Lerat
Scientific Director

The SeaCleaners
www.theseacleaners.org

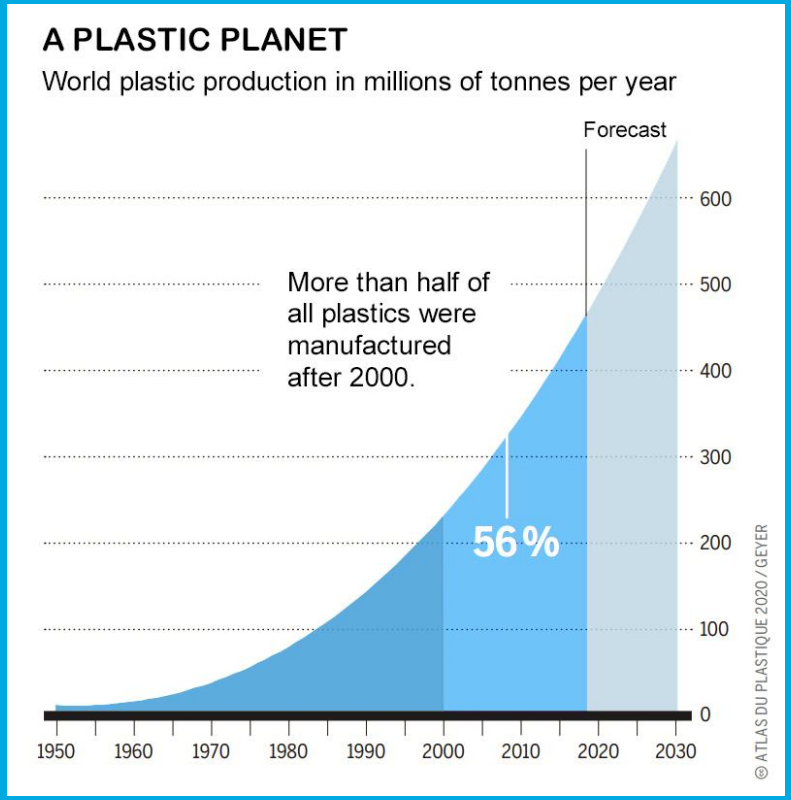
33(0)6 25 27 12 88

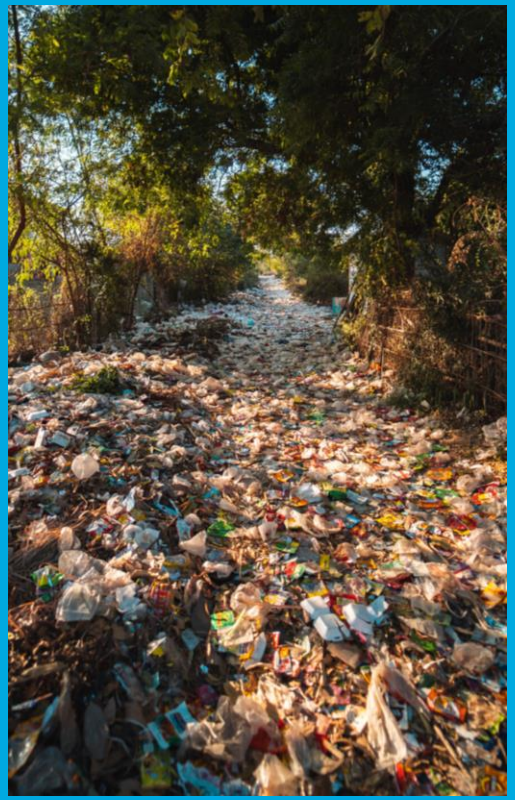
Together, let's build a story about saving the oceans !

WHY ?

PLASTIC IN A FEW FIGURES

IF NOTHING IS DONE, IT IS ESTIMATED THAT BY 2050, 13 BILLION TONS OF PLASTIC WILL BE IN THE ENVIRONMENT*





*source: World Economic Forum and Ellen McArthur Foundation study, 2016

OCEANIC PLASTIC WASTE

9 million tonnes of plastic waste are dumped into the sea every year (285 kilos per second)

In 2050*

1 ton of plastic for 1 ton of fish

At issue is the global economic system, mostly linear, a failing system in which no one player is held responsible.

*Ellen Macarthur Foundation

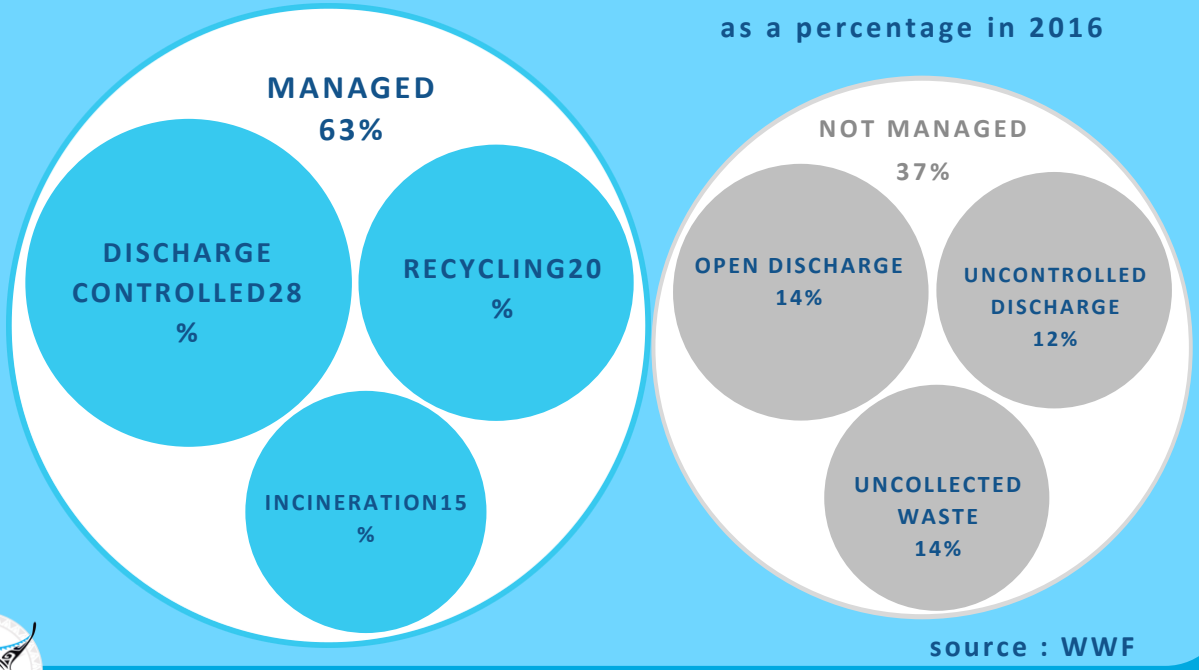
PLASTIC IN A FEW FIGURES

9.2 billion tonnes of plastics have been produced since 1950*

10 tons of plastics are produced every second*

Plastics waste management around the world

as a percentage in 2016



source : WWF

*source: Geyer et. Al (2017)

PLASTIC POLLUTION AND HUMAN HEALTH

A recent debate initiated by the numerous observations and the questioning of safety (precautionary principle). WHO calls for more studies.

3 types of toxicity :

- **Physical effects of particles that cause inflammation**
- **Chemical effects of additives and adsorbed toxic molecules**
- **Biological effect of particulate-borne pathogens.**

2 entry doors:

- ***Ingestion of contaminated microplastic foodstuffs***
- ***Inhalation of micro-particles***

Presence already observed: in the lungs and in the digestive system of humans

- ***There is a risk of translocation into the tissues and into the bloodstream.***

The impact on ecosystems will inevitably impact human health…


The SEA CLEANERS

THE IMPORTANCE OF THE OCEAN

70% OF THE PLANET'S SURFACE

NOURISHING SEA

GUARANTOR OF THE HEALTH OF THE PLANET AND OF ALL SPECIES

CARBON SINK

KEY PROVIDER OF 50% OF OUR OXYGEN

NSPIRATION BEYOND COMPARE

GROUND OF PLAY AND DISCOVERY

THE OBJECTIVES OF THE SEACLEANERS

COMPREHENSIVE, PREVENTIVE AND CORRECTIVE ACTION

- Putting people back at the heart of tomorrow's ecological issues
- Boosting sustainable development based on circular economy model
- Educating and Preventing.

ON LAND

THE OBJECTIVES OF THE SEACLEANERS

COMPREHENSIVE, PREVENTIVE AND CORRECTIVE ACTION

- Raising awareness of the urgency of collection at sea near estuaries and river mouths
- Collecting macro plastic waste in high density areas before it sinks or disintegrates into micro-plastics
- Providing data on plastic pollution, develop a network and promote scientific studies

AT SEA

Reducing plastic pollution

Preserving the oceans

THE MANTA PROJECT

A POLYVALENT AND INNOVATIVE SHIP

A ship to clean up the oceans

A vessel capable of continuously and industrially collecting plastic macro-waste before it sinks or disperses into the oceans.

A scientific platform

Debris location, quantification and characterization of waste. Open data availability.

An educational platform

Reinforcement of upstream prevention, through the development of awareness-raising actions aimed at the populations most affected by plastic pollution.

A lever of the circular economy

Initiation or development of initiatives for the collection and recovery of plastic waste and stimulation of the circular economy through the demonstration of on-board technologies.

OUR MODEL OF DEVELOPMENT OF THE CIRCULAR ECONOMY

All these technological solutions are demonstrated on MANTA and will be proposed for the development of local waste recovery channels

AT SEA, IN THE RIVERS

ACTIVE MEANS OF COLLECTION

The Manta

\+ Calm water collection vessel integrated to the Manta

\+ Collection boat in river & coastal waters integrated to the Manta

Marine and river waste

ON GROUND

GROUND waste sorting plant

This sorting center will thus be able to process maritime and river waste as well as port and land-based waste

Non-recyclable waste (plastics, organics, CSR...)

Unit of energy recovery from waste

Energy

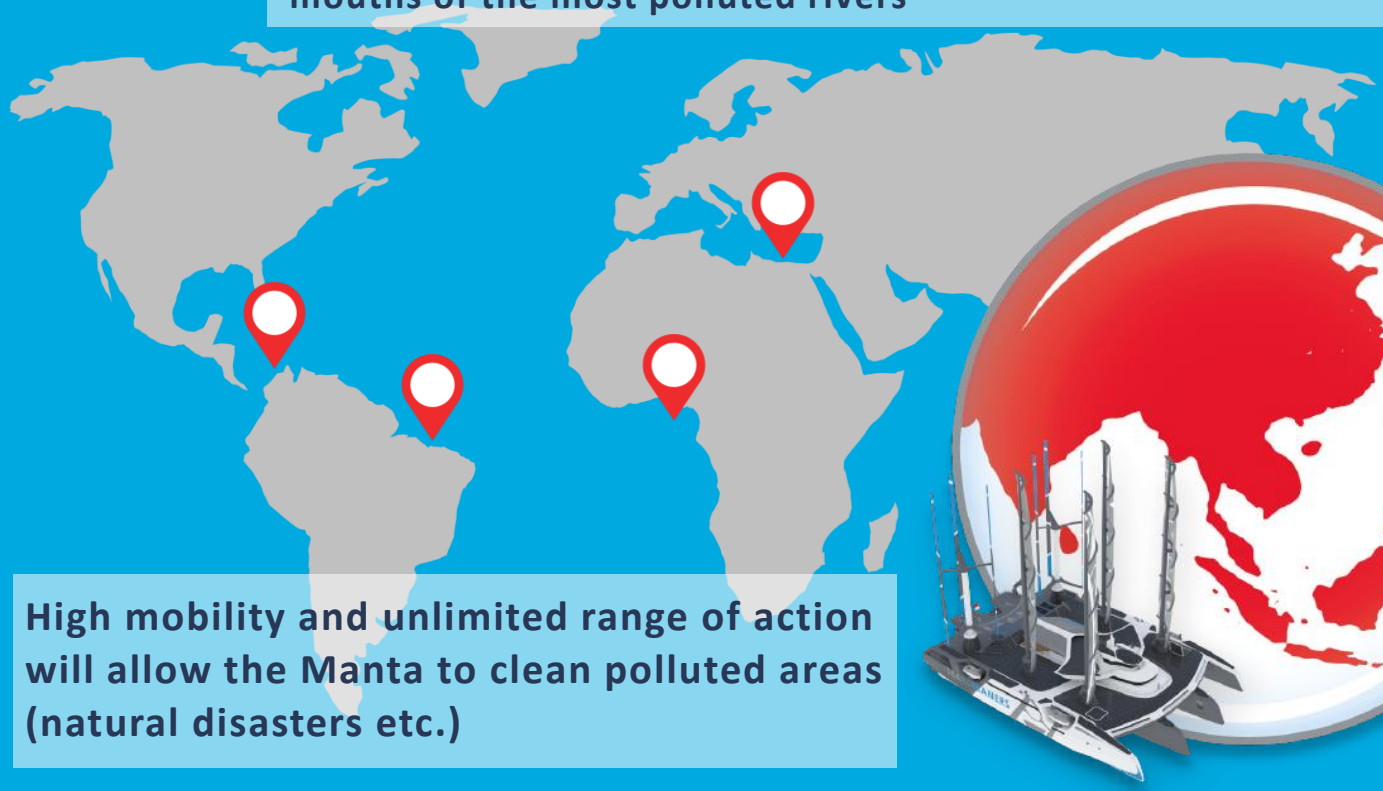
Recyclable waste (plastics, glass, metals, ...) or compostable waste

Waste Recycling Unit

Resources

THE AREAS OF INTERVENTION OF THE MANTA

Priority to collection missions close to the coast, in estuaries and at the mouths of the most polluted rivers



High mobility and unlimited range of action will allow the Manta to clean polluted areas (natural disasters etc.)

The first Manta missions are expected to focus on South-East Asia and Indonesia in particular

THE PROGRAM UNTIL 2024

2019

- Technical finalizations
- Tests on collection system demonstrators
- Equipment selection
- Organization of R&D projects
- Preliminary design studies

2020

- Detailed design studies
- Systems Integration
- Equipment supply specification
- Choice of shipyard

2021

- System procurement
- Choice of the 1st collection areas
- Validation of authorizations with of the authorities concerned

2022

- Construction of the MANTA and integration of systems into the ship
- Logistical preparation operations for MANTA missions
- Field spotting operations

2023

- End of construction

2024

- Launching, first tests and commissioning

THE INTERNATIONAL SCIENTIFIC HUB LED BY THE SEACLEANERS: A PREMIERE

Composed of researchers internationally recognized for their scientific work related to marine plastic pollution, and chaired by the Scientific Director of The SeaCleaners.
It will set thematic directions, provide strategic synthesis/advice, coordinate on-board scientific missions and will facilitate the integration of local scientific networks.

Jean-François Sassi
CEA- Cadarache, France
Expert in polymer chemistry, bio-polymers, fine chemistry

François Galgani
IFREMER, France
Expert in marine plastic pollution and networking with global organizations related to plastic pollution.

Denise Britta Hardesty
CSIRO's Oceans and Atmosphere
Biologist, ecologist, current projects in marine plastic pollution and illegal fishing.

Claire Dufau
CLS-Group
Expert in modeling of remote sensing data and surface currents

Jean LeBideau
IMN Jean Rouxel, Nantes University, France
Expert in material science and vibrational spectroscopy

Bernard Gindroz
BMGI, consulting
Expert in circular economy, ,business analysis

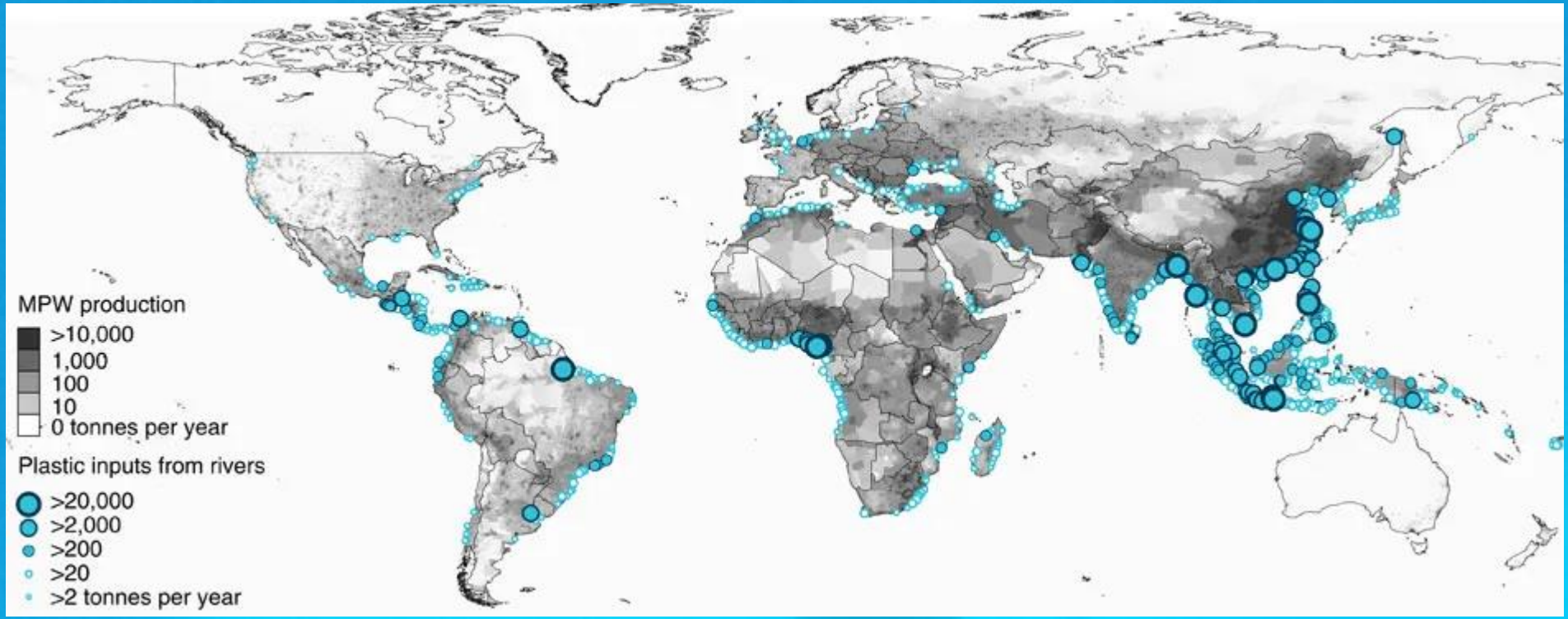
Laurent LeBreton
The OceanCleanUp Foundation
Expert in marine plastic pollution modeling

René Garello
IMT-Atlantique, Brest, France
Expert in signal processing, remote sensing

Umi Muawanah
Development Agency of Indonesian Ministry of Maritime Affairs and Fisheries
Economist

Sarah-Jeanne Royer
Marine Biology Research Scripps Institution of Oceanography
University of California, USA
Oceanographer

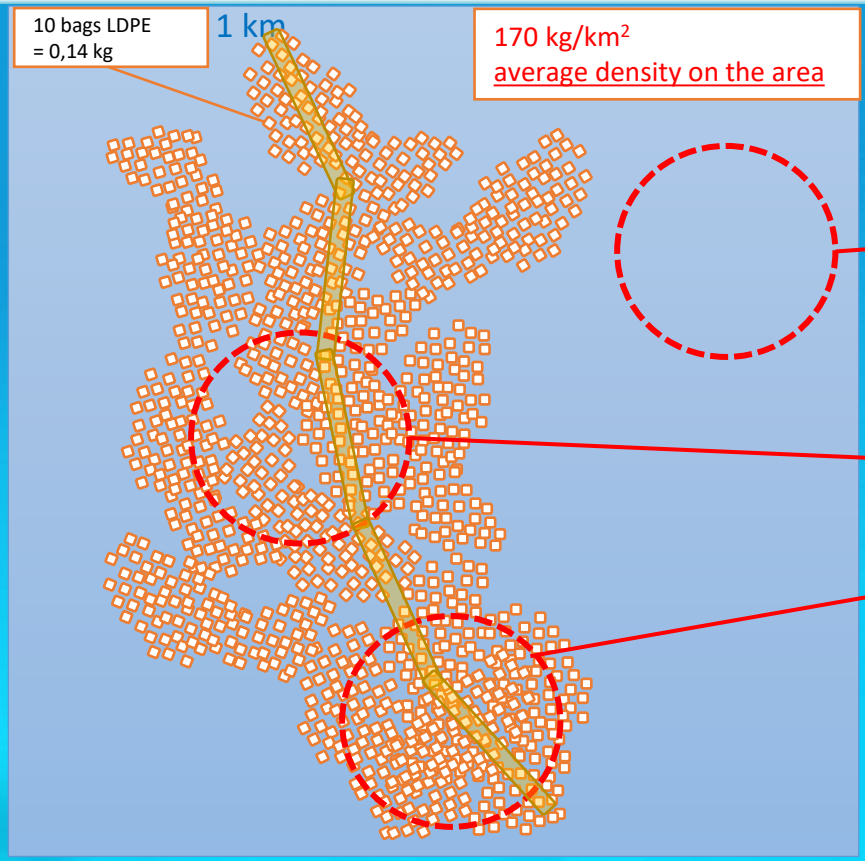
COLLECTION AREAS



River plastic emissions to the world's oceans. Laurent C. M. Lebreton, Joost van der Zwet, Jan-Willem Damsteeg, Boyan Slat, Anthony Andrady & Julia Reisser - Nat Commun. 2017 Jun 7;8:15611. doi: 10.1038/ncomms15611

The Ocean Cleanup Foundation

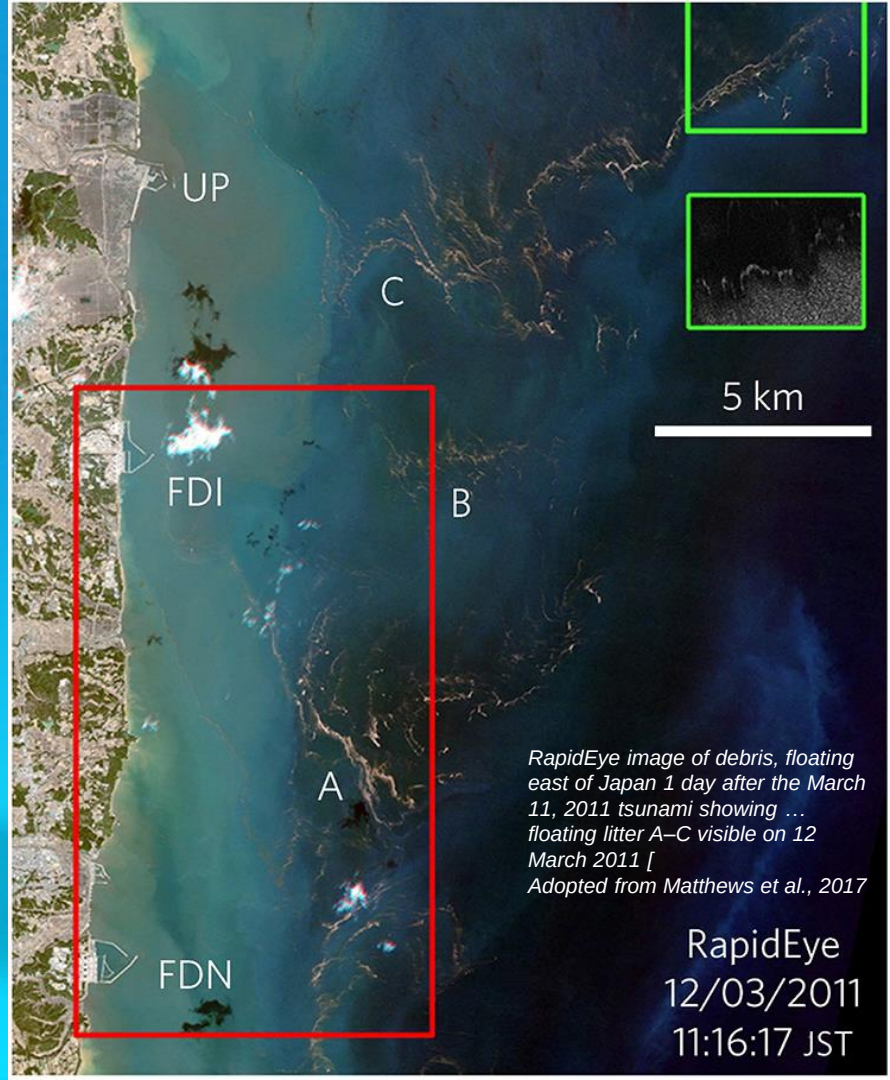
Collecting Strategy : dealing with patchyness !



Marine Plastic Litters

Requirements for Collecting Actions :

- To locate areas of highest probability for debris accumulation
- To locate debris accumulation
  - On land and at Sea
- To characterize debris types
  - Plastic, wood, metal, others…
  - Type of Plastics (nice to have !)
- To model their dispersion

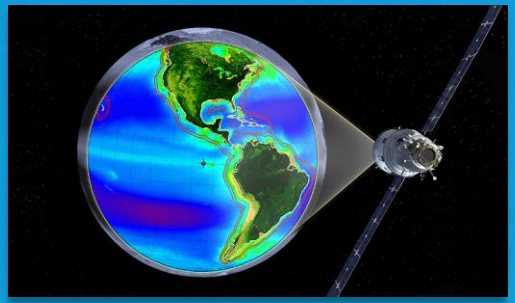


RapidEye image of debris, floating east of Japan 1 day after the March 11, 2011 tsunami showing … floating litter A–C visible on 12 March 2011 [
Adopted from Matthews et al., 2017

Technical Approaches ?

- Remote Sensing : Satellite image processing
  - Hyperspectral, visual, radar, SWIR … combining various image types
- Ground observations :
  - flights, airborne image capture, hyperspectral, lidar…
  - At sea observations : visual, cam, …
- Multimodal processing of various data sources (AI ?)
- Modelling : local and large scale

Potential Applications :



- Survey of Floating Marine Debris :
  - To Monitor Water quality indicators : UNEP → SDG14
  - To Alert for potential impacts (navigation, beach…)
  - To Help and to Promote the collection of Floating marine debris
  - To Evaluate the efficiency of upstream preventive actions

The SEA CLEANERS

Thank you for your great
Help to the Oceans !

PLASTIC-LESS SOCIETY

ESA's Planned feasibility study

esa
space solutions

PLANNED ESA-FUNDED INVITATION TO TENDER

ESA Space Solutions is planning on issuing an open competitive tender for a feasibility study to investigate the technical feasibility and economic viability of space based applications in support of reducing environmental impact of plastics/marine litter, and define a roadmap for services implementation and demonstration.

PLASTIC LESS SOCIETY ITT

TOPICS OF INTEREST (EXAMPLES)

- Provide information on floating plastic debris in ocean and coastal areas; provide comprehensive map of floating marine debris;
- Develop floating debris predictive models;
- Monitor and improve the logistics of plastic collection, waste management and recycling, and support economically and environmentally sustainable models for plastic collection, recycle and conversion;
- Assess impact and effectiveness of the recycling missions; provide ex ante analysis of impact of recycling missions;
- Develop tele-education programmes tailored to developing economies: educate the local communities on marine litter and plastic impact to the environment.

VALUE OF SPACE

Satellite Navigation

- Positioning information to support cleaning systems
- Positioning of Unmanned Aerial Vehicles equipped with optical and radar payloads to perform accurate analysis over specific areas of interest

Satellite Communications

- Provide communication for data collected from offshore sensors (vessels or other platforms) and data crowdsourcing
- Provide communication in support of tele-education programmes covering rural locations
- Provide Command and Control/payload communication link for UAVs or High Altitude Pseudo Satellites (HAPS) equipped with marine litter detection payloads

Earth Observation

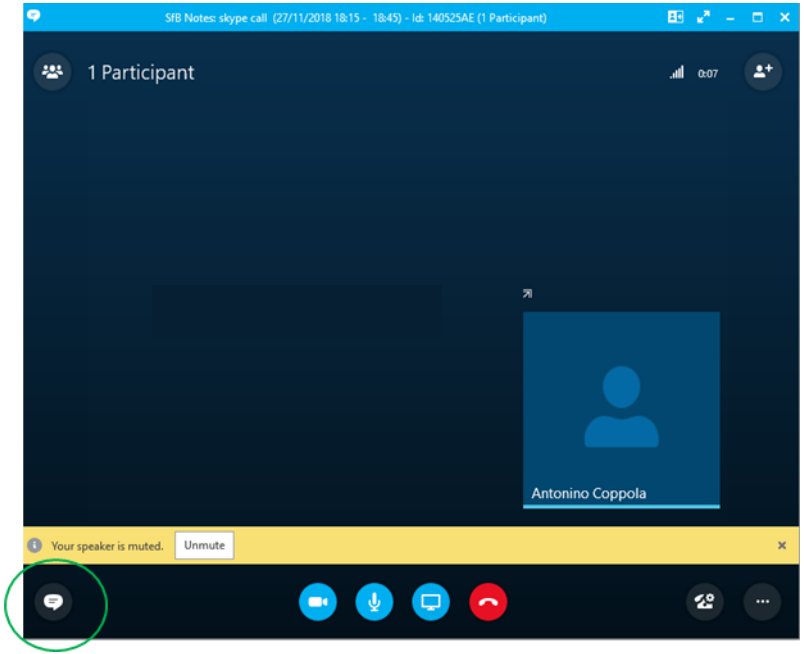
- Measuring and detecting sea-borne plastic waste
- Measuring ocean currents and as an input to predictive marine litter models

PLANNED ESA-FUNDED INVITATION TO TENDER

To know more about the application process: https://business.esa.int/funding/intended-tender/plastic-less-society

Join the webinar on 24/06/2020 - 11:00 CEST

OPEN QUESTIONS & ANSWERS SESSION



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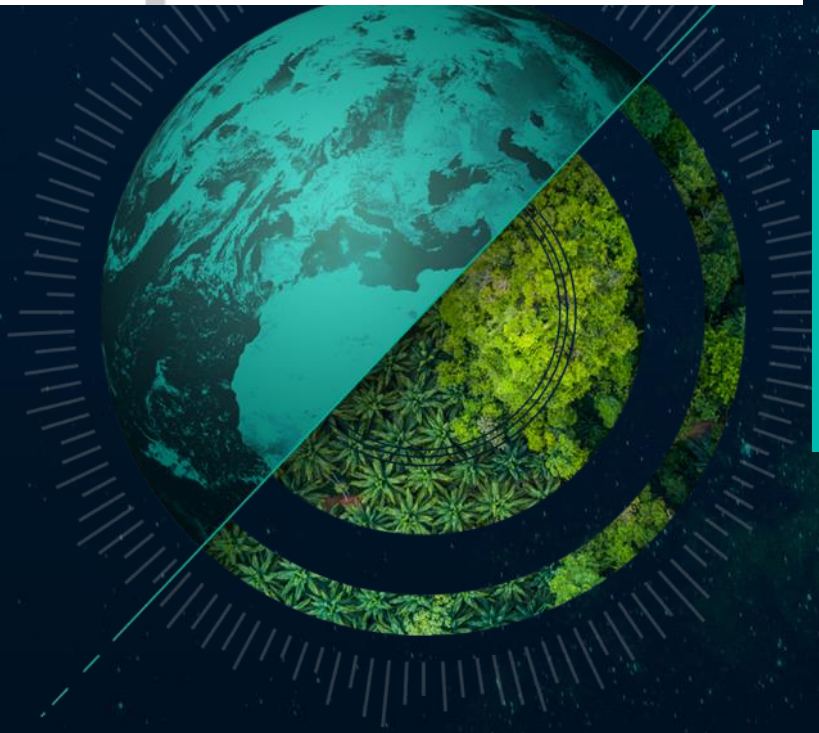

Thank you!

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