

Universidade de Vigo

With the
collaboration of



PARQUE NACIONAL MARÍTIMO TERRESTRE
DAS ILLAS ATLÁNTICAS
DE GALICIA



AEBAM
ASOCIACIÓN ESPAÑOLA
DE BASURAS MARINAS



Litter Drone

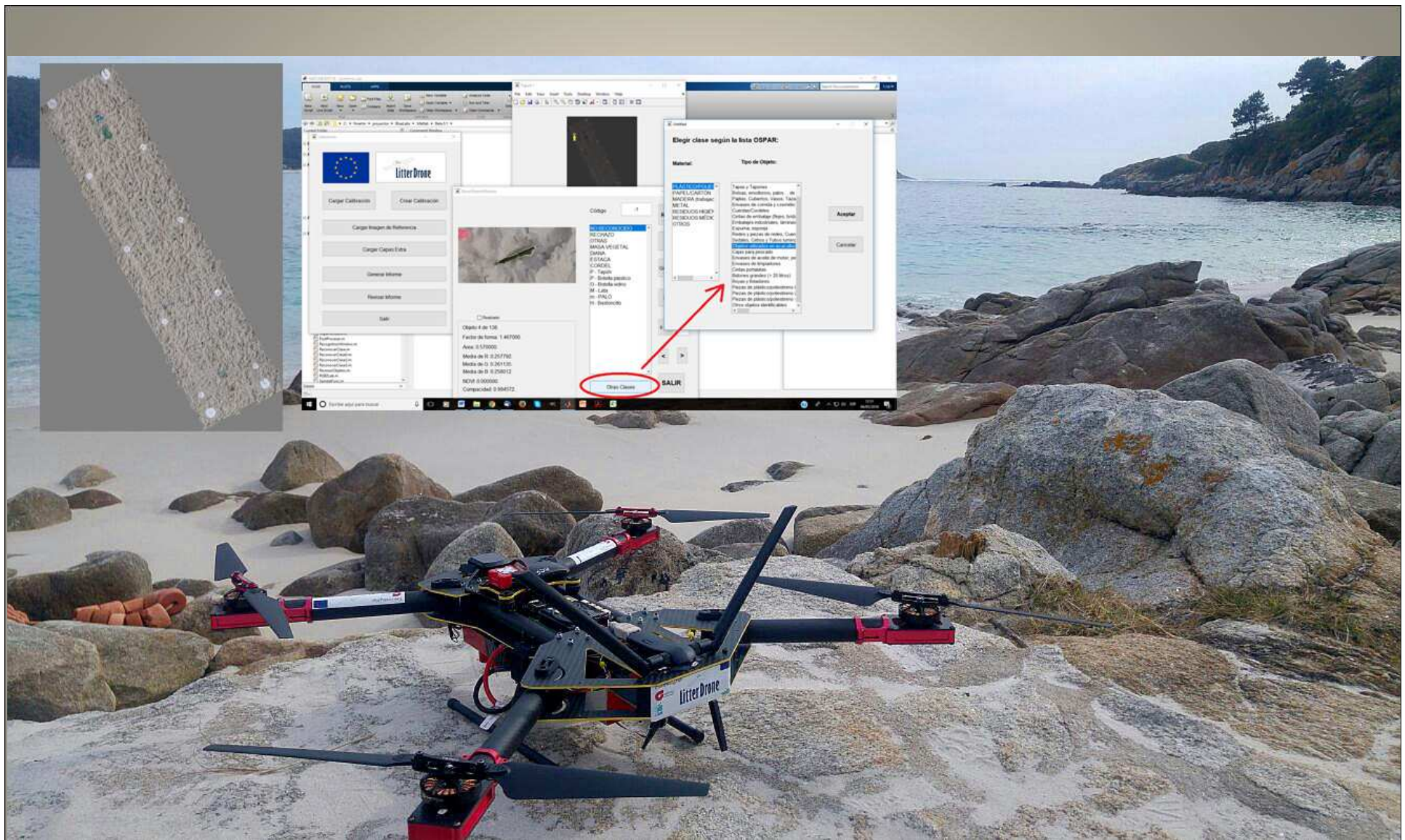
**“Development and Exploitation of Innovative
Tools for Remote Marine Litter Control and
Management through UAV's”**



Co-funded by the European Union

Supported by





Drone-based image acquisition + Computer based image analysis.



The
PROJECT

Litter Drone

¿WHAT IS MARINE LITTER?

Man made solid waste that, for any cause, are abandoned in marine or coastal environment



SOURCE: PNUMA

LITTERDRONE ORIGIN

- Marine litter characterization as a key factor to eradicate them.
- Official monitoring program for marine litter on beaches (MAPAMA).
- Standardization and automation of marine litter characterization.



SOURCE: Surfrider España

"DEVELOPMENT AND EXPLOITATION OF INNOVATIVE TOOLS FOR REMOTE MARINE LITTER CONTROL AND MANAGEMENT THROUGH UAV'S" (LITTERDRONE)

- Main objective: development of innovative tools for control and management of marine litter on coastal areas
- Application of new technologies (UAV's + digital imaging) versus traditional characterization (on foot)
- Training of expert people in the use of these new innovative tools
- Analysis of the arrival of the new tools to the market

FUNDED BY EU (BLU-LABS PROGRAM)

- EASME/EMFF/2016/1.2.1.4 - Blue Labs - innovative solutions for maritime challenges.

- Support from EcoEmbes.



UniversidadeVigo

- Three partners.





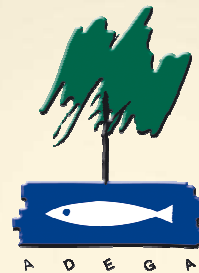
The Partners

Litter Drone

AEBAM: ASOCIACIÓN ESPAÑOLA DE BASURAS MARINAS (SPANISH MARINE LITTER ASSOCIATION)



Non profit organization founded in 2015

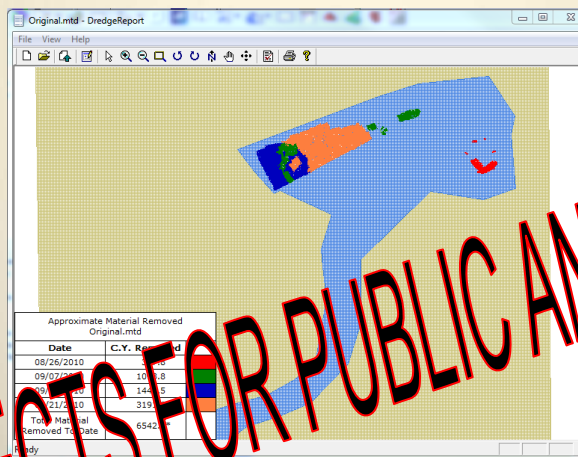


DIC: Drones International Congress, Ourense, 2018.

GRAFINTA S.A.

- Enterprise established 1964.
- Since the beginning, GRAFINTA S.A. has been involved in distributing instrumentation and solutions for the surveying and mapping industry, hydrography, oceanography, GPS and navigation.

- DELPH SEISMIC+.
 - Hesperides BIO vessel.
- DELPH SONAR.
 - GEOMYTSA.



NAVANTIA
U.P. ASTILLERO
CARTAGENA



SEVERAL PROJECTS FOR PUBLIC AND PRIVATE ENTITIES

University of Vigo

- Number of Degrees: 54.
- Master Programs: 74.
- Students: 20826.
- Departments: 47.
- Campus: 3.
- Schools/Colleges: 21.

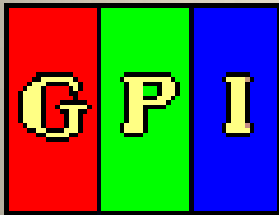


Image
Processing



Marketing &
Strategy

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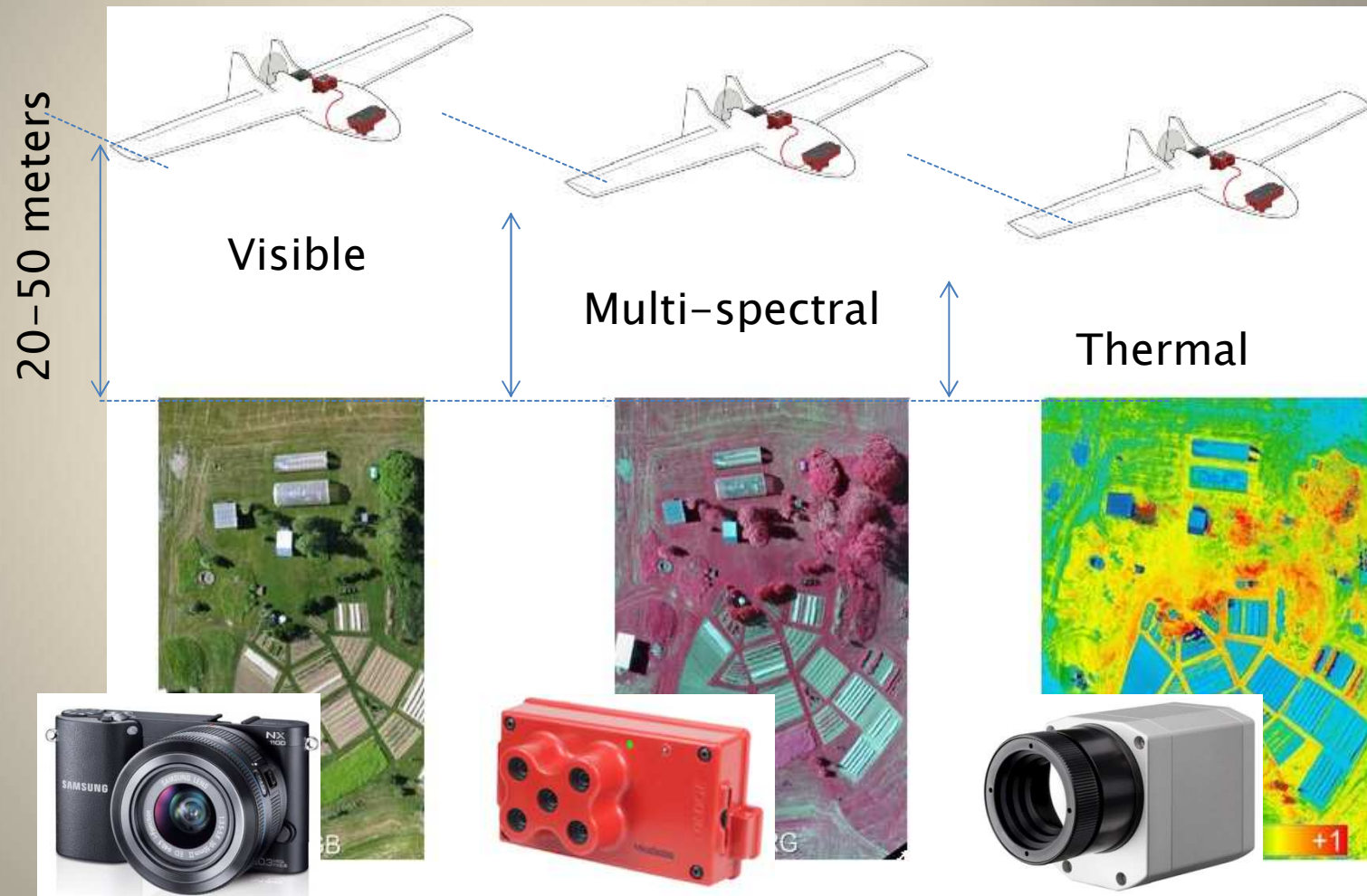




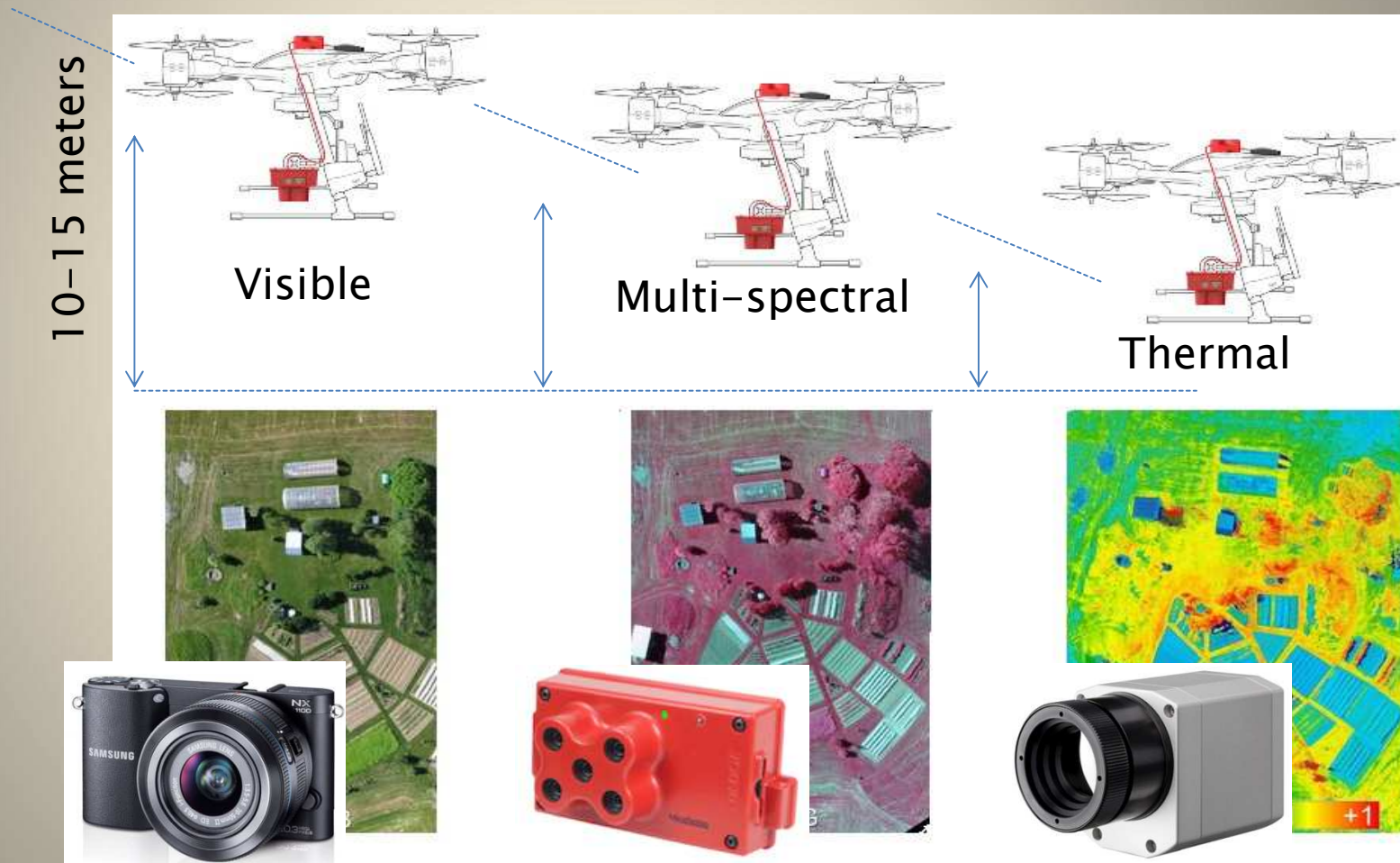
Drones &
flights

Litter Drone

UAV's & Cameras



UAV's & Cameras



Real Flights



DIC: Drones International Congress, Ourense, 2018.

Image Acquisition: Othophoto

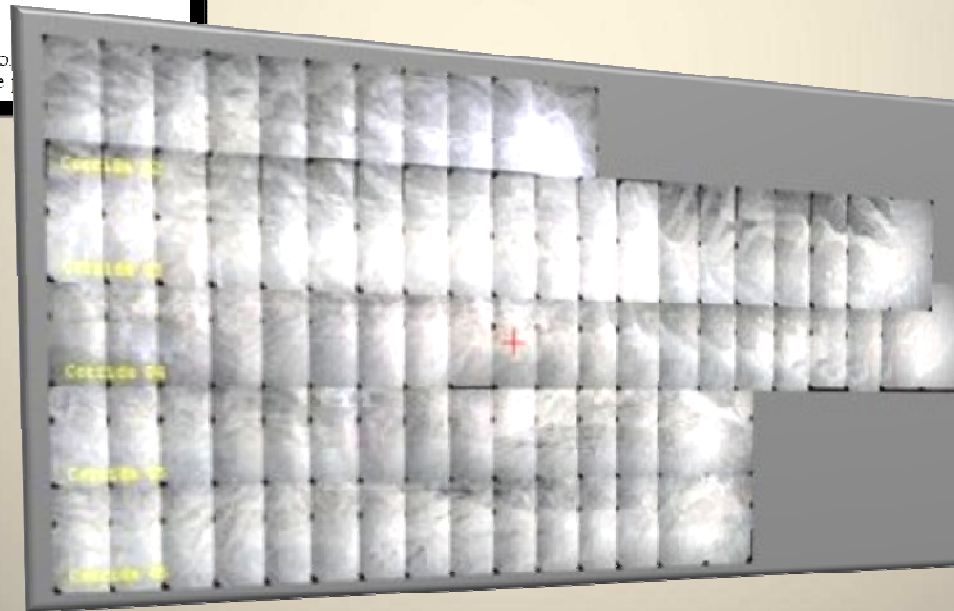
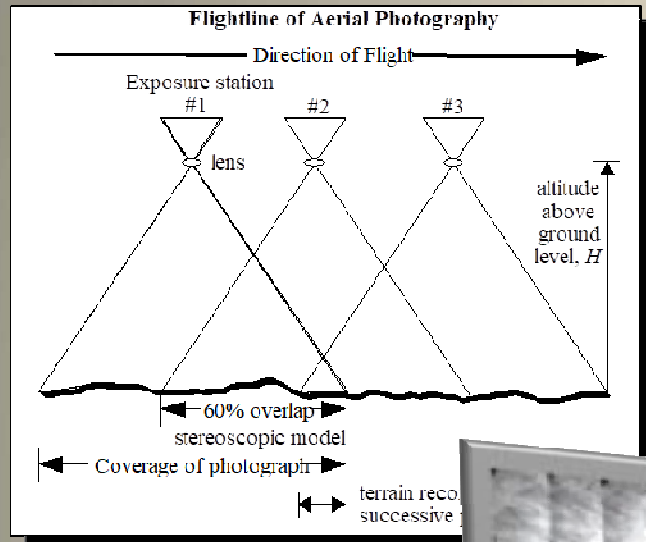
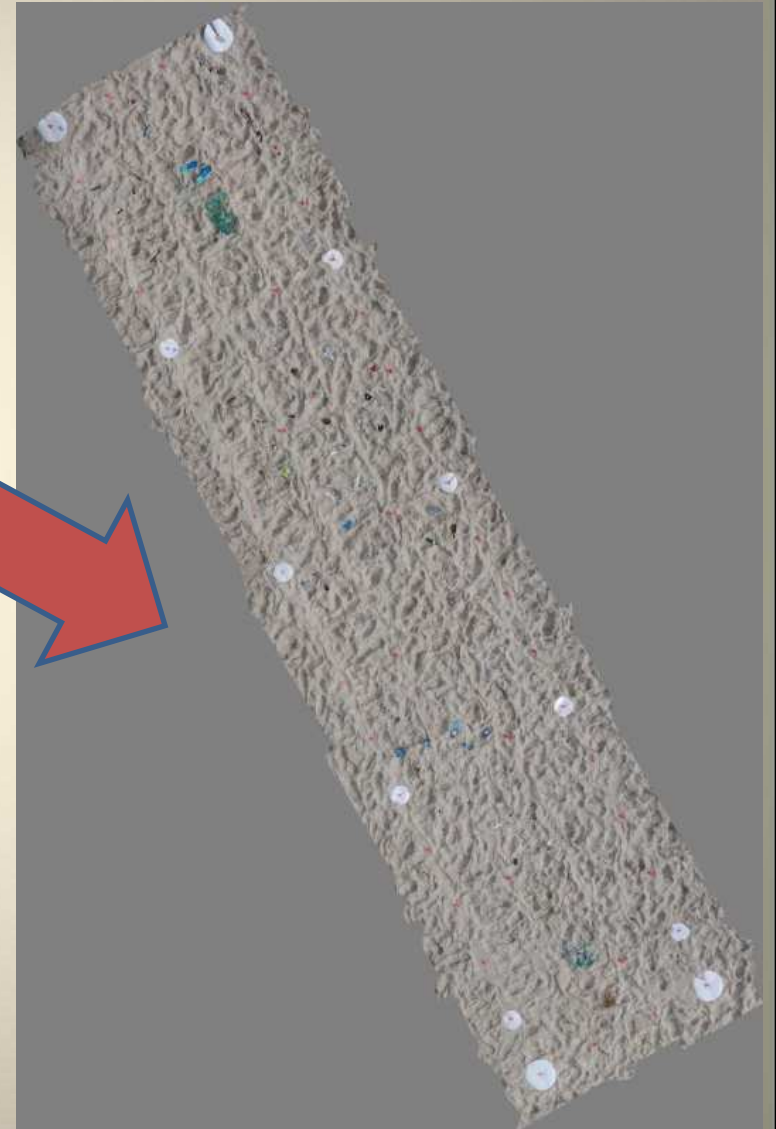


Image Acquisition: Othophoto



Photomodeler: from photos to
Orthophoto (georeferenced,
exact).



Test Zone

- Flying on one of the monitored beaches: “playa de Rodas” (Galician Atlantic Islands Maritime-Terrestrial National Park).
- Detection of true marine litter and comparison with official data.
- Flying on another (non monitored) beach.



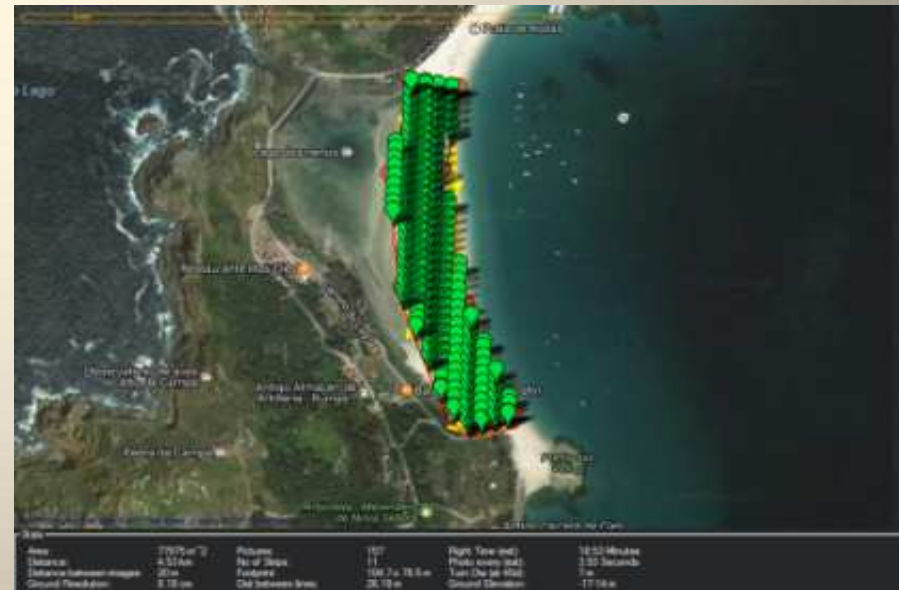
**With the
collaboration of**

Real Flights



Flight transects

Flight with individual photo shots labelled



DIC: Drones International Congress, Ourense, 2018.



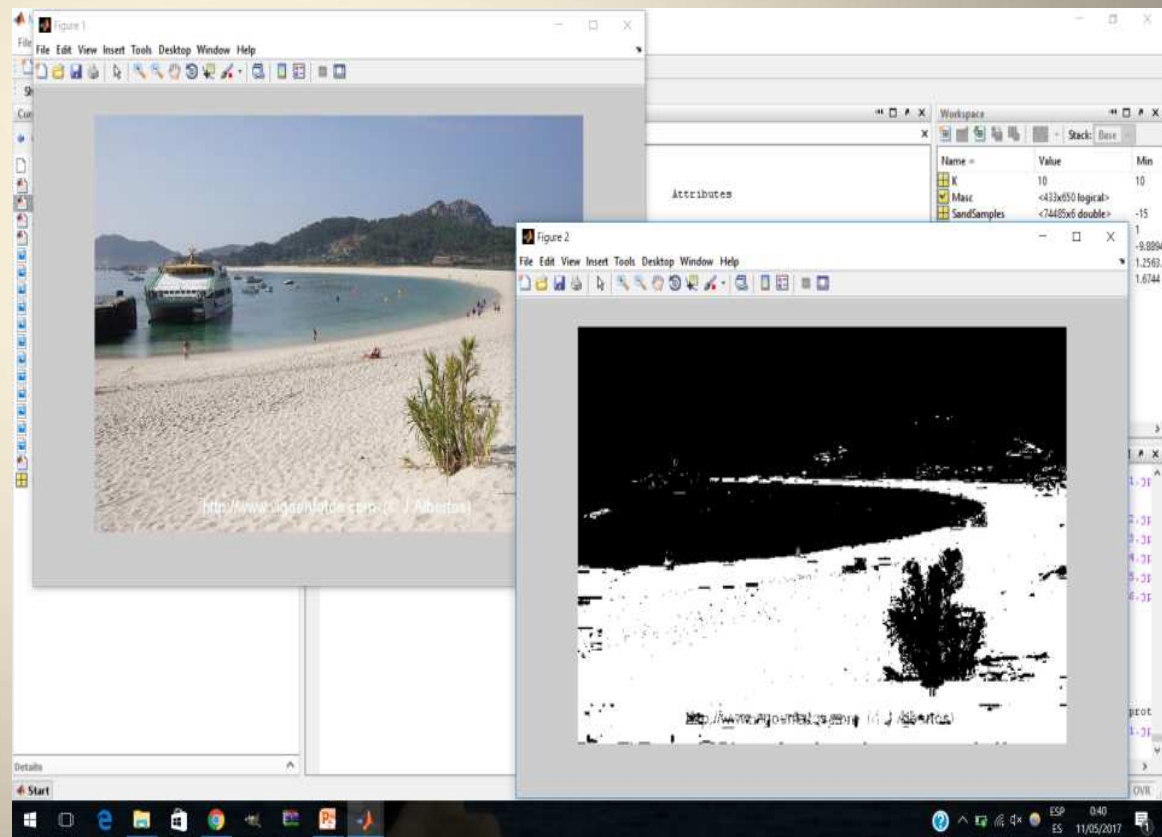
Image
processing

Litter Drone

Image Processing

**Objects detection with beta version:
sand characterization**

**IMAGE TYPE:
RGB (VISIBLE,
CONVENTIONAL
CAMERA).**



DIC: Drones International Congress, Ourense, 2018.

Object Detection

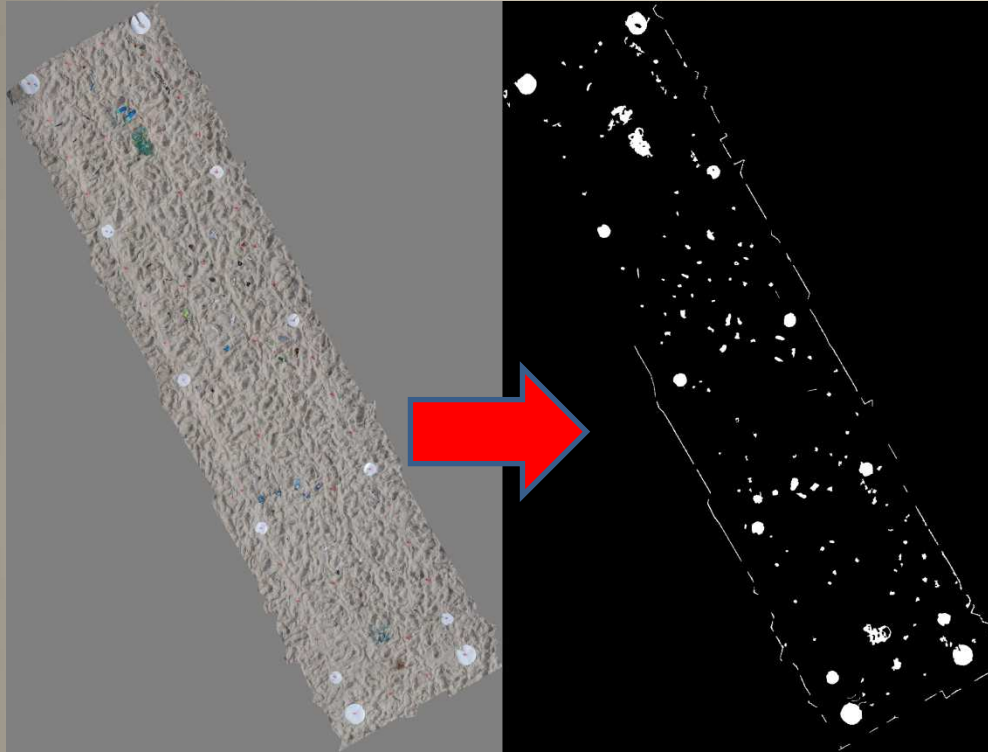
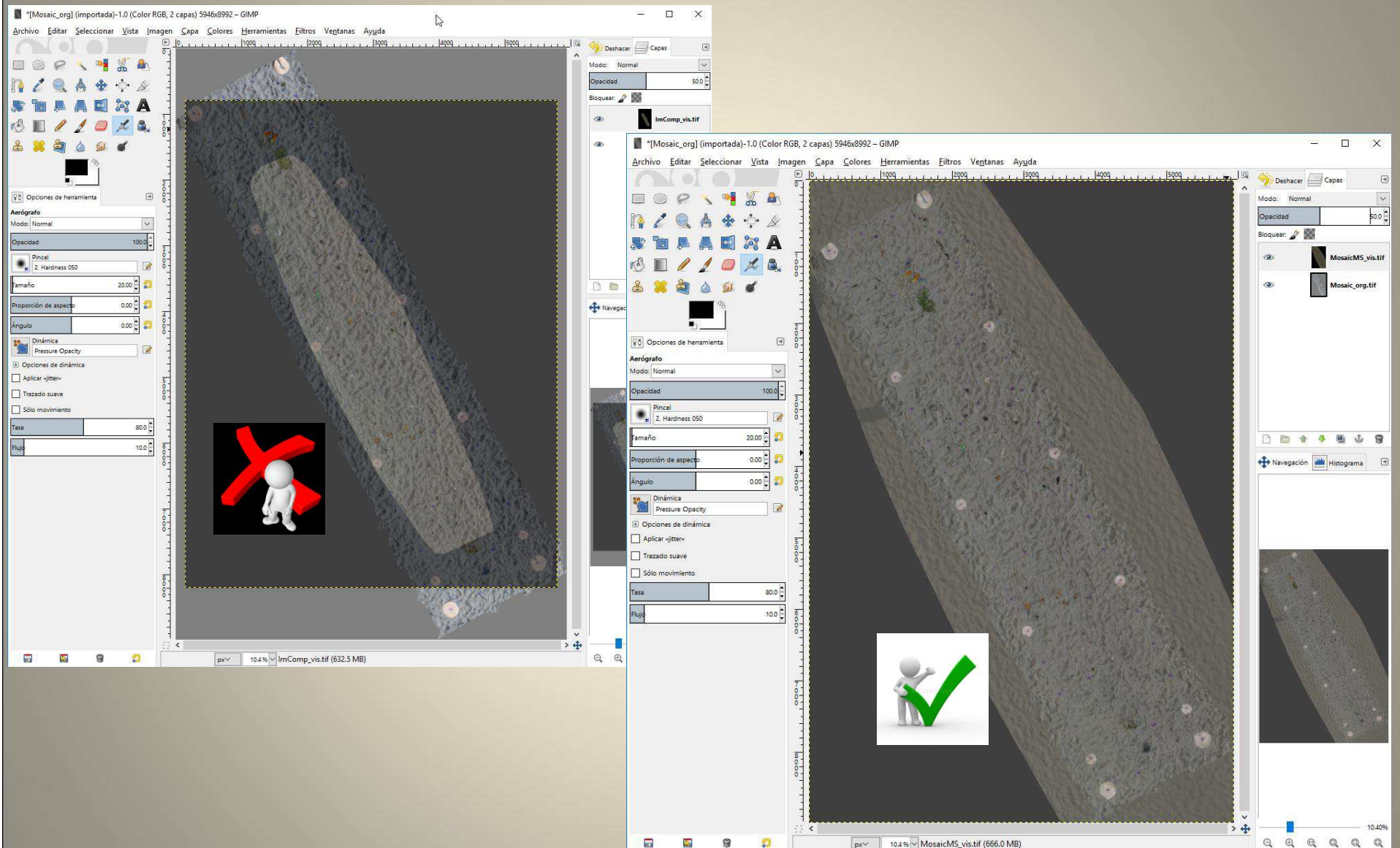


IMAGE TYPE:
RGB (VISIBLE,
CONVENTIONAL
CAMERA).

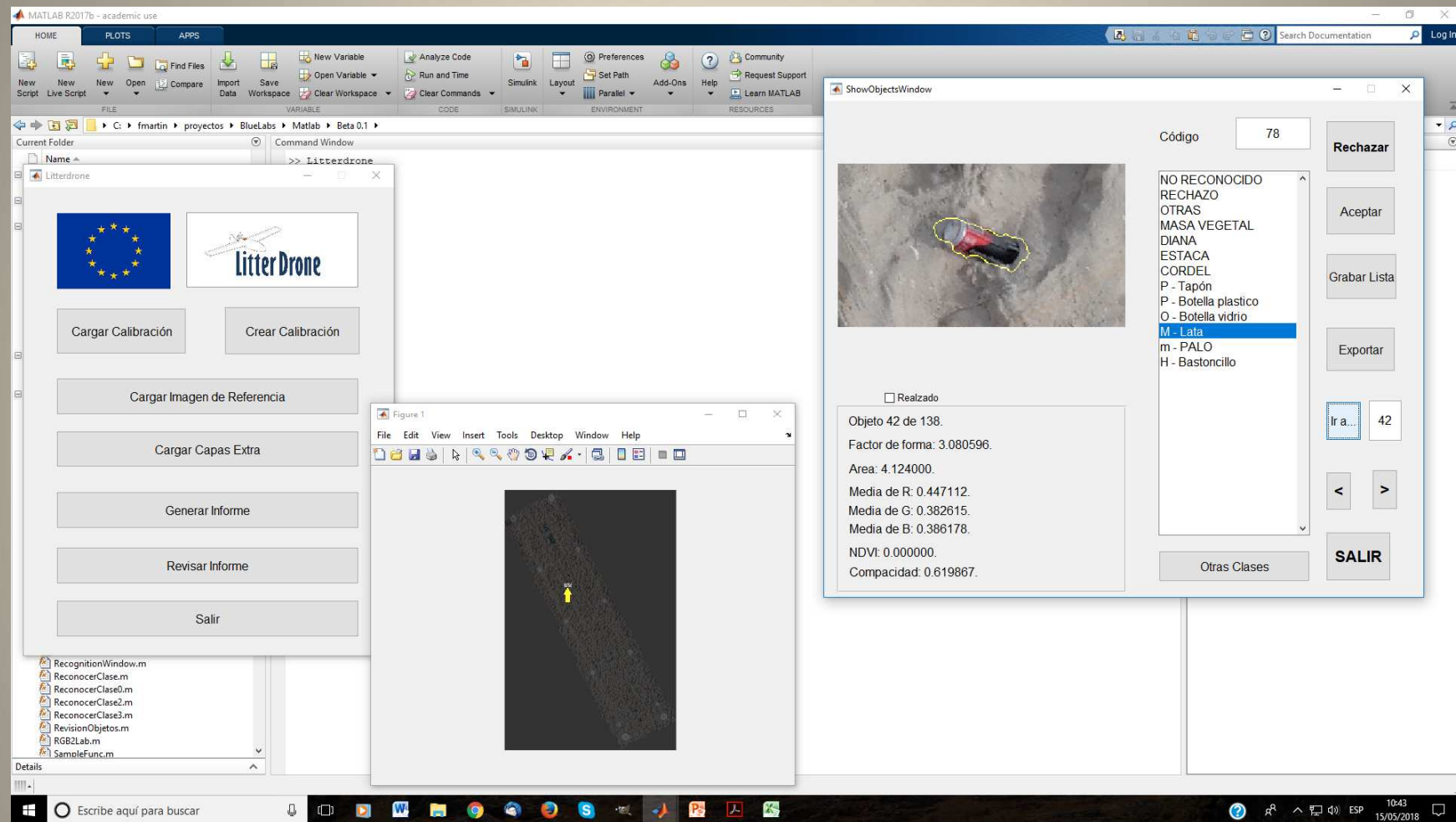


Image Superposition



DIC: Drones International Congress, Ourense, 2018.

Object Recognition



Automatic recognition of more common objects: lids, bottles, cans, sticks... and also auxiliary objects (white targets).

DIC: Drones International Congress, Ourense, 2018.

Object Recognition

The screenshot displays the MATLAB R2017b environment with several windows open:

- Litterdrone**: A window showing the European Union flag and the LitterDrone logo.
- Figure 1**: A window showing a satellite image of a littered area with a yellow arrow pointing to a specific object.
- ShowObjectsWindow**: A window showing a close-up of the selected object (a dark, elongated shape) with a yellow outline. Below the image, a list of properties is displayed:
 - ☐ Realizado
 - Objeto 4 de 138.
 - Factor de forma: 1.467066.
 - Area: 0.570000.
 - Media de R: 0.257792.
 - Media de G: 0.261135.
 - Media de B: 0.258012.
 - NDVI: 0.000000.
 - Compacidad: 0.994572.
- Untitled**: A window titled "Elegir clase según la lista OSPAR:" (Choose class according to the OSPAR list). It contains two columns:
 - Material:**
 - PLÁSTICO/POLIEST (highlighted)
 - PAPEL/CARTÓN
 - MADERA (trabajada)
 - METAL
 - RESIDUOS HIGIÉNICOS
 - RESIDUOS MÉDICOS
 - OTROS
 - Tipo de Objeto:**
 - Bolsas (compra, comida, congelados)
 - Botellas de bebida
 - Tapas y Tapones
 - Bolsas, envoltorios, palos ... de chuc
 - Pajitas, Cubiertos, Vasos, Tazas, Co
 - Envases de comida y cosméticos
 - Cuerdas/Cordeles
 - Cintas de embalaje (flejes, bridas ...)
 - Embalajes industriales, láminas de p
 - Espuma, esponja
 - Redes y piezas de redes, Cuerdas y
 - Sedales, Cebos y Tubos luminosos
 - Objetos utilizados en acuicultura (Ta
 - Cajas para pescado
 - Envases de aceite de motor, pegame
 - Envases de limpiadores
 - Cintas portatalas
 - Bidones grandes (> 25 litros)
 - Boyas y flotadores
 - Piezas de plástico/poliestireno 0-2,5
 - Piezas de plástico/poliestireno 2,5 cr
 - Piezas de plástico/poliestireno > 50
 - Otros objetos identificables

Buttons for "Aceptar" (Accept) and "Cancelar" (Cancel) are visible on the right side of the "Untitled" window.

The Windows taskbar at the bottom shows the date and time as 15/05/2018 0:37.

Human correction of non recognized objects.

DIC: Drones International Congress, Ourense, 2018.



Market
research

Litter Drone

Market Research and Business Model

- **PHASE 1:** Contributed Value and Market Niches
- **PHASE 2:** Marketing Plan Strategy
- **PHASE 3:** Feasibility



TASKS

Grupo de investigación I-Mark

Universidade de Vigo

Phase 1: Contributed Value	TASK 1.1: Qualitative analysis: market research, PESTEL, SWOT (DAFO) TASK 1.2: Suitability study product/market niche
Phase 2: Strategic Planning	TASK 2.1: Marketing purposes TAREA 2.2: Qualitative analysis: market profile TAREA 2.3: Positioning strategy TAREA 2.4: Marketing mix
Phase 3: Feasibility	Foresight Analysis



Conclusions



Litter Drone

Conclusions

- Interesting project ending at January 2019.
- Pending work:
 - Testing new cameras.
 - Improving object recognition.
 - Market research.

**MEETING OF DRONE TECHNOLOGY,
REMOTE SENSING AND COMPUTER VISION,
MORE PROJECTS OF THIS KIND ARE
EXPECTED IN THE FUTURE.**

Thank you....

[HOME](#)[PROJECT](#)[CONSORTIUM](#)[GALLERY](#)[DOCUMENTATION](#)[NEWS](#)[CONTACT](#)[LEGAL](#)[LANGUAGE: !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

LITTERDRONE PROJECT

*The **LitterDrone** project seeks to develop innovative tools for the control and management of marine litter through unmanned drones.*

[PROJECT](#)[CONTACT](#)

www.litterdrone.eu