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UNIVERSITY OF LISBON  
INTERDISCIPLINARY STUDIES  
ON SUSTAINABLE ENVIRONMENT AND SEAS



University Network for Innovation,  
Technology and Engineering

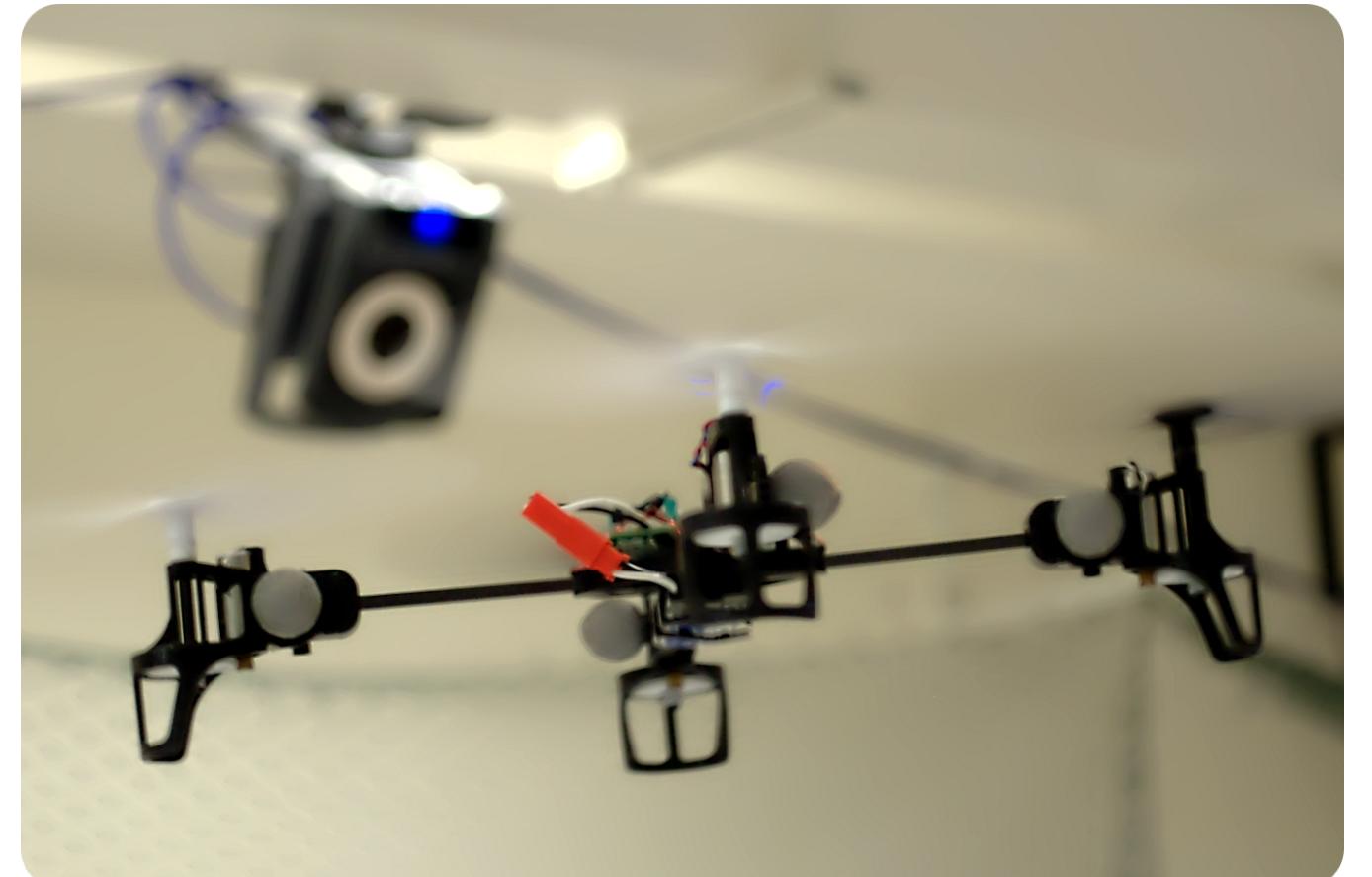


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# Aerial Vehicles for missions at sea



Rita Cunha

Lisboa, May 2020



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# Why focus on drones for applications at sea?

## Bird's eye view

- Quick access to remote and difficult to reach places

## Lower cost and less risk

- Perform dangerous, dirty, and dull tasks

## Technology maturity

- Enabling sensor suites



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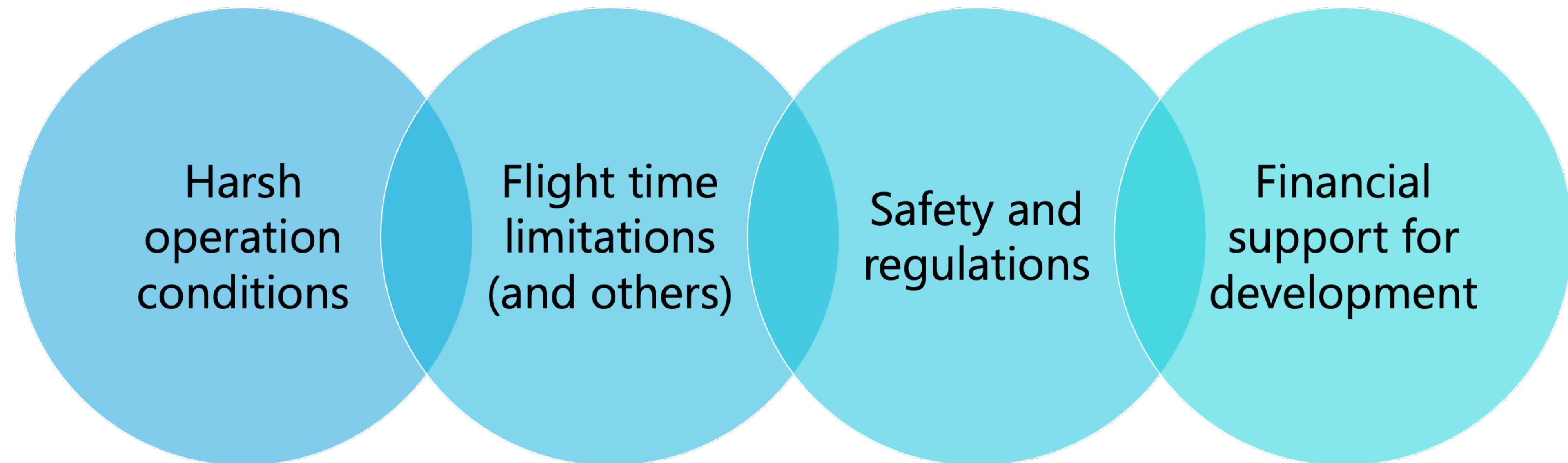
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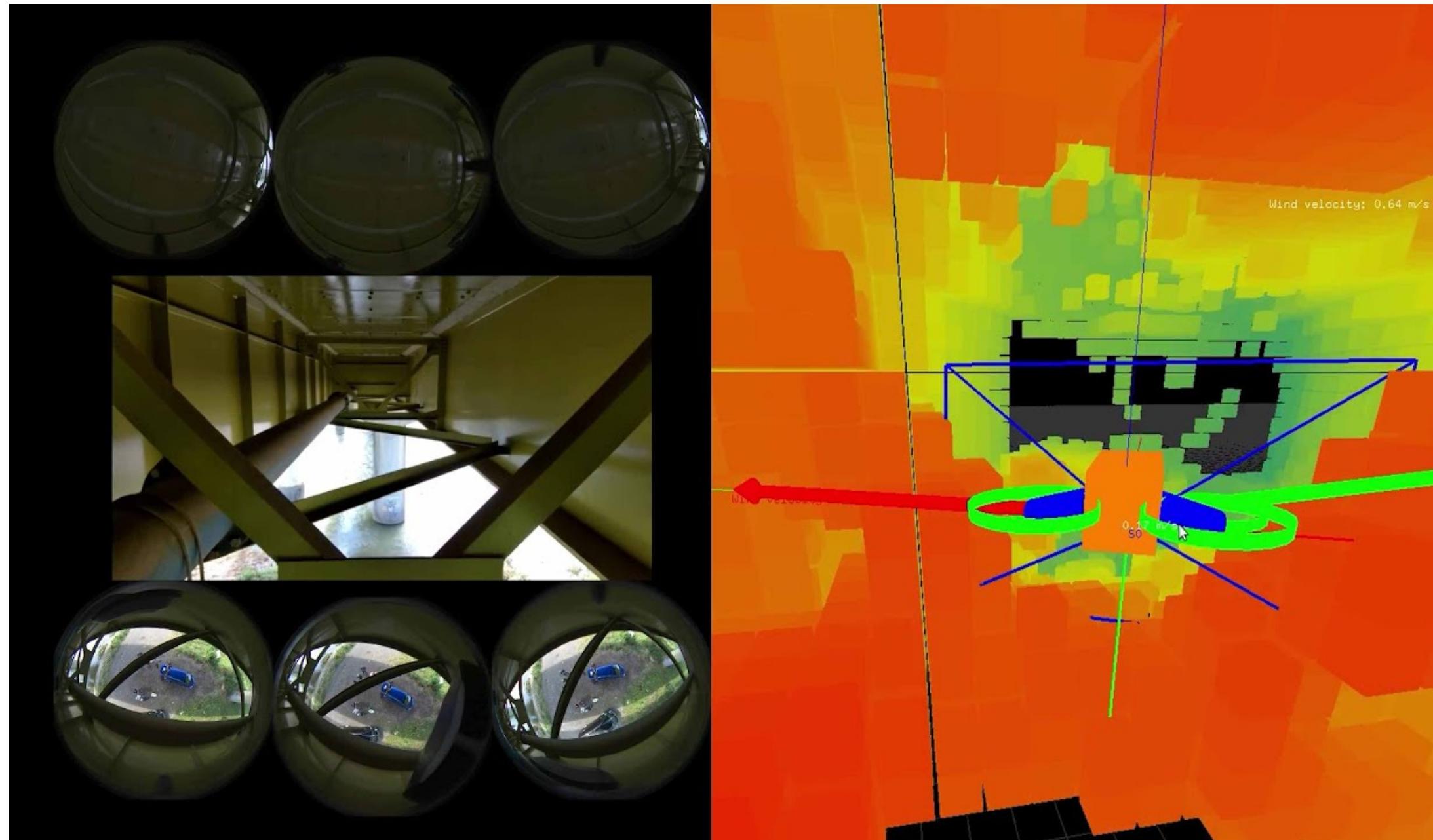
# Challenges to overcome - missions at sea



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# Applications



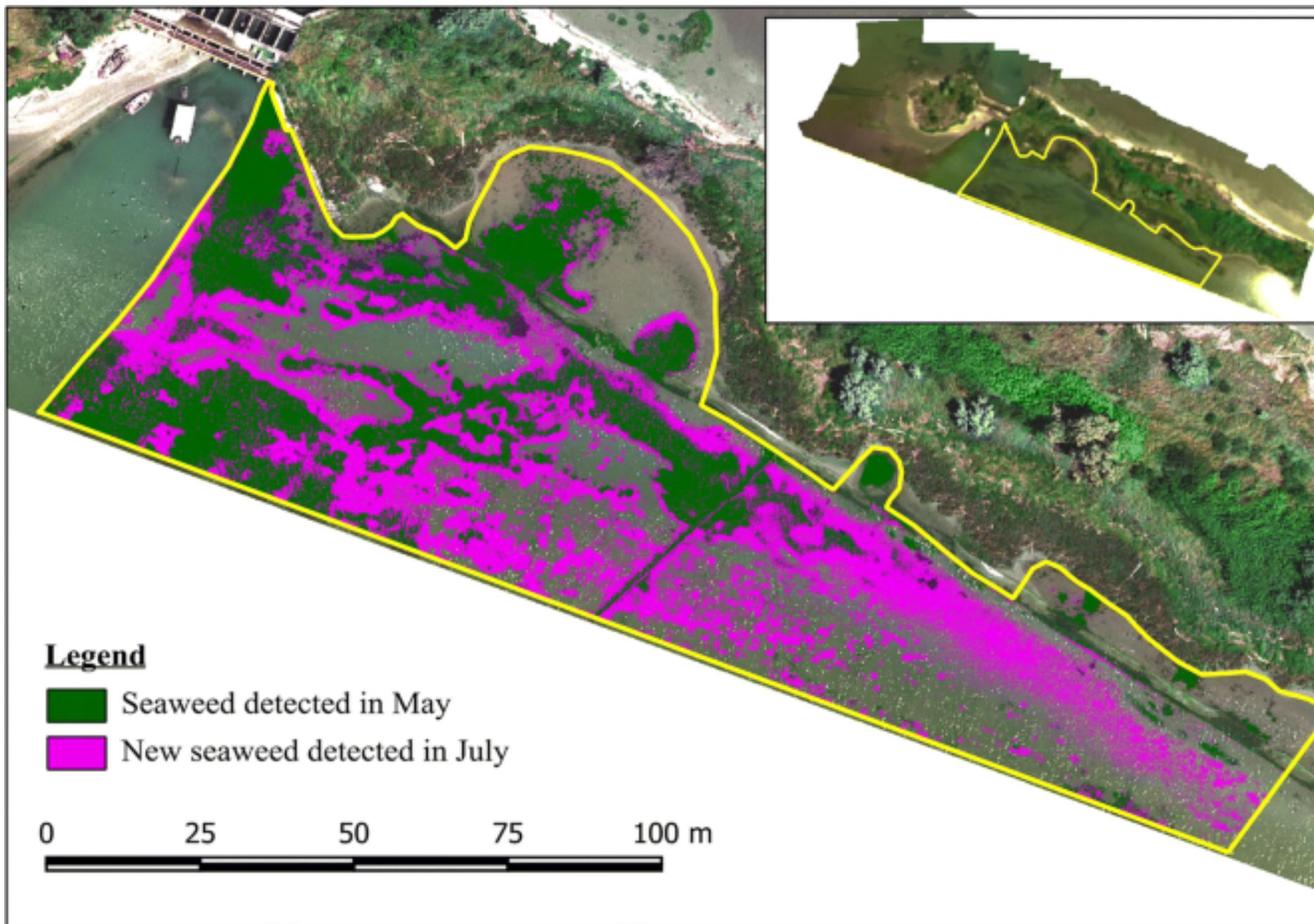
Inspection and mapping  
(Skydio)

More info:  
<https://www.youtube.com/watch?v=ncZmnfIRIWE>



Smoke plume monitoring  
(Nordic Unmanned)

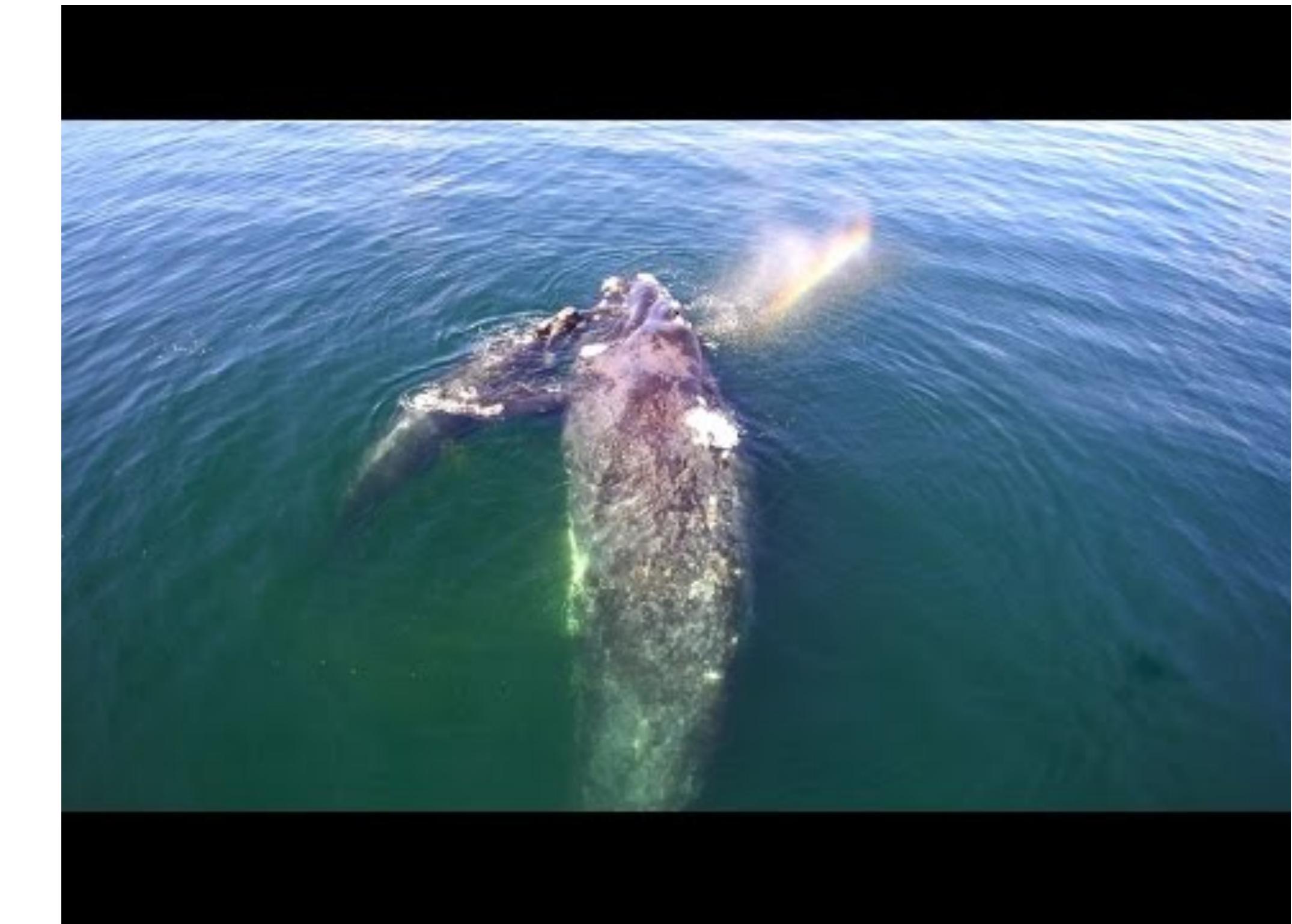
# Applications



## Multispectral monitoring of algal bloom

More info:

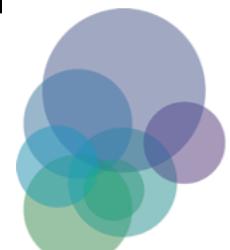
Taddia, Y., Russo, P., Lovo, S. *et al.* Multispectral UAV monitoring of submerged seaweed in shallow water. *Applied Geomatics* 12, 19–34 (2020)



## Study of marine species (Snotbot)

More info:

<https://www.parley.tv/#fortheoceans>



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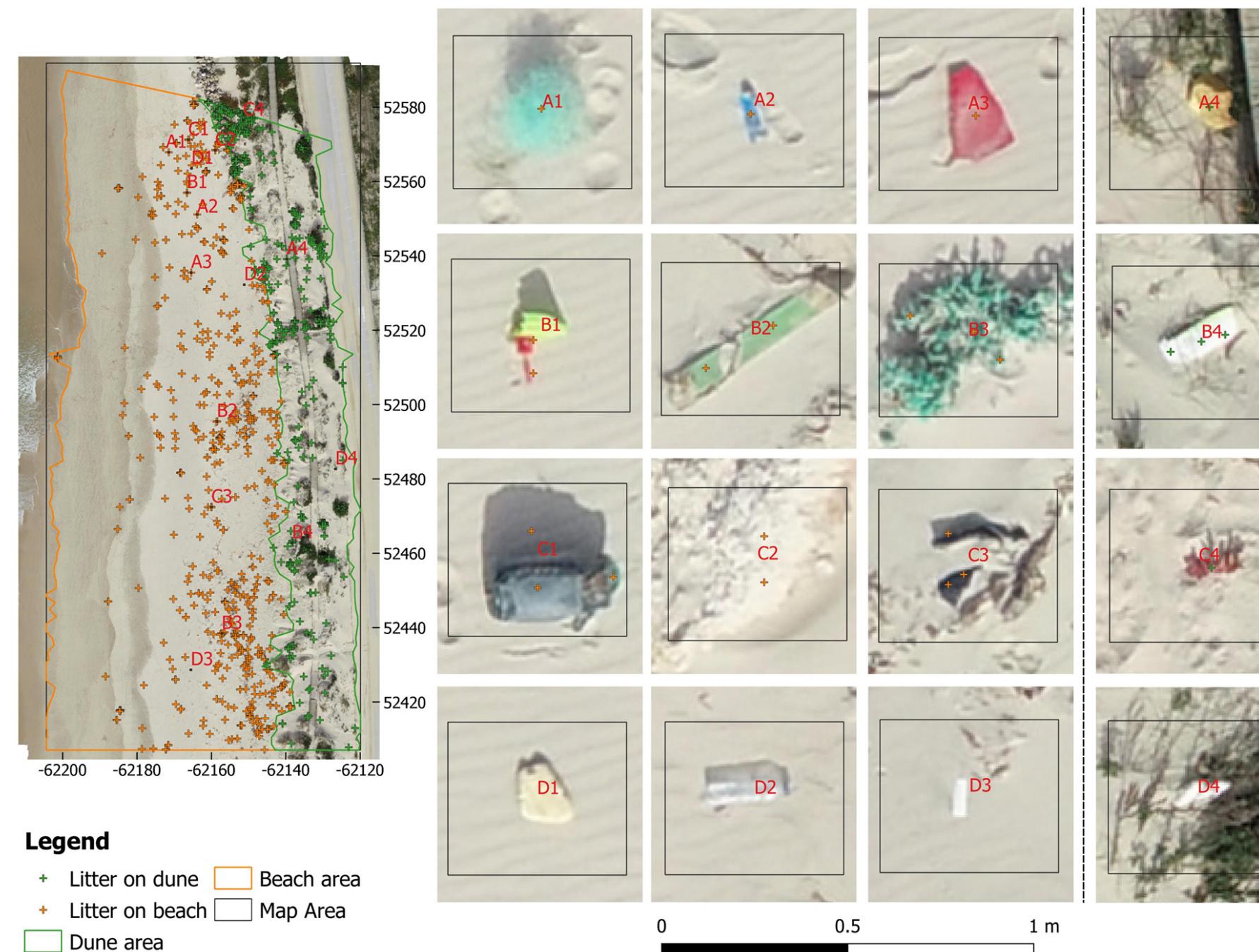
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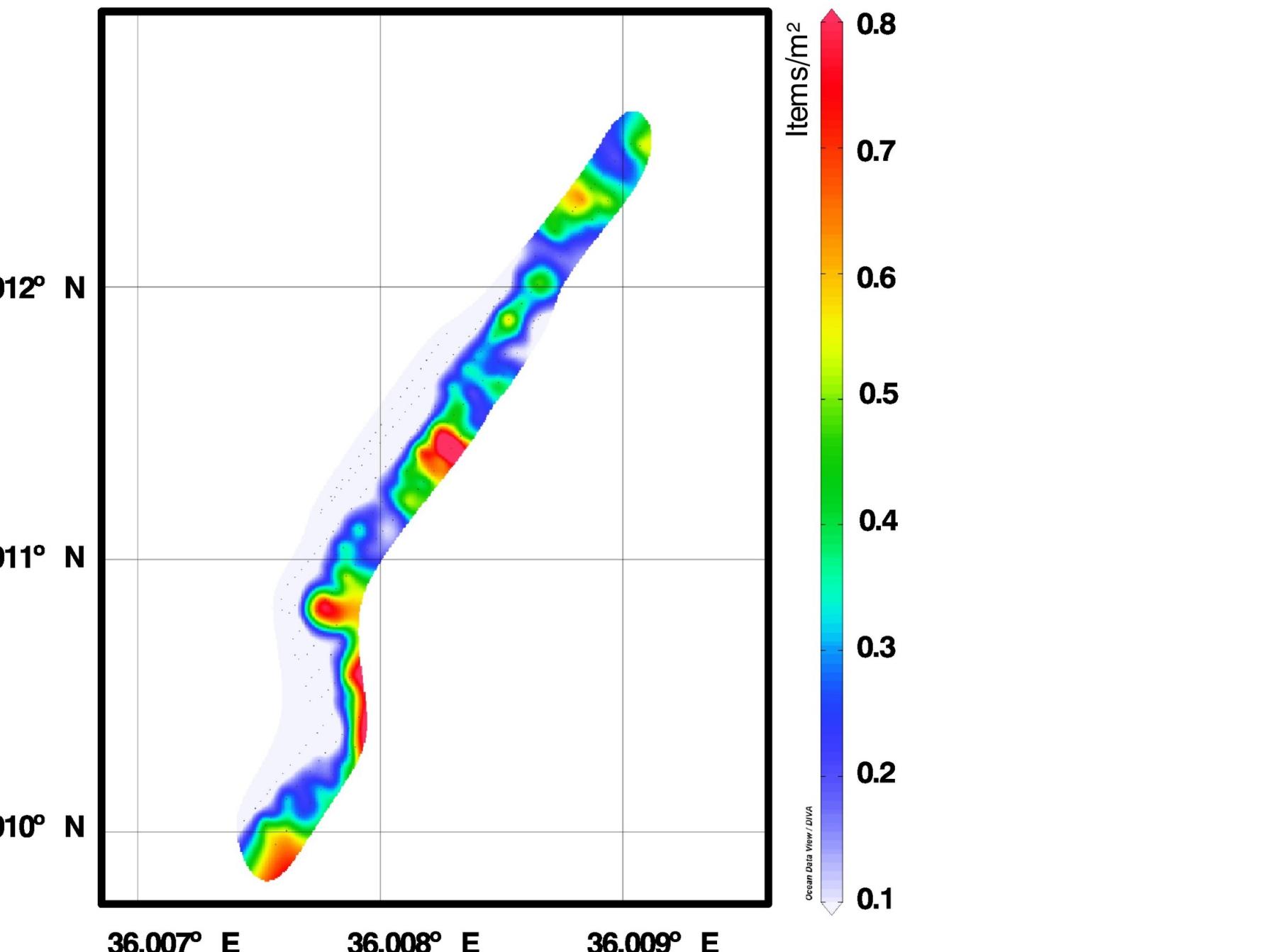
# Applications



Detection, identification, and mapping of marine litter

G. Gonçalves et al., Mapping marine litter using UAS on a beach-dune system: a multidisciplinary approach, *Science of The Total Environment*, 2020.

C. Martin et al., Use of unmanned aerial vehicles for efficient beach litter monitoring, *Marine Pollution Bulletin*, 2018.



Litter density map (litter objects per m<sup>2</sup>)

# Drones on the news



Global News, Mar. 2021  
Iceland Volcano near Reykjavik



Forbes, Mar. 2021  
Self-flying drones are helping speed deliveries of COVID-19 vaccines in Ghana

# The quadrotor as a control system

