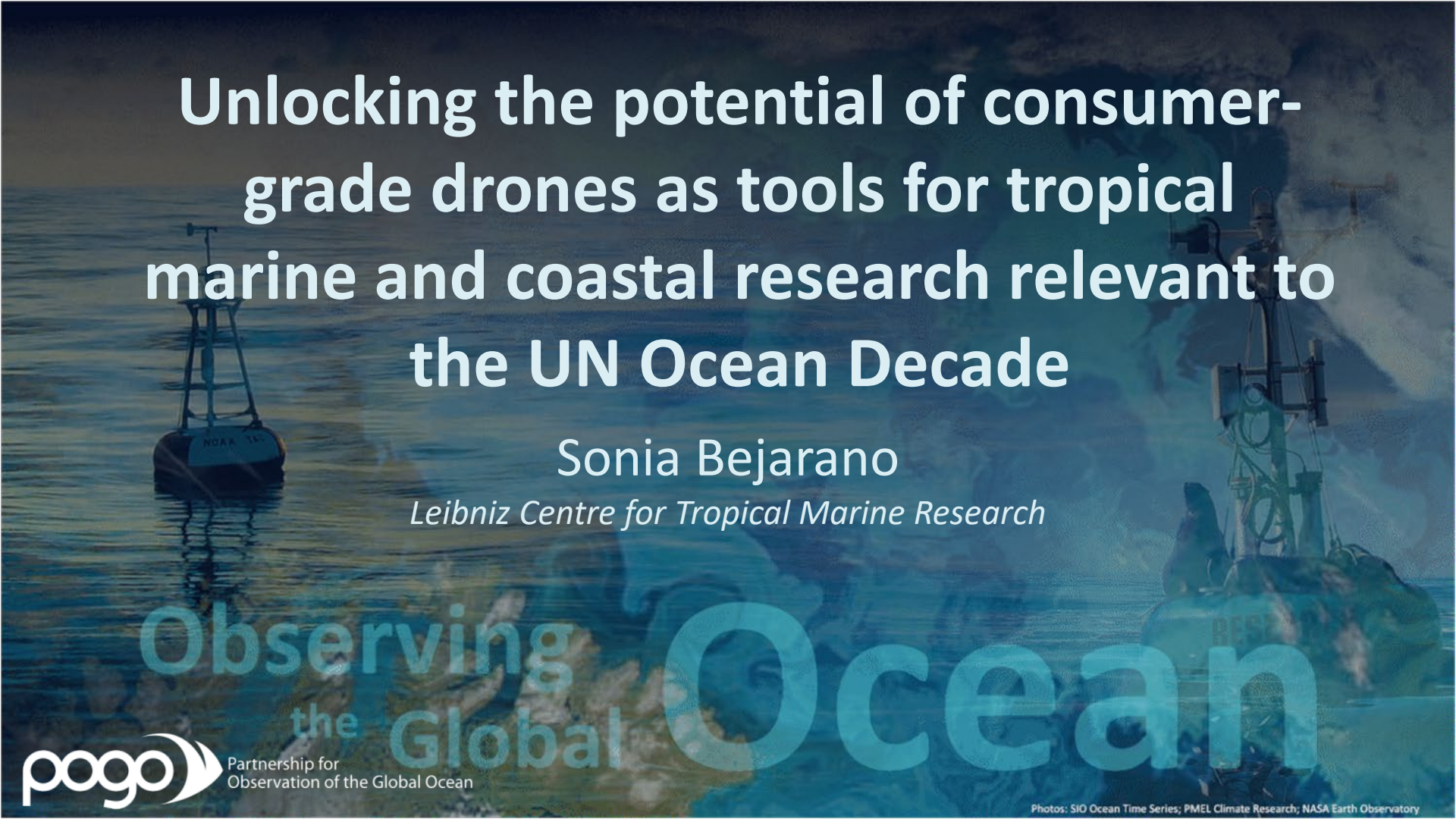
Unlocking the potential of consumer-grade drones as tools for tropical marine and coastal research relevant to the UN Ocean Decade

Sonia Bejarano

Leibniz Centre for Tropical Marine Research



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Photos: SIO Ocean Time Series; PMEL Climate Research; NASA Earth Observatory

Provide a **scientific basis** for the **protection and sustainable use** of tropical coastal ecosystems by conducting **research**, **capacity development** and **consulting** activities in close cooperation with international and national partners.

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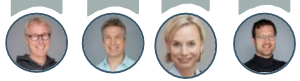
BIOGEOHEMISTRY AND GEOLOGY

- Carbon and nutrient cycling
- Ecological biogeochemistry
- Geoecology and carbonate sedimentology
- Submarine groundwater discharge



ECOLOGY

- Experimental aquaculture
- Fish ecology and evolution
- Reef ecosystems
- Mangrove ecology

SOCIAL SCIENCES

- Institutional and behavioural economics
- Social-ecological systems analysis
- Deliberation, valuation and sustainability

INTEGRATED MODELLING

- Complexity and climate
- Data science and technology
- Spatial ecology and interactions
- Systems ecology

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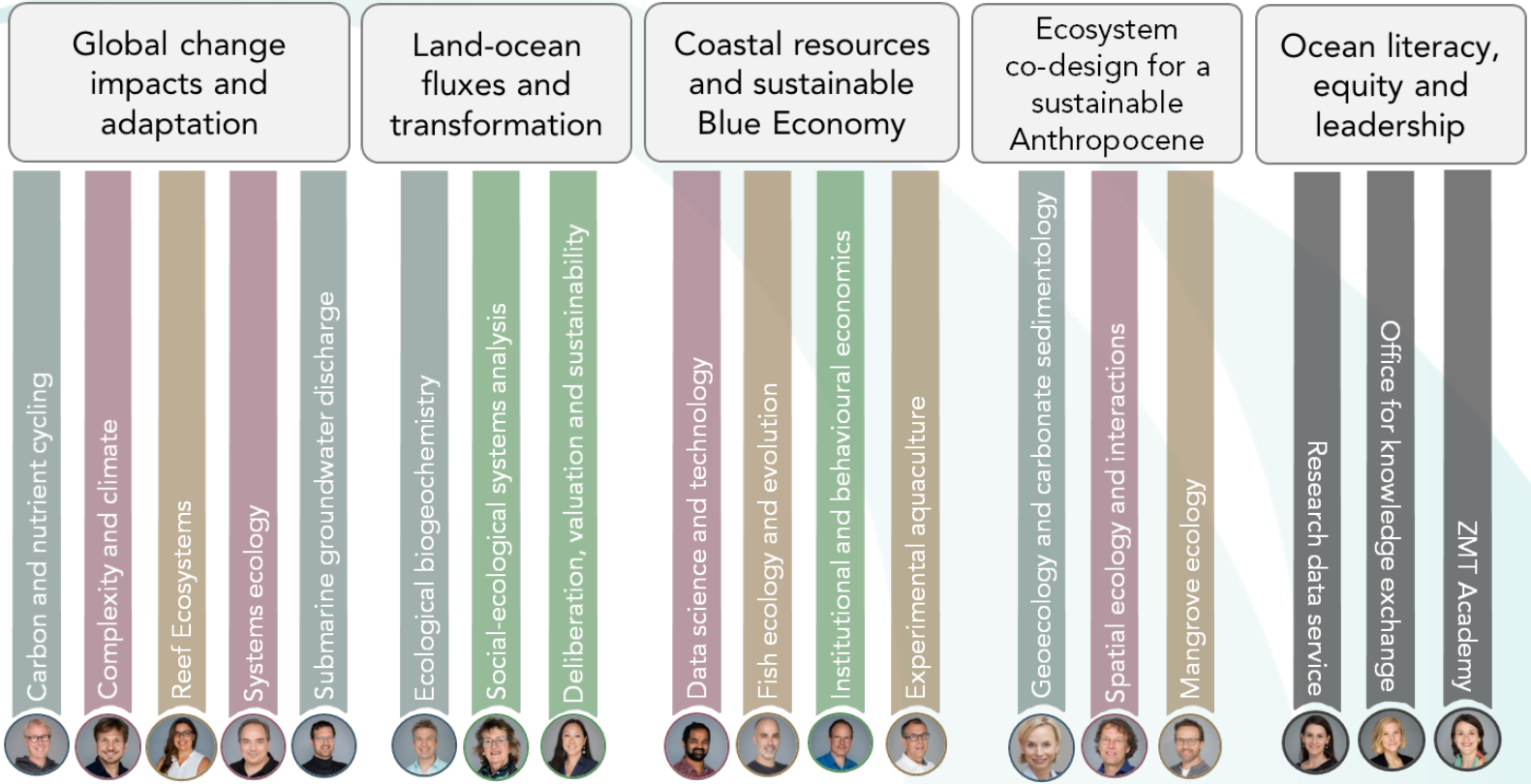

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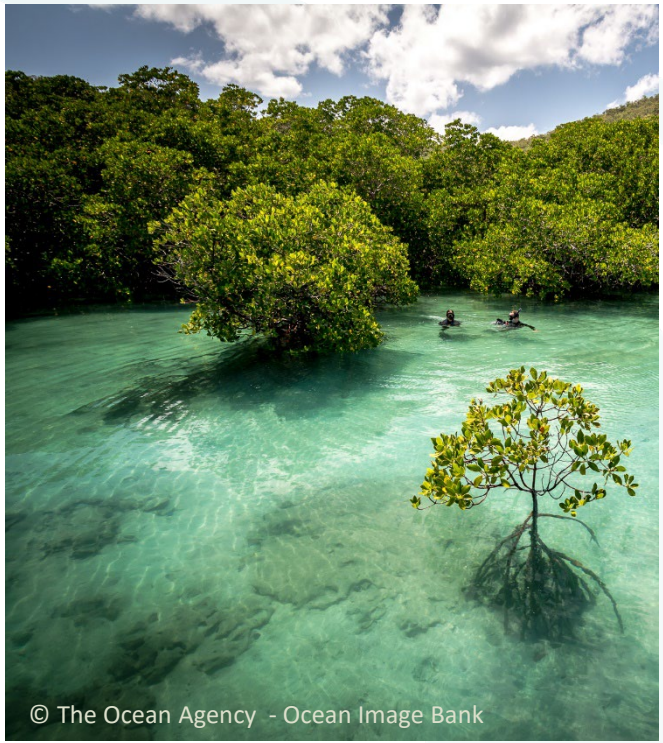

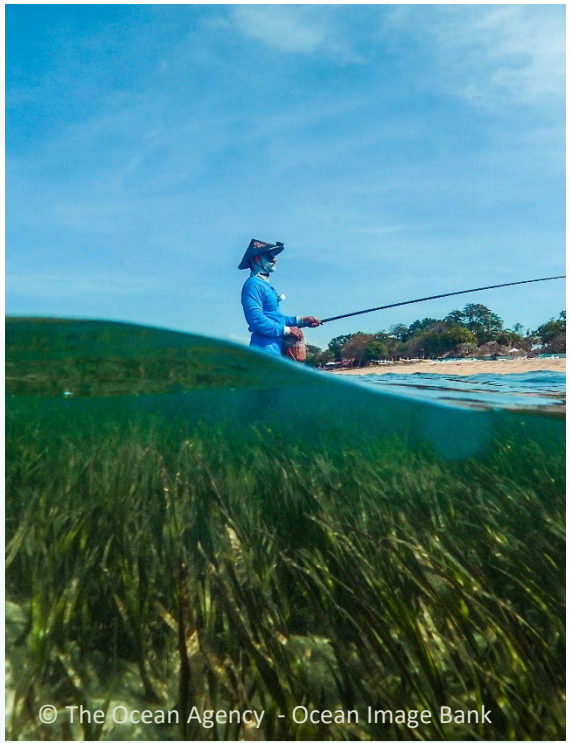

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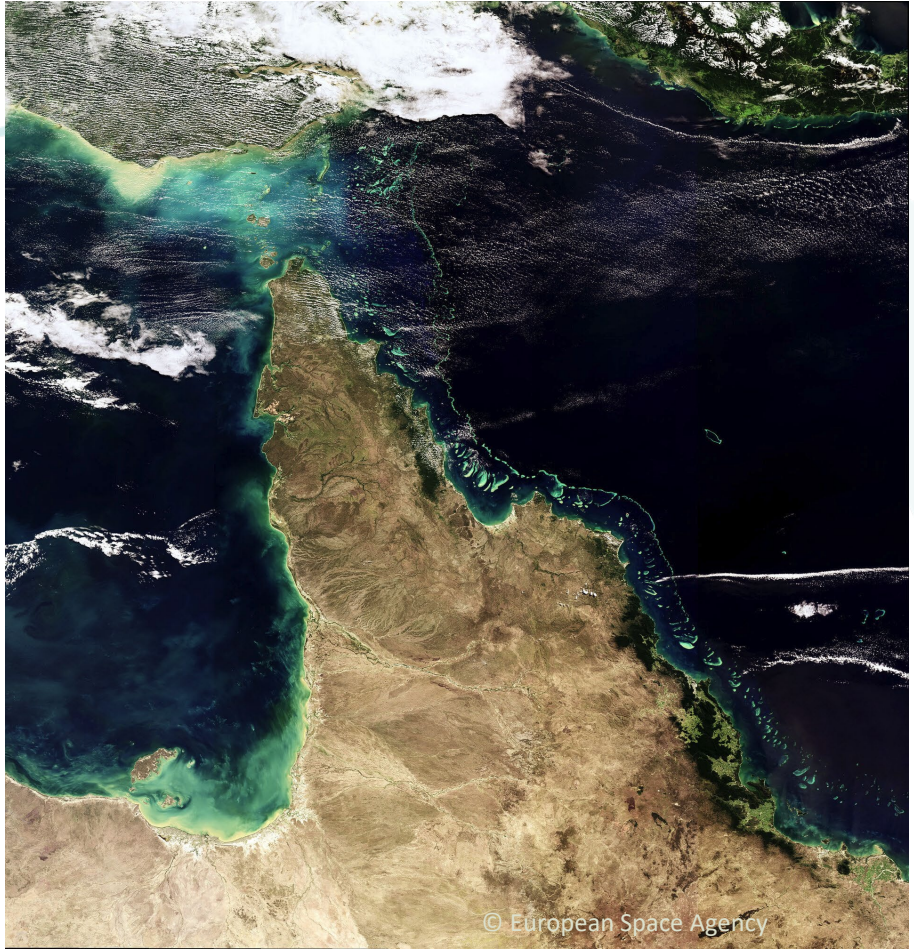

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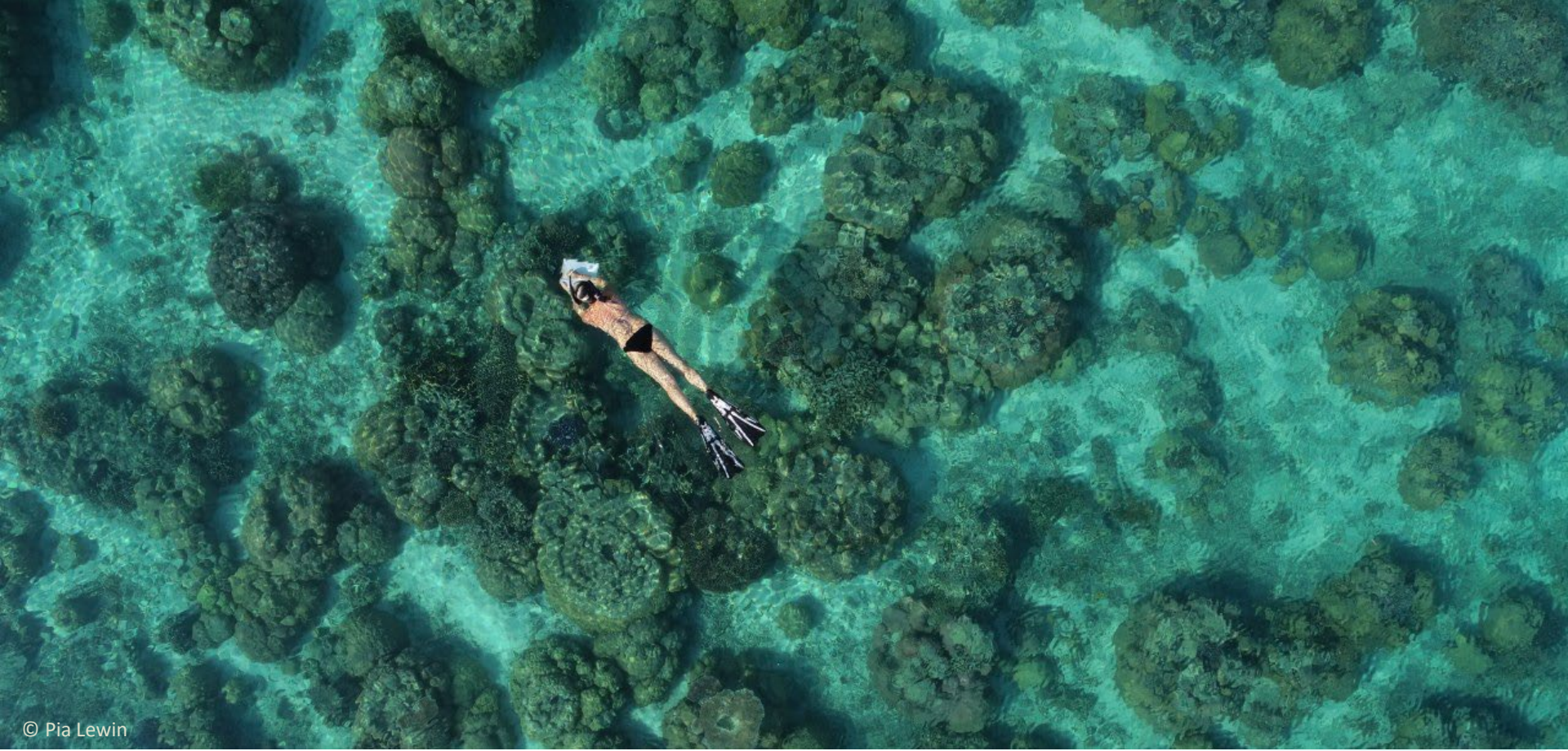

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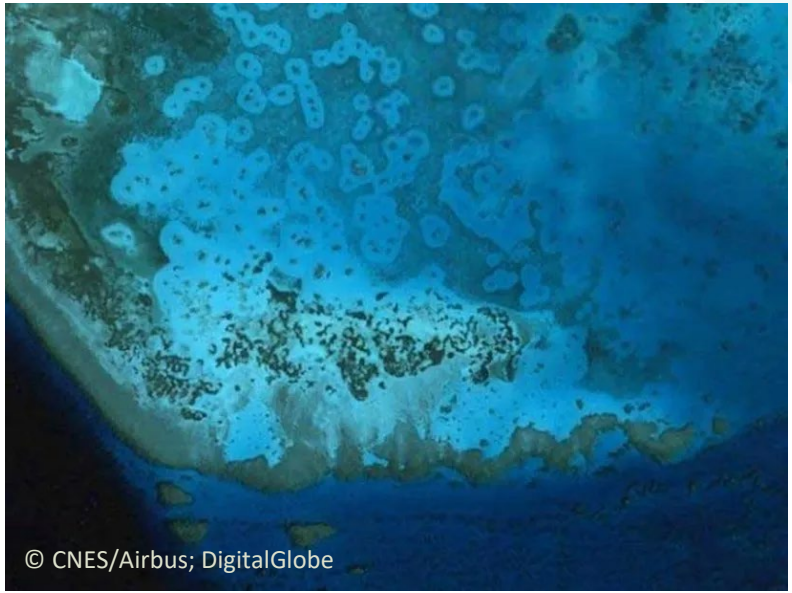

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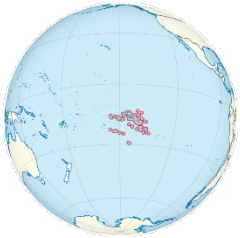

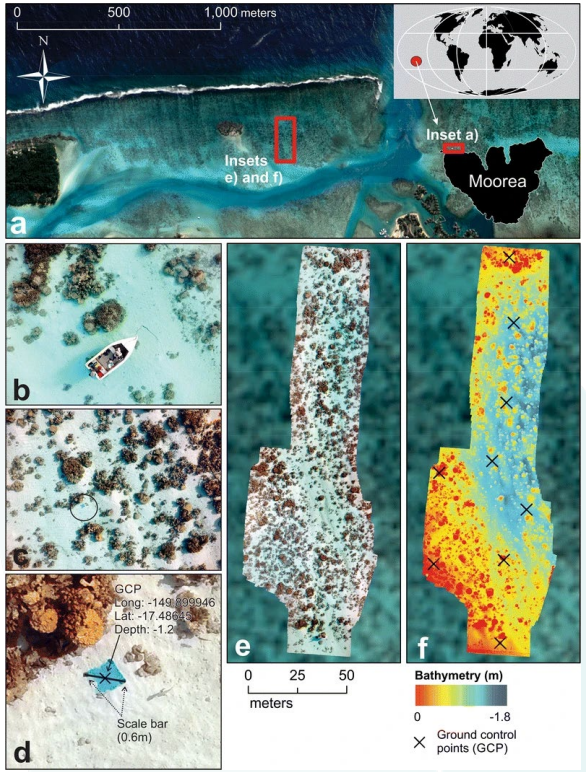

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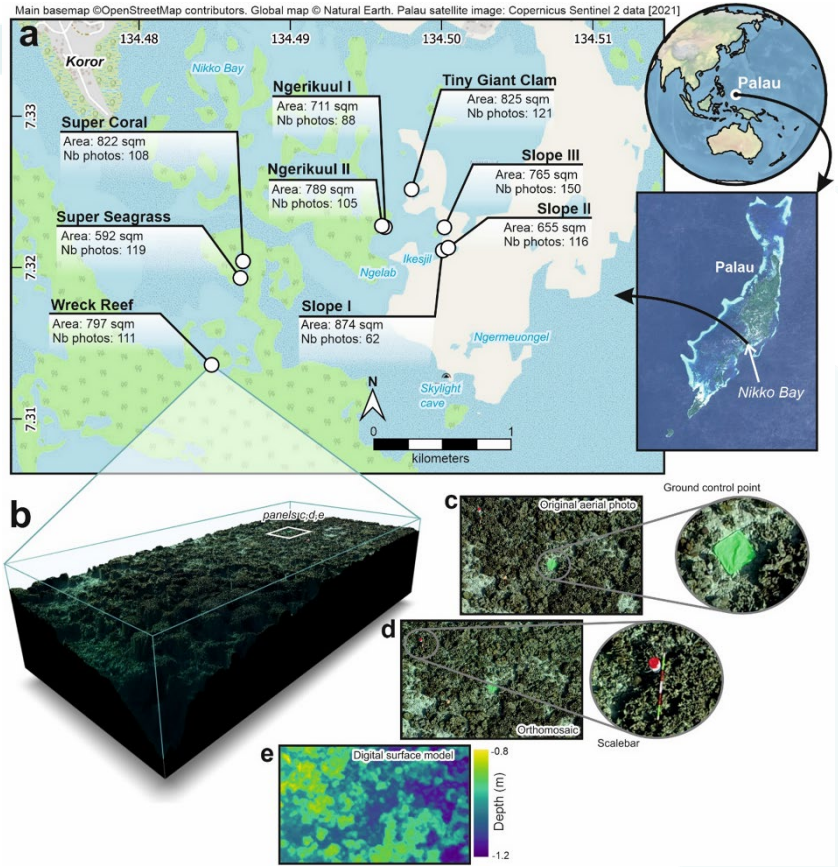

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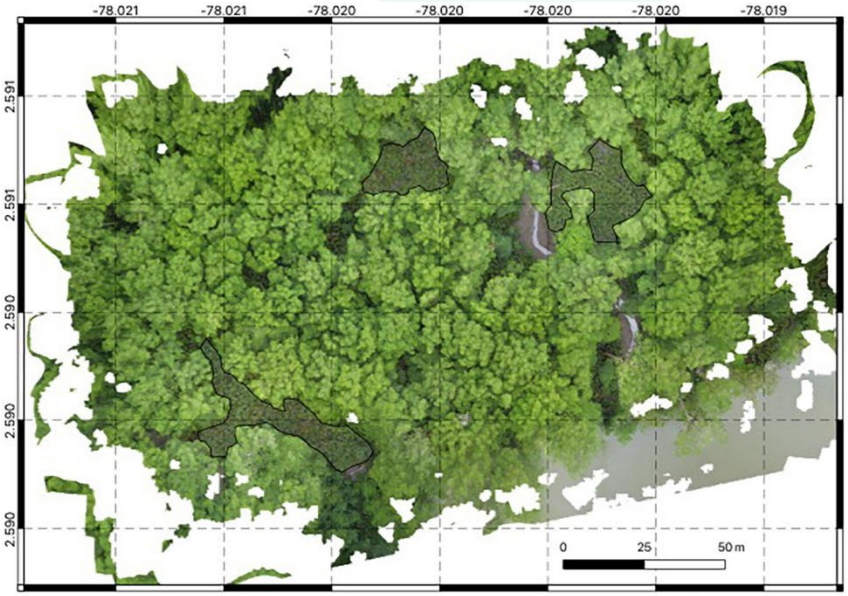

The potential of drones for ecological research is enormous

Drone technology is evolving fast

Drone use regulations are variable and changing

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2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Unlocking the potential of consumer-grade drones in marine research

AUTHOR
Sonia Bejarano

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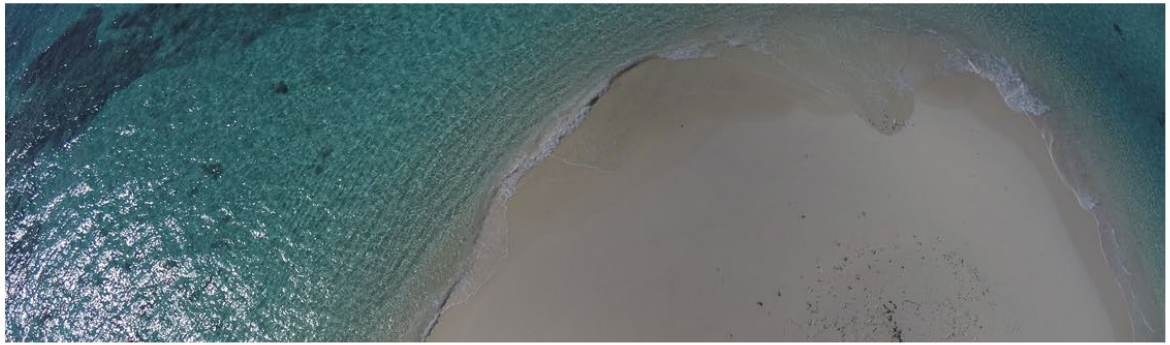

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How are drones used in coastal research?

What drones and capabilities are available now?

What is the current status of drone use legislation?

ZMT LEIBNIZ CENTRE for Tropical Marine Research

cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici

IRD Institut de Recherche pour le Développement FRANCE

invemar

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Presenters from 9 countries

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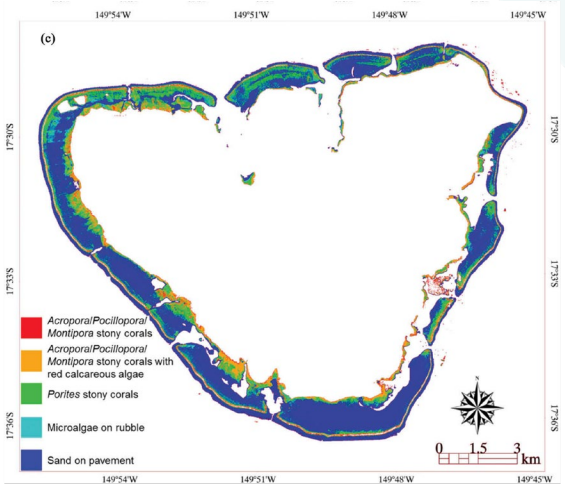
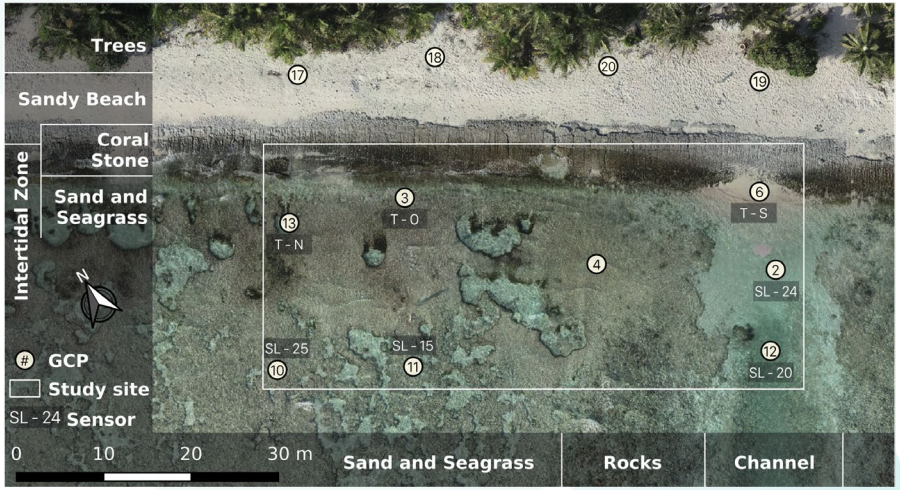
How are drones used in coastal research?

Presentation by Alessio Rovere and Elisa Casella
Ca Foscari University, Italy



Collin et al. (2018) - Int. J. Remote Sensing
(Taylor and Francis - All Rights Reserved)



David et al. (2021) - Coral Reefs
(CC BY 4.0)

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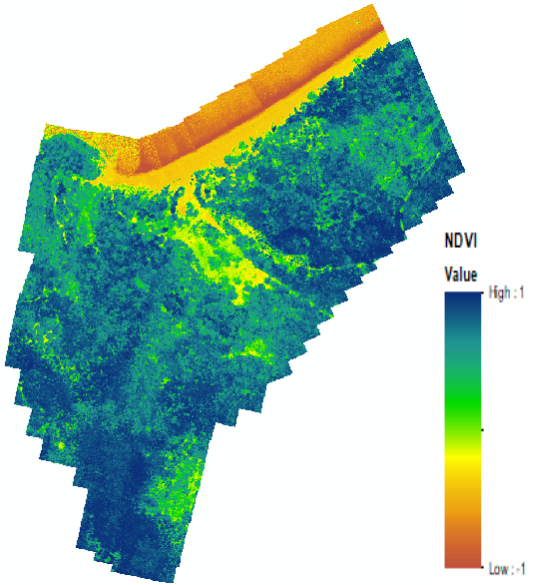
How are drones used in coastal research?

Presentation by Diana Carolina Romero
INVEMAR, Colombia

Orthophotomosaic
Multispectral (UAV)

Generated from 1500 photographs with an 80% horizontal and vertical overlap



Normalized Difference
Vegetation Index - NDVI

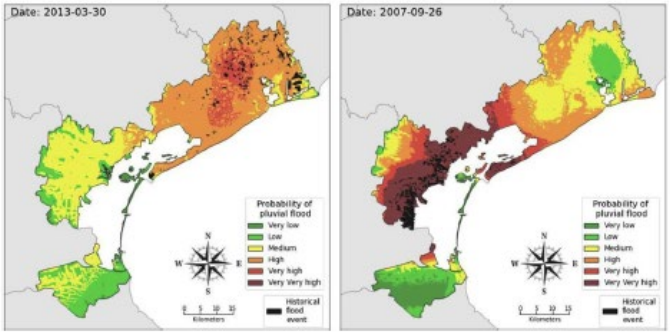
How are drones used in coastal research?

Presentation by Jacopo Furlanetto
CMCC, Italy

Pluvial Flood Risk in coastal areas: a ML approach

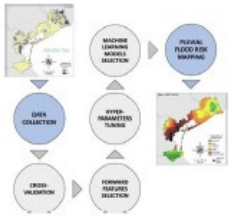
Map of susceptibility to flood risk

Comparison between model predictions and pluvial flood areas for the two historical events



A novel AI-based methodology for **pluvial flood susceptibility**

Topographic, climatic, land use/cover, vegetation data are used as **predictors**



A set of **pluvial flood susceptibility maps** are developed to **support local adaptation processes.**

Marco, Z., Elena, A., Anna, S., Silvia, T., & Andrea, C. (2022). Spatio-temporal cross-validation to predict pluvial flood events in the Metropolitan City of Venice. Journal of Hydrology, 612, 128150.

cmcc

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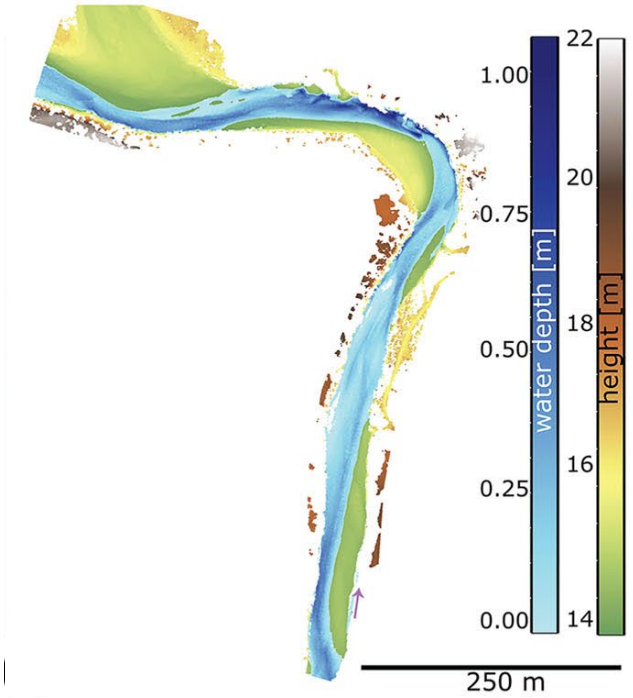
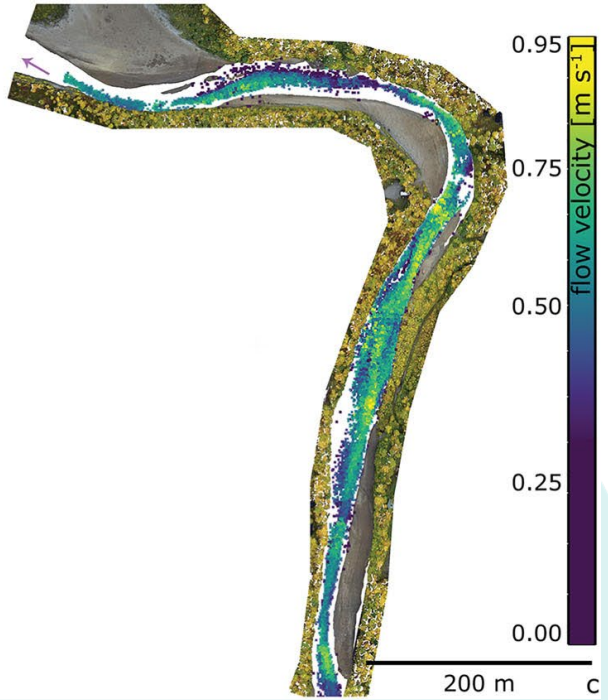
How are drones used in coastal research?

Presentation by Anette Eltner





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How are drones used in coastal research?

Presentation by Luca Fallati
MARHE Centre, Maldives

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What consumer-grade drones are available?

Presentation by Oda Ryggen
Blueye, Norway

blueye

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The ultimate tool for professionals. Quick and user-friendly inspection of your assets below the surface.

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- Excellent **SUPPORT**
- Multiple spectators **OBSERVER APP**
- Depth **1000 FT**
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- 1x **GUEST PORT**

More technical details | See all products

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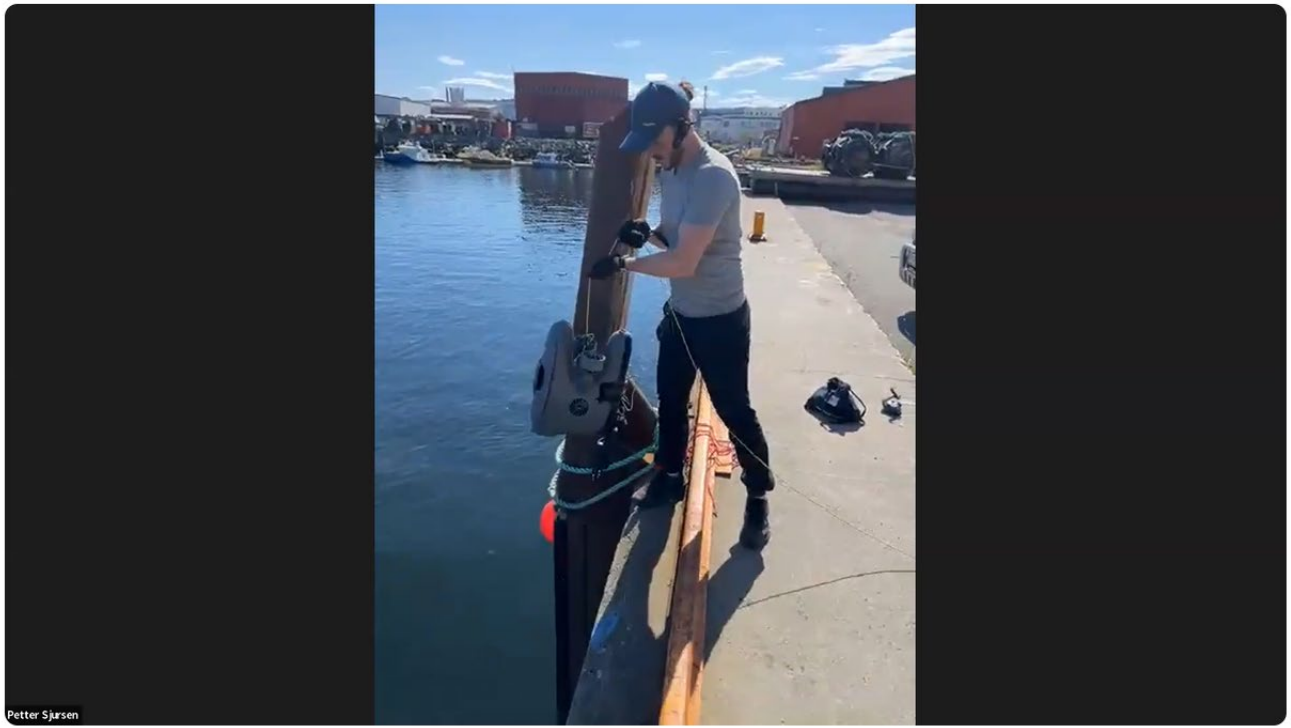
What consumer-grade drones are available?

Presentation by Oda Ryggen
Blueye, Norway



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What consumer-grade drones are available?

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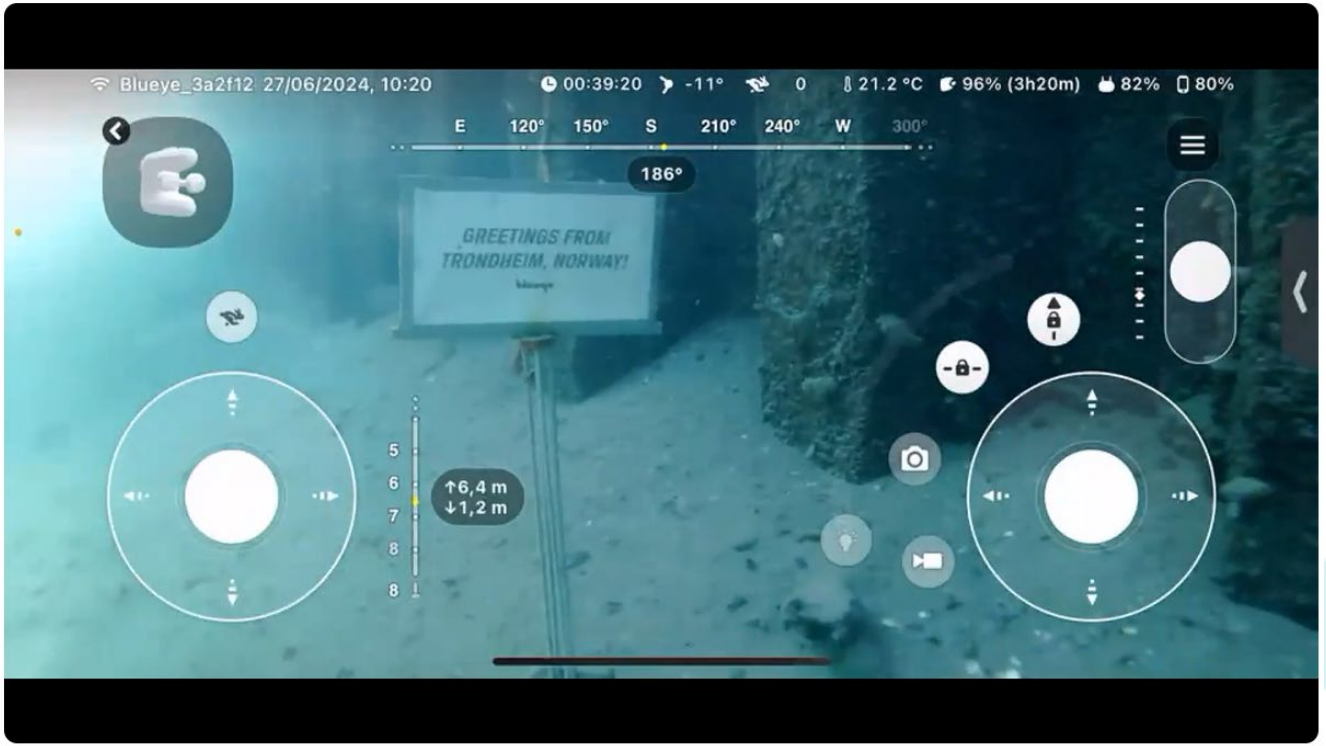
Blueye, Norway



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What consumer-grade drones are available?

Frank Lehmann
OptoPrecision, Germany

Opto Precision

OPTOPRECISION AIRBORNE SYSTEMS

AIRBORNE LONG RANGE LONG ENDURANCE VERTICAL TAKE OFF SYSTEM

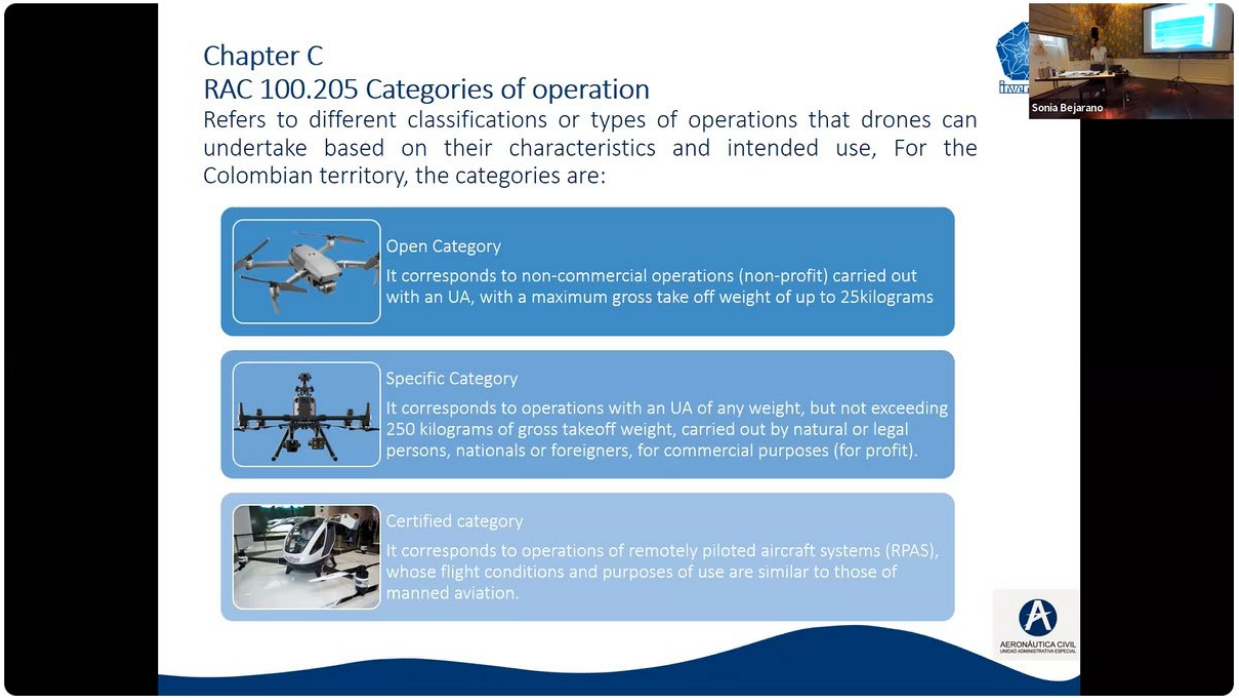
- VERTICAL TAKE OFF AND LANDING
- OPERATION WITH (CAR/CONTAINER) OR WITHOUT GROUND LOGISTICS
- SPAN 4,0M, TAKE OF WEIGHT 75KG
- LOAD VOLUME 75L, 12KG MAX
- ENDURANCE UP TO 6H, 600KM RANGE
- ANTI ICING
- 100KM/H OPT. MAPPING SPEED
- UP TO 7KM FLIGHT ALTITUDE

- PAYLOAD (OPTIONAL):
- CAMERASYSTEMS VIS,NIR, SWIR, THERMAL
- 3D MAPPING
- LASER RANGE FINDER
- RELAY NETWORK SUPPORT
- FIRE AND GAS DETECTION
- GAS SENSORS SO2,CO2, NOX, METHAN, PARTICELS
- VULCANIC GASES AND RADIOACTIVE PARTICLES
- DEPLOYMENT OF GROUND AND MATITIME PROBES


COPTERUNI
Deine PREMIUM
Drohnenflugschule
Hilfe / Help?

Current drone-use legislation

Presentation by Diana Carolina Romero
INVEMAR, Colombia



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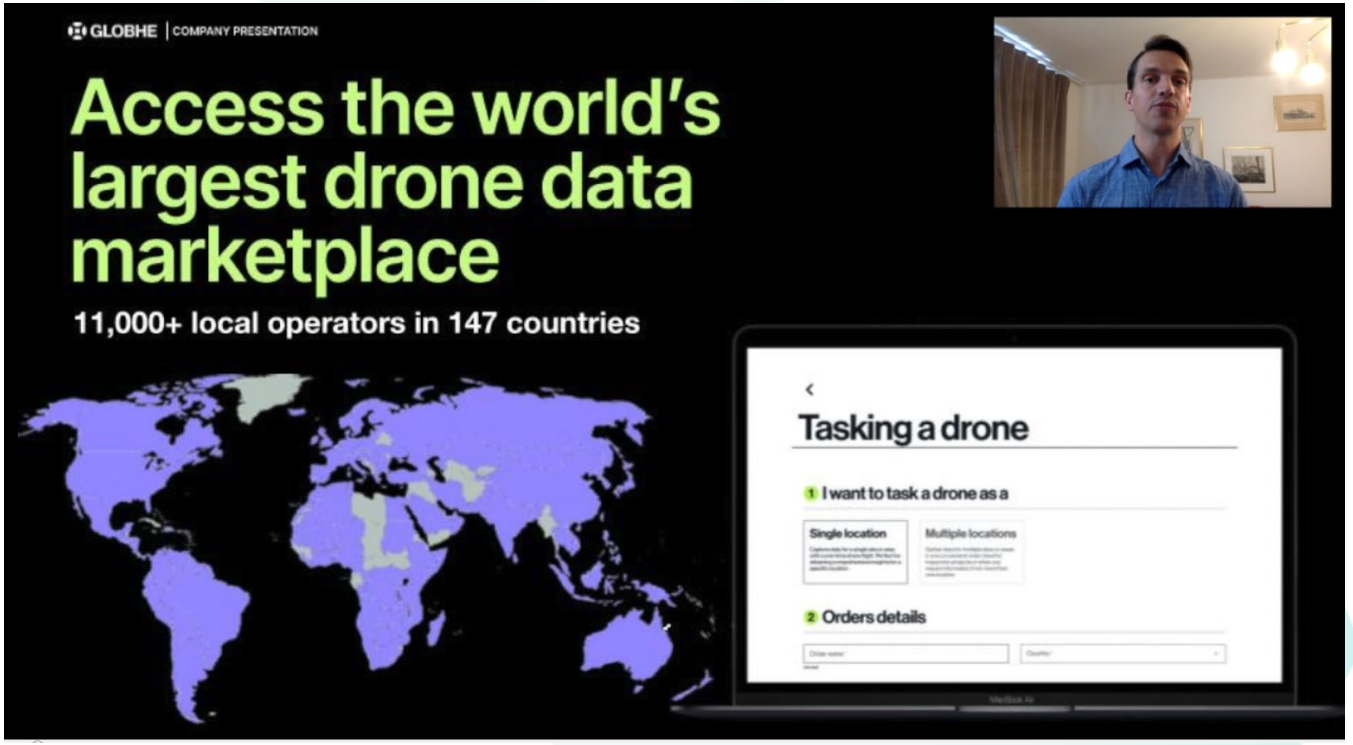
Current drone-use legislation

Presentation by Diana Carolina Romero
INVEMAR, Colombia



Partnership for Observation of the Global Ocean

Protect and restore ecosystems and biodiversity

Unlock ocean-based solutions to climate change

Increase community resilience to ocean hazards

Sustainably expand the global ocean observing system

Create a digital representation of the ocean

What next?

GeoNadir

@GeoNadir · 867 subscribers · 57 videos

We help people capture the best possible drone mapping data to s

twitter.com/GeoNadirAu and 4 more links

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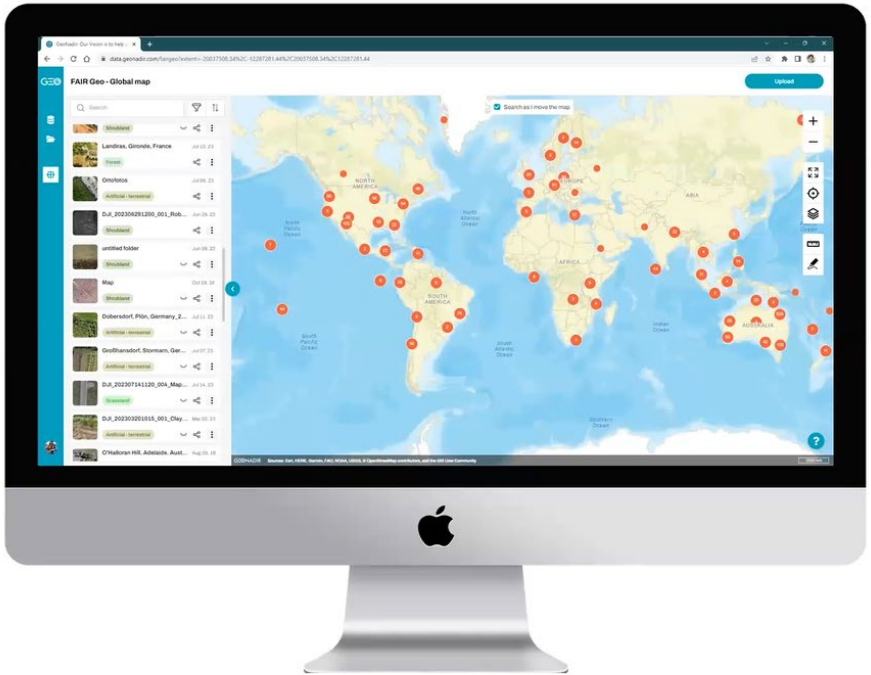

Our global repository now hosts >1.8M drone mapping images from 80 countries, with 9.5K users

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What next?

- *The potential of drones is superior to other imaging tools*
- *Standardising data collection methods*
- *Achieving the best possible metadata documentation*
- *Improving data accessibility, reusability, and integration across disciplines*
- *More and better financial and government support*
- *Towards a globally-coordinated observation system*

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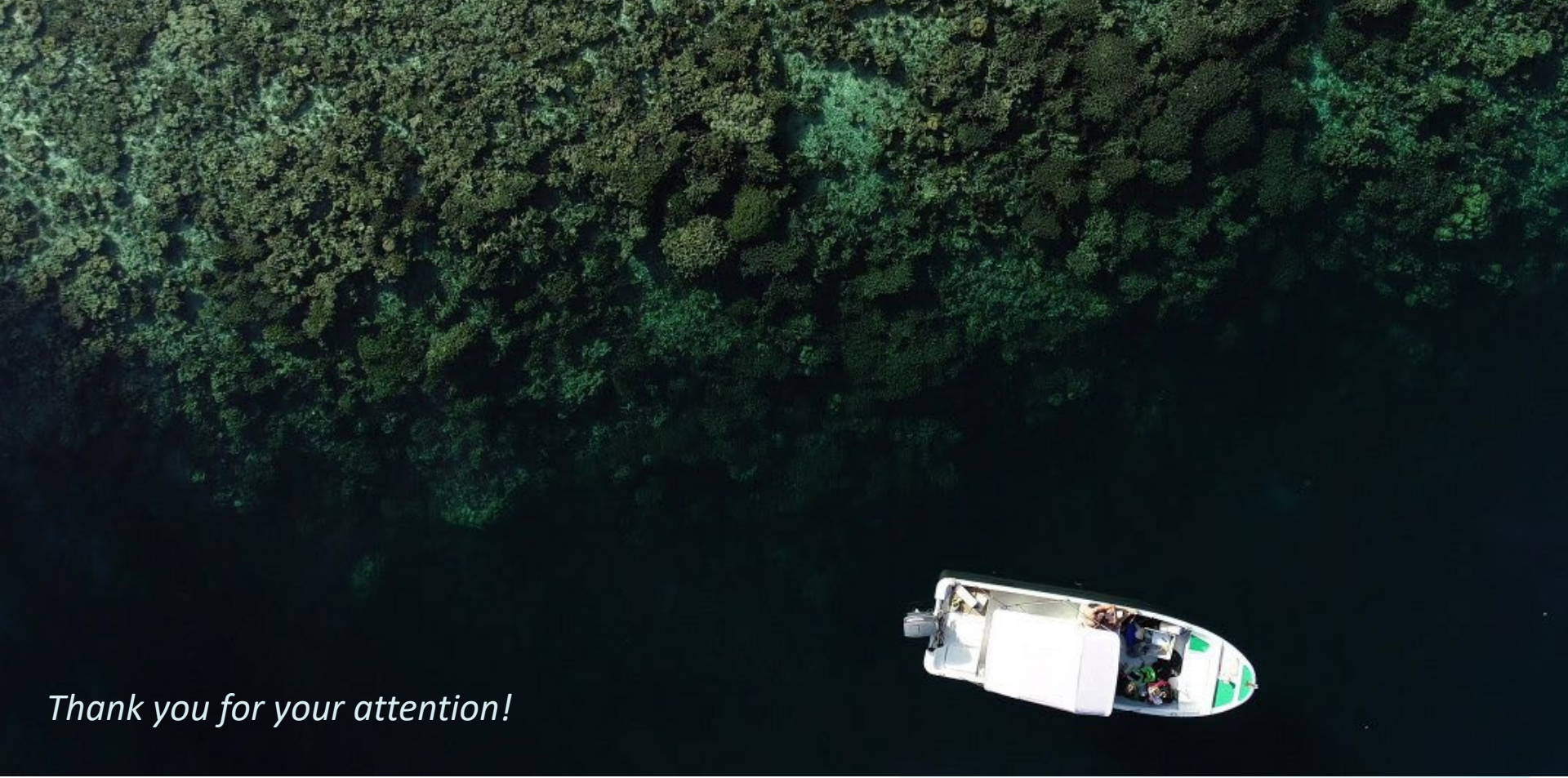

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