





→ 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

esa business applications

→ AGENDA

- Introduction
 - Fuel your business
 - What ESA offer
- Artificial intelligence kick start calls
 - Background & Opportunity
 - Topics of relevance
- AI for environment: use case examples
 - The SeaCleaners
 - The OceanCleanUp
- Kick-start Activity essentials
 - How to apply
 - Authorization from National Delegations
 - The Proposal Template
- Q&A







esa business applications



→ OUR OFFER

We'll work together to make your idea commercially viable, with:



Zero-Equity Funding (€60k-€3M+) Tailored Project Management Support Access to Our Network & Partners

Use of the ESA Brand for Credibility

ESA UNCLASSIFIED - For Official Use

ESA | 01/10/2019 | Slide 10

European Space Agency



business applications

→ FUNDING & SUPPORT OF SPACE-ENABLED SERVICES POWERED BY ARTIFICIAL INTELLIGENCE

Funding up to €60K per Activity

esa business applications

→ AI ESA KICK START CALL

- The European Space Agency is offering technical support and funding to companies developing innovative and commercial products and services combining Artificial Intelligence with space technology.
- To find out more: <u>https://business.esa.int/funding/invitation-to-</u> <u>tender/artificial-intelligence-kick-start</u>





ESA | 01/10/2019| Slide 15

European Space Agency

AI kick start

6 months duration up to €60K ESA funding (75% ESA co-funding)

Develop business case for commercially viable services

- Customer Engagement
- Technical Feasibility Assessment
- Commercial Viability Assessment



ESA UNCLASSIFIED - For Official Use

ESA 01/10/2019 | Slide 16

esa business applications



→ AI KICK START: TIMING

The AI kick start is organised around specific macro-areas for which dedicated calls will be issued:

Consumer goods , business and industrial services (OPENING DATE 13th May 2019, CLOSING DATE 21st June)

Social Impact (OPENING DATE 25th June 2019, CLOSING DATE 30st August)

Infrastructure (OPENING DATE 2nd September 2019, CLOSING DATE 11th October)

Environment and natural resources (OPENING DATE 14th October 2019, CLOSING DATE 29th November)



Agriculture; Renewable and clean energy; Climate; Oceans, seas and marine resources; etc.

ESA | 01/10/2019| Slide 19

European Space Agency

esa business applications

→ AI FOR ENVIRONMENT AND NATURAL RESOURCES: TOPICS OF INTEREST

Space technology and AI to develop new services addressing:

- Agriculture
- Oil, Gas and Mining
- Renewable and clean energy
- Climate
- Oceans, seas and marine resources
- Others related to environment and natural resources



Earth Observation



Satellite Communication



ESA | 01/10/2019| Slide 20



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

PLASTICS IN A FEW NUMBERS



8,3 billions tons of plastics have been manufactured since 1950



Only 12% of all plastics produced each year are incinerated, and 9 % recycled

In 2050, **13 billions tons** of plastics will have been scattered in nature

10 tons of plastics are produced every second

01,

10

PLASTIC POLLUTION IN A FEW NUMBERS

9 000 000

tons of plastic waste is scattered in the seas every year

1 000 000

birds are killed by plastic waste every year

100 000

marine mammals are killed by plastic waste every year

1400 + marine species already

impacted

70%

of floating plastic waste ends up sinking

450 years

for a plastic bottle to decompose



The UN officially supports The SeaCleaners. The SeaCleaners presented the Manta project at the World Environmental Day 2018, dedicated to the fight against plastic pollution.

THE SEA CLEANERS' OBJECTIVES *A GLOBAL VISION*



Collect plastic macro-waste in the sea areas where it is the most concentrated



Supply scientific data about plastics, develop scientific networks and promote scientific studies



Educate future generations about plastic pollution so they see the value in preventing it



Boost the local and circular economy by promoting and distributing plastic valorization equipment



THE MANTA : A WASTE SORTING AND TREATMENT UNIT

3 COLLECTING SYSTEM

to bring the wastes on board

1 WASTE SORTING UNIT

to separate the plastics from other floating debris

1 WASTE TREATMENT UNIT

to convert plastic and organic waste into energy for ship operation

THE PROGRAM UNTIL 2023



Technical design specifications Basic design studies Reduced scale prototype testing Equipment selection Yard selection



Detailed design studies Systems integration optimisation Full scale prototype testing Procurement specifications Ship building planning



End of ship building Boat launching Technical tests



End of ship commissioning First collection missions



Start of ship building Systems and equipment procurement Selection of the collection areas Permits / Authorizations validation

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**

Routing Strategy : dealing with patchyness !











- Our Requirements :
 - Where, Frequency ?
 - 1 m / 1 h ?
 - Which Amount ?
 - Covered area (m²)
 - Density (kg/m²)
 - Which type of debris ?
 - **PE**, **PP**, **PS**, **PET**...
 - Dispersion Model
 - Currents
 - Winds



• Preferred Output :

- GIS
- Routing system
- Applications :
 - Downstream Mitigation Actions :
 - Floating marine debris collection
 - Survey of Floating Marine Debris :
 - Evaluate efficiency of upstream preventive actions
 - Water quality indicators : UNEP \rightarrow SDG14



Data Processing : Where AI can help ?

- Remote Sensing : Satellite image processing
 - Hyperspectral, visual, radar,... combining various image types to get :
 - \rightarrow Floating debris mapping, debris type identification, quantification ?
- Ground observations :
 - flights, airborne image capture, hyperspectral, lidar...
 - At sea observations : visual, cam, ...
- Multimodal processing of various data sources
- Modelling





Al and The Ocean Cleanup

Robin de Vries – Geospatial Analyst



THE OCEAN CLEANUP

© 2018 The Ocean Cleanup

JAA





THE OCEAN CLEANUP

The Ocean Cleanup

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

The Ocean Cleanup – Ocean system

- 2018: System 001 fail to succeed!!!
- 2019: System 001/B
 Much smaller focus on minimal proof of concept...
- Where is the highest concentration of plastic?
- How do we get this information as actual as possible?

The Ocean Cleanup - Research

Models





O A visual showing where plastic waste leaks into the environment

THE OCEAN CLEANUP

• Observations





©2018 The Ocean Cleanup

Missing plastic



D Coastal plastic Source: Andrés Cózer, Universided de Cédiz



Ocean plastic found in the Great Pacific Garbage Patch (2015)



THE OCEAN CLEANUP

The Ocean Cleanup and imagery

 We aim to sample *coastal*, *riverine* and *oceanic* environments → closing the plastic budget equation

• Imagery from platforms:

- UAV
- Airborne
- Satellite
- Land-based

Automatic mapping debris concentration – Drones

Manual labeling \rightarrow Automatic detection!



THE OCEAN CLEANUP

©2018 The Ocean Cleanup

Large debris detection in Optical Satellite Images



10 hits

Total area:	10 km ²
Masked area:	44 %
Effective area:	5.6 km ²

Very likely all large floating litter objects (or TOC drifters)

THE OCEAN CLEANUP

Plastic remote sensing development

- The Lesvos experiment 2018, 3 10*10 plastic "stamps":
 - · Initiative from Pr. Kostas Topouzelis (University of the Aegean)
 - Processed by Bill Baugh (Maxar)

Natural Color



Polymer Index (SWIR) raw



Polymer Index (SWIR) with water mask



©2018 The Ocean Cleanup

VesselCam: Automatic detection & Mapping from vessels





RiverCam: plastic litter mass flow in rivers



THE OCEAN CLEANUP

Coastal: timelapse camera's and UAVs





THE OCEAN CLEANUP

©2018 The Ocean Cleanup

Al and The Ocean Cleanup: future

- Multi/Hyperspectral detection of Marine Plastic Litter (Hybrid with optical?)
- Satellite high-resolution optical detection of Marine Plastic Litter
- (Near) real-time detection of main concentrations
- Increased flow of data through partners and citizen science
- Al to handle the large expected volume of data



→ HOW TO APPLY 1/2

- Register by completing online questionnaire on <u>ESA-STAR</u> <u>Registration</u> (minimum 'light registration') (https://esastar-emr.sso.esa.int)
- 2. Download the official tender documentation (Invitation to Tender) via EMITS <u>AO9889</u>
- 3. Create 'Bidder Restricted Area' in ESA-STAR
- 4. Write your proposal and obtain Letter of Authorization from <u>National Delegation</u>, if needed.
- Submit your proposal via 'Bidder Restricted Area' in <u>ESA-</u> <u>STAR Tendering</u> by the specific deadlines (Don't wait until the last minute!)



ESA UNCLASSIFIED - For Official Use

ESA 01/10/2019 | Slide 53

→ HOW TO APPLY 2/2

The Letter of Invitation to Call for Proposals is issued on EMITS (<u>http://emits.sso.esa.int/emits/owa/emits.main</u>) and includes :

- Cover letter
- Appendix 1: Activity Description
- Appendix 2:
 Draft Contract
- Appendix 3: Tendering Conditions for Express Procurement Procedure - EXPRO/TC
- Appendix 4:
 Proposal Template



ESA UNCLASSIFIED - For Official Use

ESA 01/10/2019 | Slide 54

→ THE PROPOSAL TEMPLATE

Your Proposal shall include the following information:

- Executive Summary (max 1 page) 1)
- 2) Business Potential (max 5 pages)
- 3) Technical Concept (max 5 pages)
- Team and Resources (max 3 pages) 4)
- 5) Management (max 4 pages)
- 6) Financials (max 2 pages)



OPEN QUESTIONS & ANSWERS SESSION









ESA UNCLASSIFIED - For Official Use

ESA 01/10/2019 | Slide 58

European Space Agency

esa business applications

➔ YOUR BUSINESS POWERED BY SPACE



Your company could be next.





→ THANK YOU!

European Space Agency

Davide.Coppola@esa.int