Coastal Marine Litter Observatory (CMLO): a contribution to SDG plastic debris density

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Coastal Marine Litter Observatory (CMLO)

Marine Litter Pollution

4.6-12.7 million tons per year

Reaction & commitments

UN-SDG 14 - Life Below Water

Ban 10 single-use plastic items

30% Recycled content in plastic bottles (rPET) → 2030

Collection target of 90% for drink bottles → 2029

Monitor the transaction process of reducing plastic waste

GR has set a 3-year cleaning program from 2022 (EOAN)

The solution

- **UAV data collection**
- **Image processing and analysis with AI**
- **Automated target detection of marine litter**
- **Automated creation of marine litter density maps**

CMLO methodology

Use of Artificial Intelligence Algorithms

Automated detection of marine litter

Detection of **7 categories**

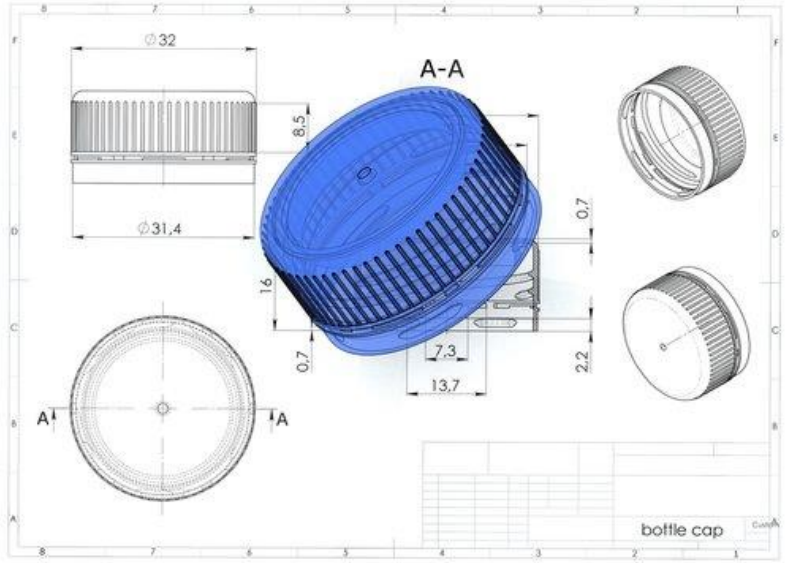
Marine Litter Main Categories & Size

1	SYNTHETIC POLYMER MATERIALS (PLASTICS)
2	RUBBER MATERIALS
3	CLOTH-TEXTILE MATERIALS
4	PAPER - CARDBOARD MATERIALS
5	WOODEN MATERIALS
6	METALLIC MATERIALS
7	GLASS- CERAMICS MATERIALS

- GSD = 1cm or 0,5 cm → 18-20 m Phantom Pro
- Min Area =1cm^2 – 0,25cm^2

Or

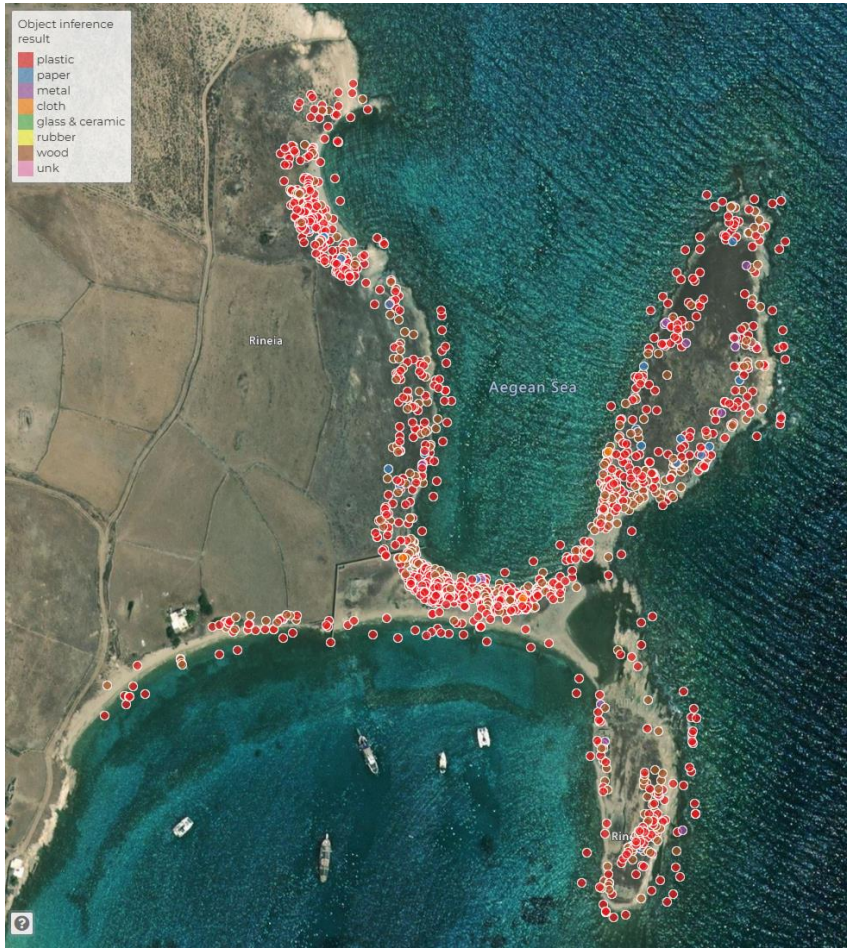
- min measurable item dimensions equal a plastic bottle cap in 2 to 4 pixels for consumer grade

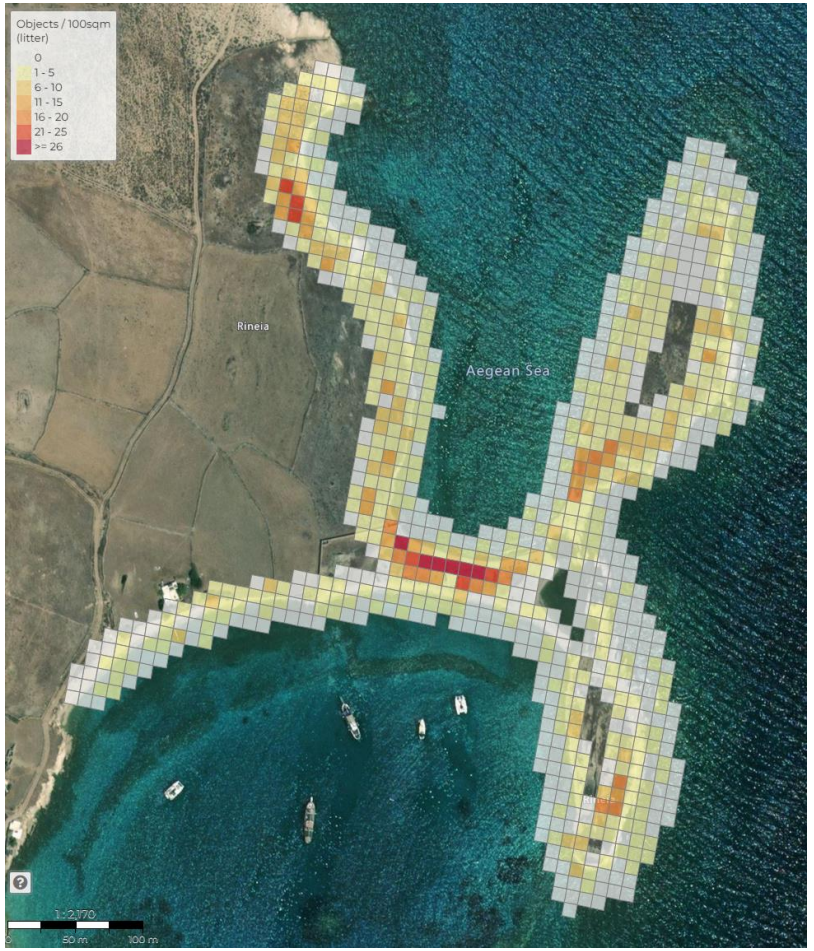


Coastal Marine Litter Observatory (CMLO)

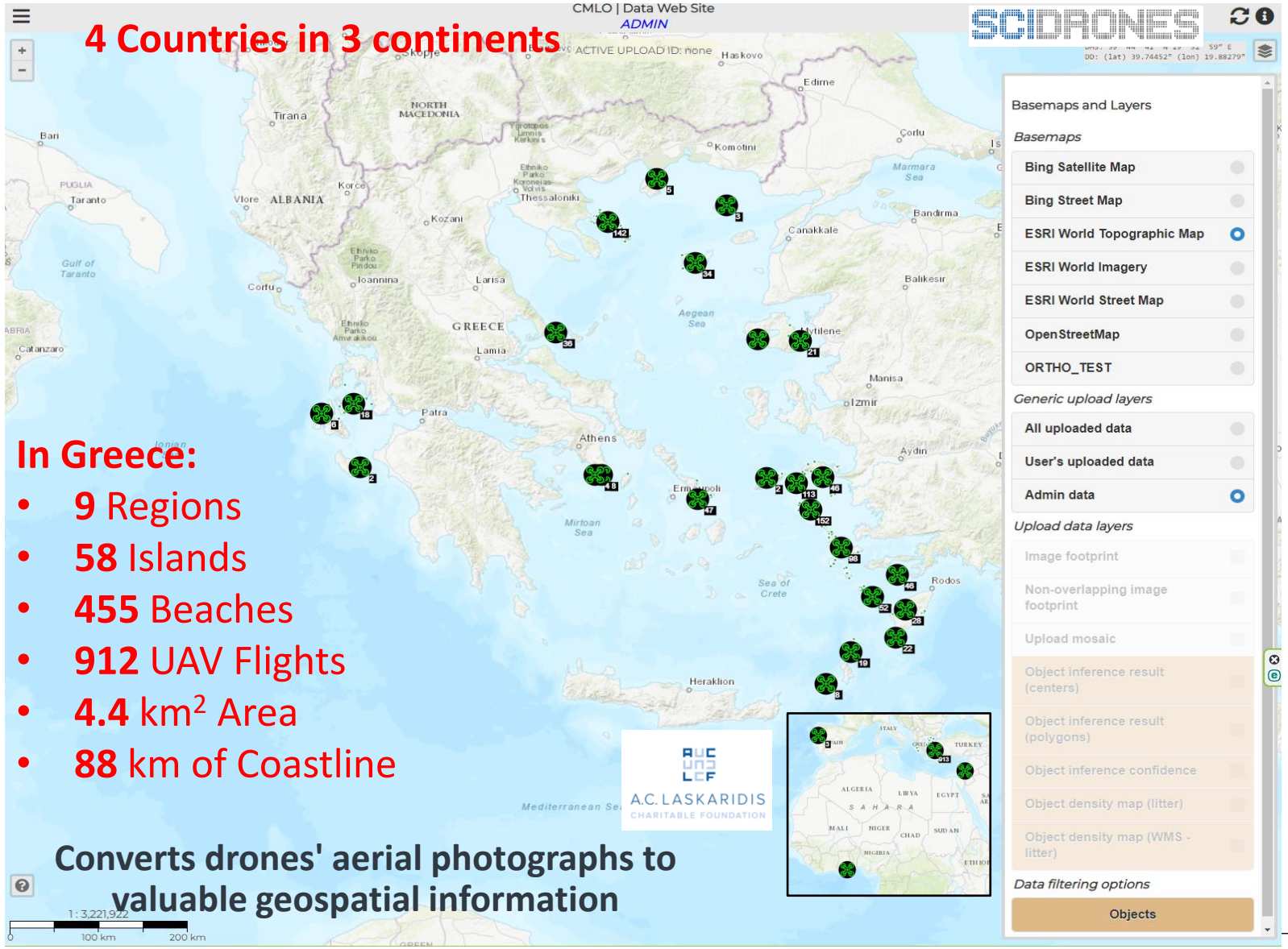
Maps of marine litter geolocations, types and densities.

Special Geo-Visualizations





CMLO General Statistics



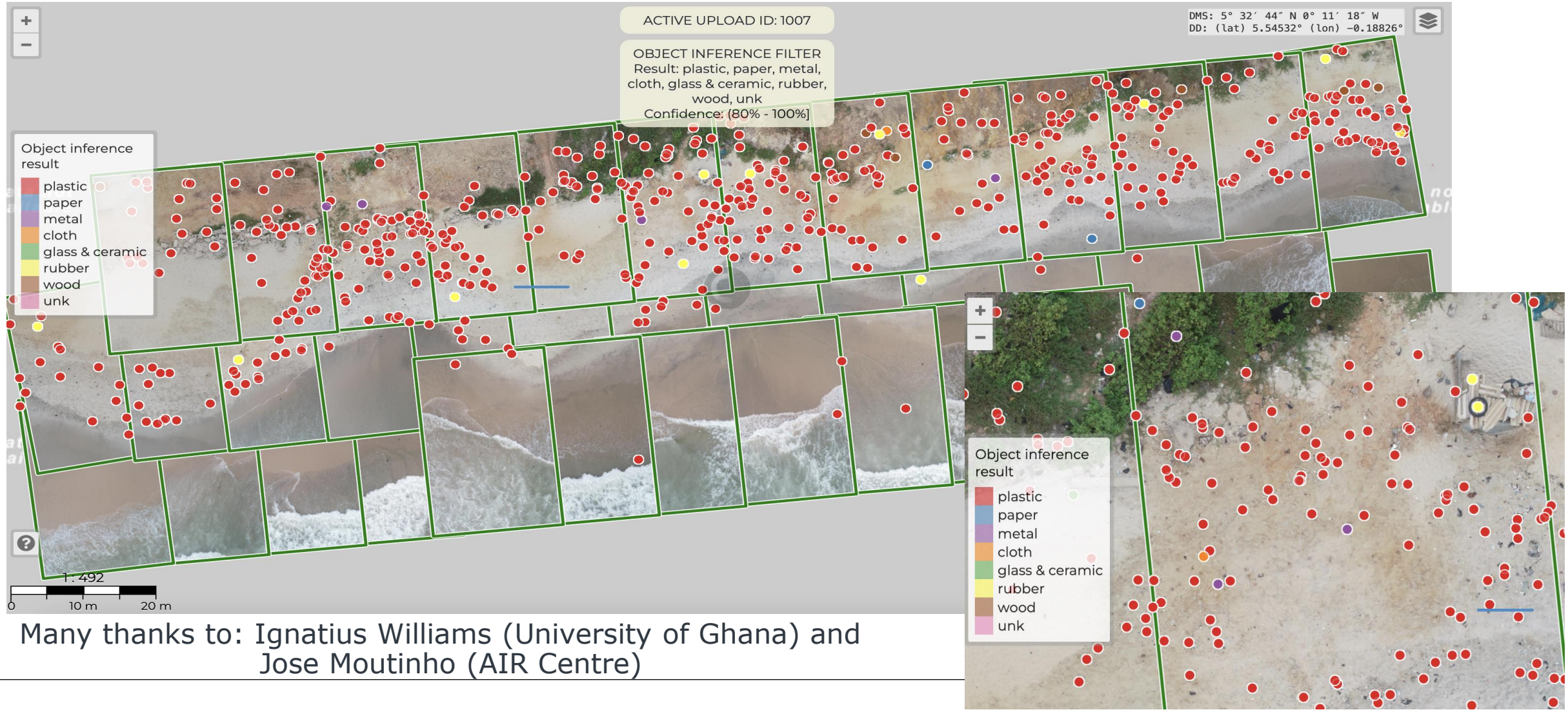
- **Combination of Drones & AI**
- **Fully Automated Process**
- *TRL Level:* ***7***
- *Accuracy:* $\geq 80\%$
- *Online cloud platform:*
  - **Mapping of litter positions**
  - **Monitoring the changes in time & space**
  - **Pollution time series visualization**

14.391 High resolution Aerial Images

409.567 Marine litter items→

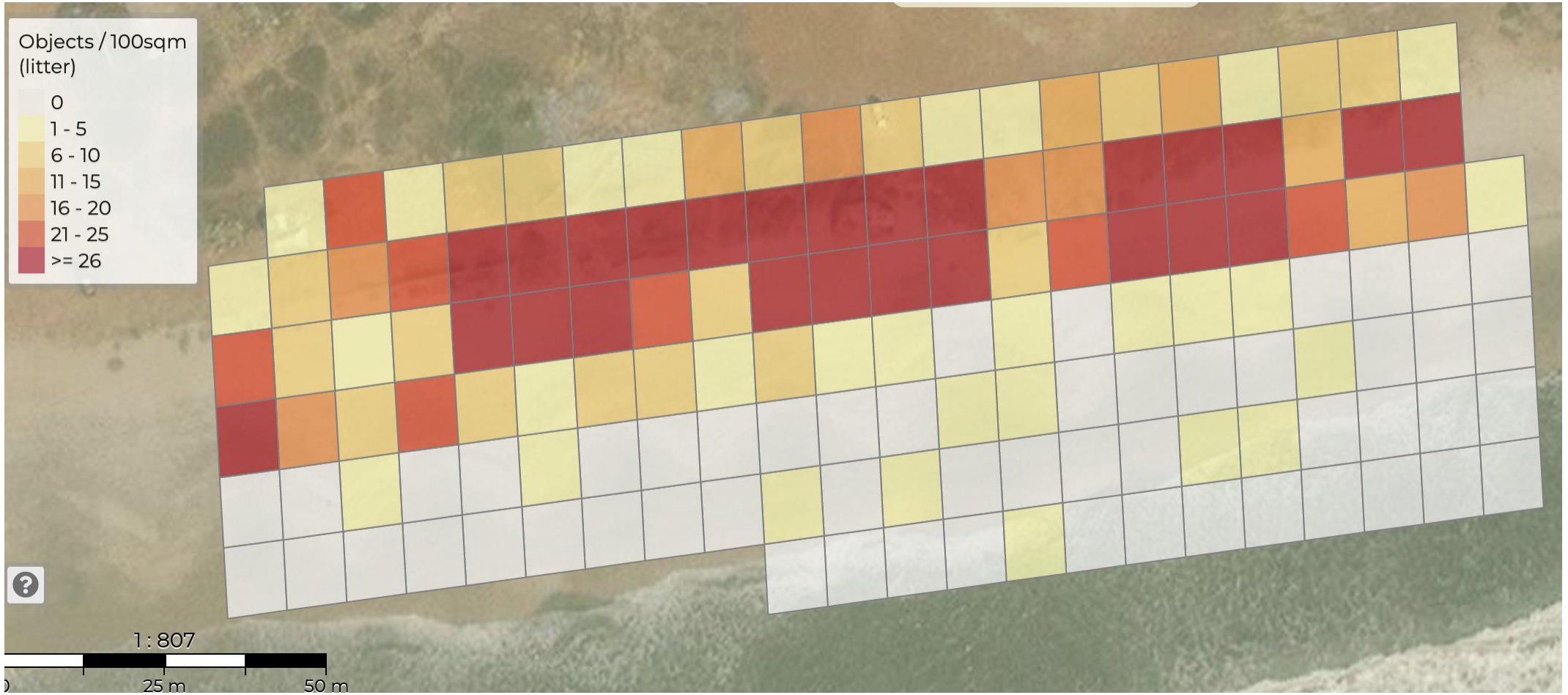
341.768 Plastic items

Ghana use case



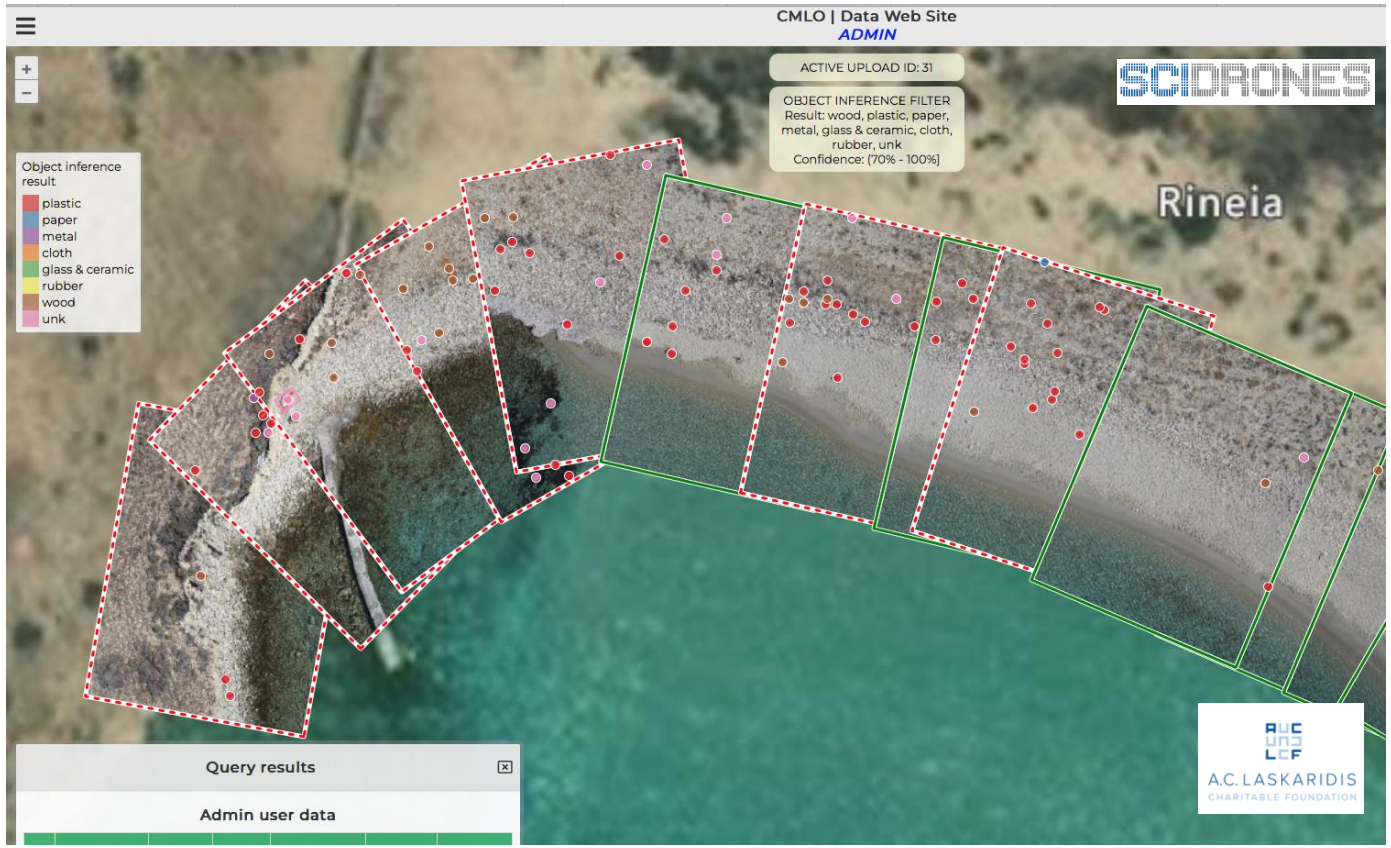
Many thanks to: Ignatius Williams (University of Ghana) and Jose Moutinho (AIR Centre)

Ghana use case



Ghana use case

Conclusions

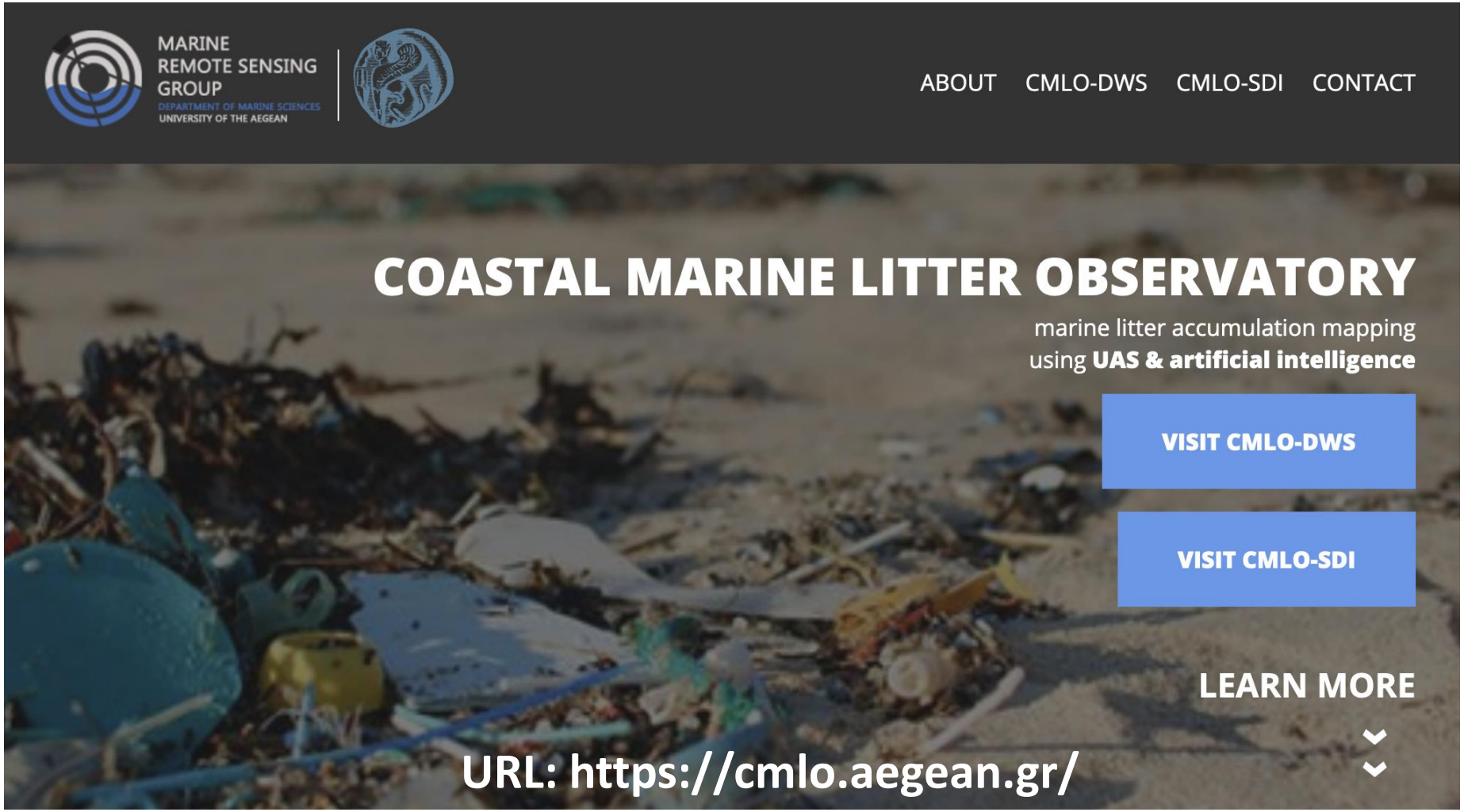


Monitoring of marine litter pollution

- Blue Flag Program
- Environmental footprint of cleaning actions
- Targeted decontamination actions
- Ability to assess pollution
- Decision making / interventions
- Faster and cheaper decontamination

<u>WHO</u>

- **DECONTAMINATION COMPANIES**
- **CSR DEPARTMENTS OF COMPANIES→**
- **MUNICIPALITIES / REGIONS**
- **INSTITUTIONS**
- **NGOs**



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