

Spatially Explicit Seagrass Extent Mapping Across the Entire Mediterranean

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On behalf of:

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Wissen für Morgen

Aims

Commercialization of Cloud-native service for Seagrass Extent and Carbon Stock Mapping

Methods and Applications:

Cloud-native, Scalable and Operational Seascape Mapping



Nature-based Solution for Climate Change Mitigation



Sustainable Development Goals

100 million

Seagrasses provide coastal protection to more than 100 million people.

Seagrasses reduce wave strength and protect the coast from erosion.

159

The countries which have seagrasses in their coastal extent.

350,000 km²

The approximate total global seagrass extent, almost the size of Germany.

25-50%

Reduction of Tidal Height

CO₂

18%

The amount of the annual oceanic carbon sequestered by seagrasses.

This number is 29% more than the annual carbon emissions of the whole cruise ship industry.

20%

The percentage of global fisheries supported by seagrasses.

50%

The reduction of marine pathogenic bacteria by seagrasses.

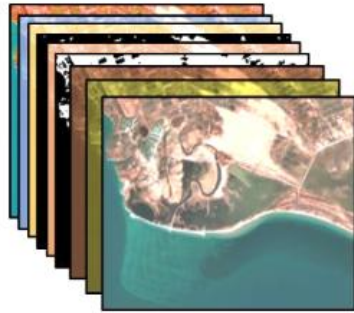
Seagrasses reduce exposure to bacterial pathogens known to cause diseases in both humans and marine organisms.



EO-driven coastal ecosystem accounting

Powerful Cloud computing
Google Earth Engine

TB-scale satellite data analytics
(Sentinel-2, PlanetScope NICFI)



Machine Learning

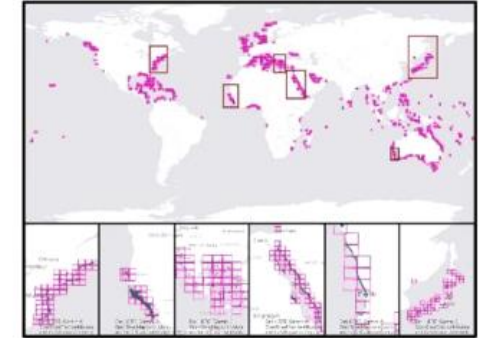


Big reference data



**GLOBAL
SEAGRASS
WATCH**
serverless is more

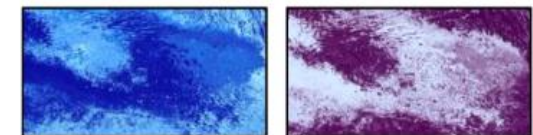
Spatially-explicit
seagrass ecosystem extent



Spatially-explicit
seagrass ecosystem condition & services



Per-pixel
probabilities & uncertainties



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Open Access Technical Note

Towards Global-Scale Seagrass Mapping and Monitoring Using Sentinel-2 on Google Earth Engine: The Case Study of the Aegean and Ionian Seas

by Dimosthenis Traganos, Bharat Aggarwal, Dimitris Poursanidis, Konstantinos Topouzelis, Nektarios Chrysoulakis, and Peter Reinartz

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sentinel-2

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JOURNALS

Remote Sens. 2018, 10(8),

Received: 29 June 2018 /

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Earth observation for ecosystem accounting: spatially explicit national seagrass extent and carbon stock in Kenya, Tanzania, Mozambique and Madagascar

Abstract

Seagrasses are traversing t invaluable ecosystem servic Here, we combine the cloud multispectral image archive workflow for large-scale, hig be easily tuned to space, seagrasses in an area of 41

Dimosthenis Traganos, Avi Putri Pertiwi, Chengfa Benjamin Lee, Alina Blume, Dimitris Poursanidis, Aurelie Shapiro



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SECTIONS

Abstract

ORIGINAL RESEARCH article

Front. Mar. Sci., 22 July 2022 Sec. Global Change and the Future Ocean https://doi.org/10.3389/fmars.2022.871799

This article is part of the Research Topic Blue Carbon: Beyond the Inventory View all 14 Articles >

Spatially Explicit Seagrass Extent Mapping Across the Entire Mediterranean

- Dimosthenis Traganos^{1*}, Chengfa Benjamin Lee¹, Alina Blume¹, Dimitris Poursanidis², Hrvoje Čizmek³, Julie Deter^{4,5}, Vesna Mačić⁶, Monica Montefalcone⁷, Gérard Pergent⁸, Christine Pergent-Martini⁹, Aurora M. Ricart^{9,10} and Peter Reinartz¹¹

¹ German Aerospace Center (DLR), Remote Sensing Technology Institute, Berlin, Germany

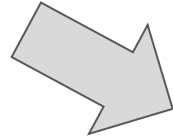


Publication



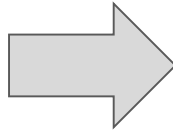
279,186

Sentinel-2 satellite images
(2015-2019)



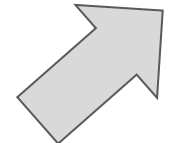
62,928

Human-labelled
training dataset



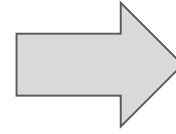
2,480

Independent, field-based
validation dataset



Google Earth Engine

Pre-processing
(incl. Atm corr & masking)
Classification
(Random Forest)

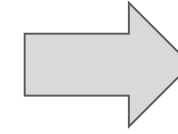


19,020 km²

P. oceanica meadows
(up to 25 m in depth)

56,783 km²

Total seabed area
(up to 25 m in depth)



**Estimated
Tier 1 & 2 Blue
Carbon Stocks**
for 22 Mediterranean
countries

72%

Map Overall Accuracy

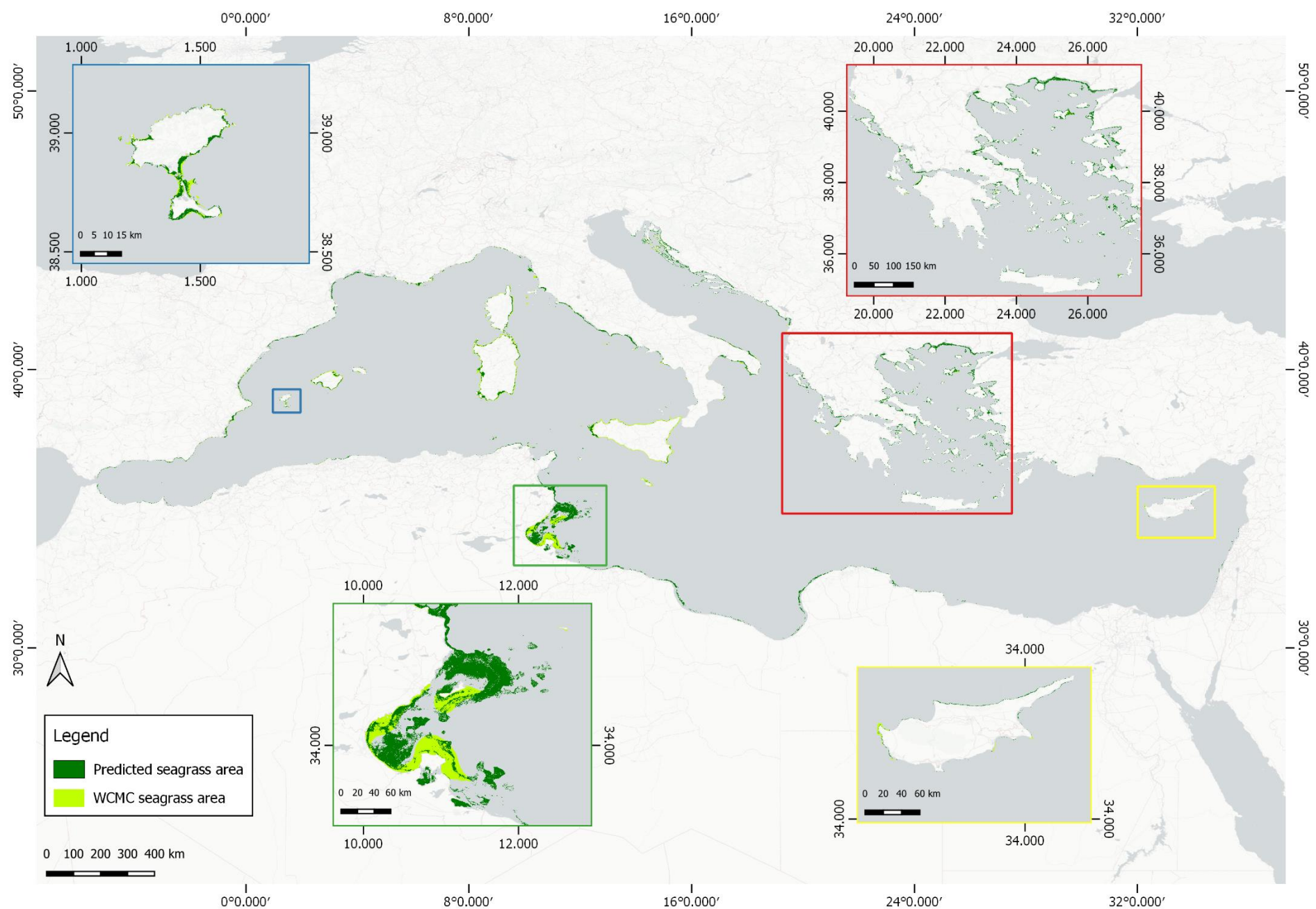


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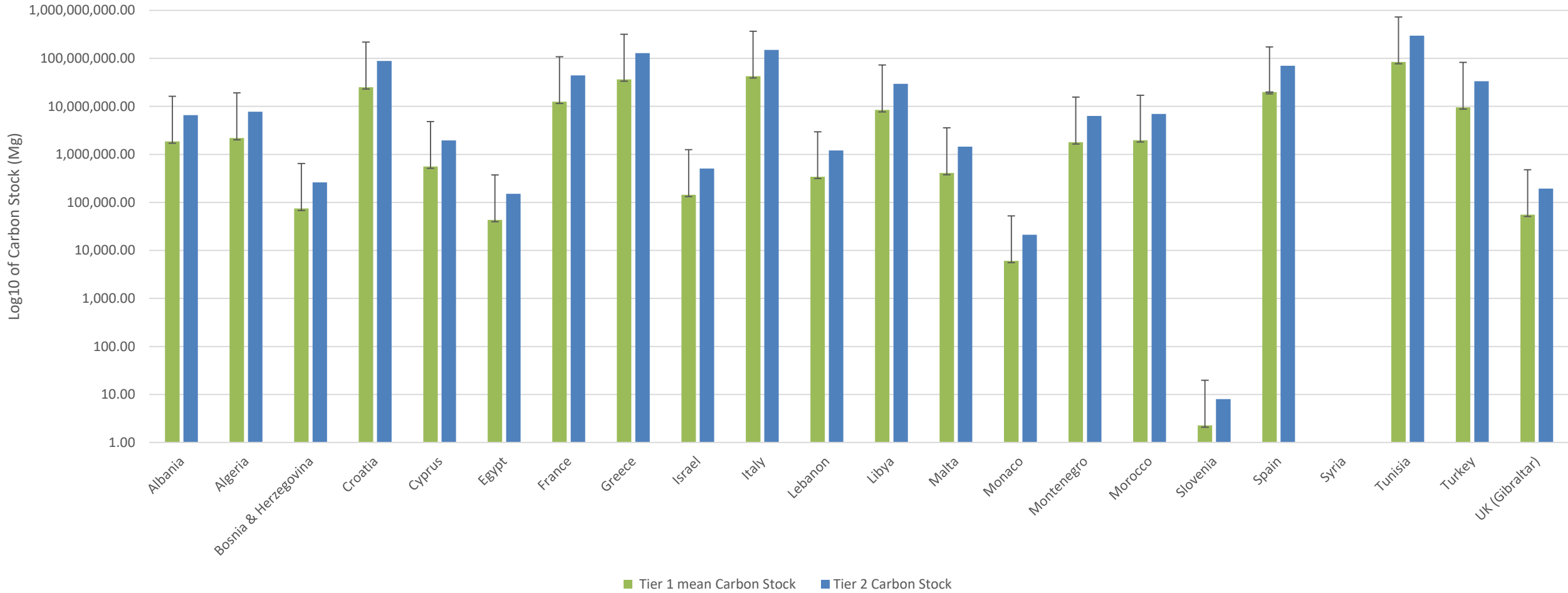
In comparison with the previous estimate (Telesca *et al.*, 2015):

- Greater coastline coverage (e.g. +92% in Greece)
- Country-scale estimate for Bosnia and Herzegovina
- Overseas Territory estimate for Gibraltar

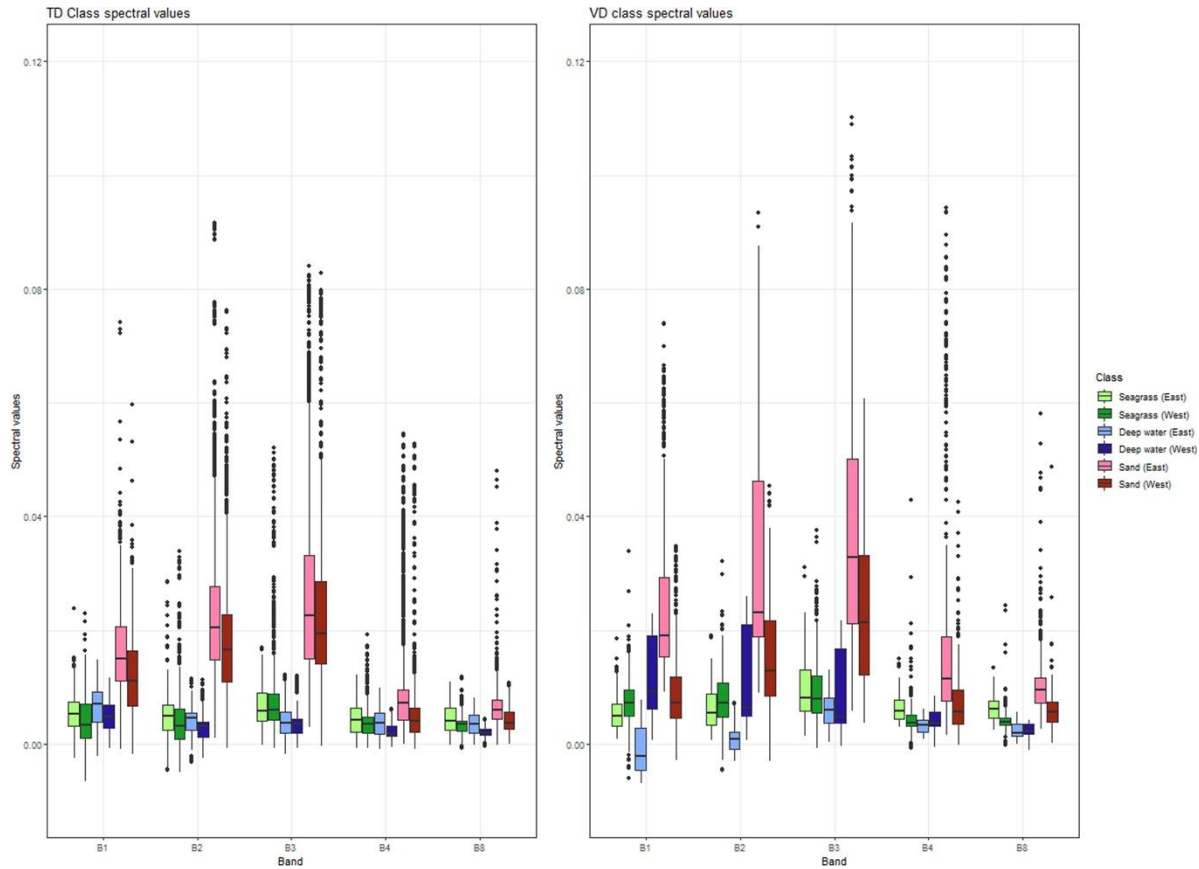


Carbon stocks

Estimated national carbon stocks of the Mediterranean countries



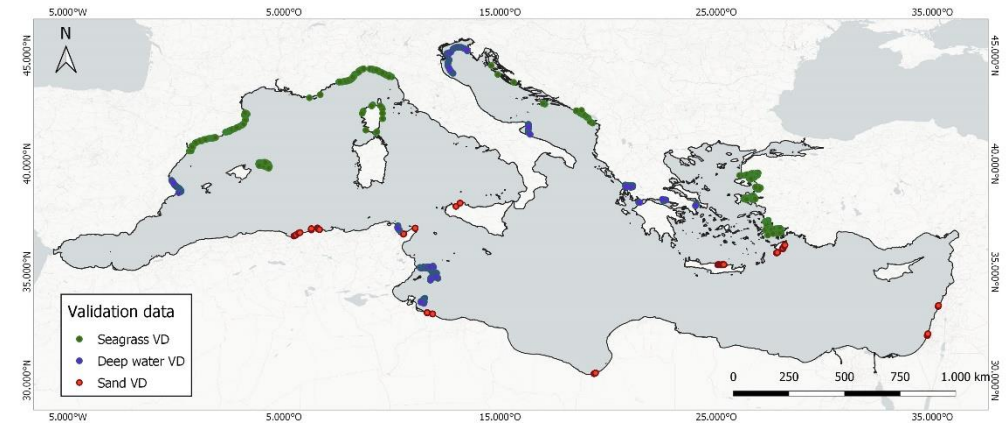
What's the catch?



Simultaneous over- & underestimation of seagrass



Multitemporal composition vs change detection



Data hungry



Latest Release

- Google Earth Engine App for Viewing only
 - <https://leechengfa.users.earthengine.app/view/panmediterranean-app>



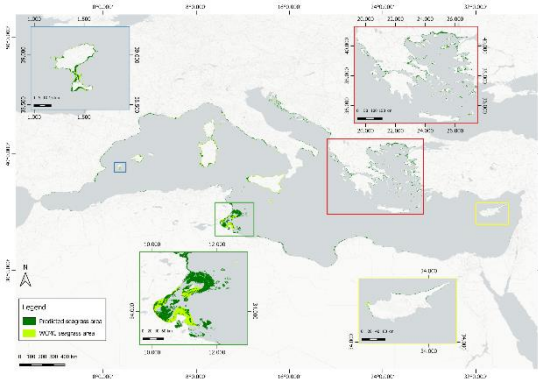
GEE App

- Downloadable vector map of the predicted seagrass areas
 - Coming soon at WCMC-UNEP Ocean Data Viewer



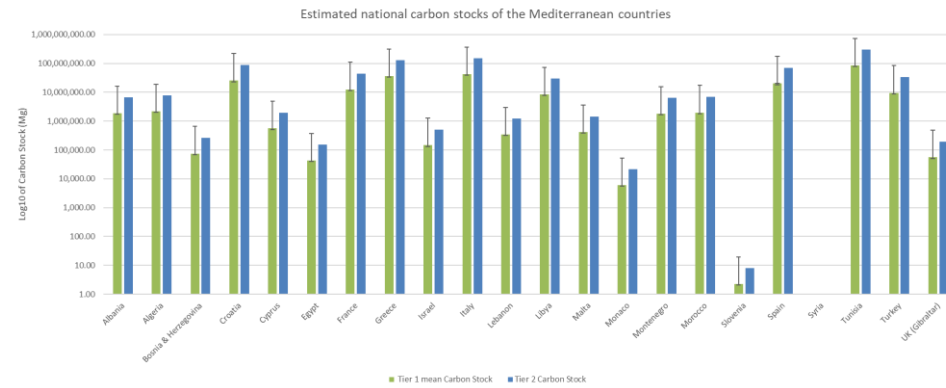
Outlook

Seagrass map of the Mediterranean from satellite imagery



19,020 km²
P. oceanica meadows
(up to 25 m in depth)

Derived Tier 1 & Tier 2 National blue carbon stocks



Linkedin



GEE App



Publication



Thank you for your attention.

Any questions? Contact me at chengfa.lee@dlr.de!

GLOBAL SEAGRASS WATCH

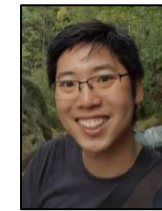
serverless is more



Dimos Traganos
Project Manager



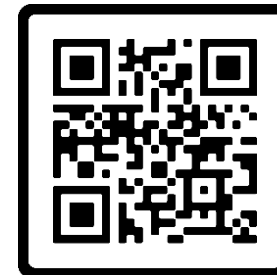
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GEE App



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