



MEDITERRANEAN-WIDE SEAGRASS MAPPING USING SENTINEL-2 ON GOOGLE EARTH ENGINE

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INTRODUCTION

SITUATION

- Current Mediterranean seagrass extent estimates: **12,247 – 25,260 km²**
 - Market value based solely on carbon sequestering function: **1.018 – 8 billion €¹**
- 1: Value assumes sediment depth of 1 m, an EU trading scheme of 7.93€ tn⁻¹ CO₂ and a soil/sediment carbon stock between 10,500 – 40,000 g C m⁻²

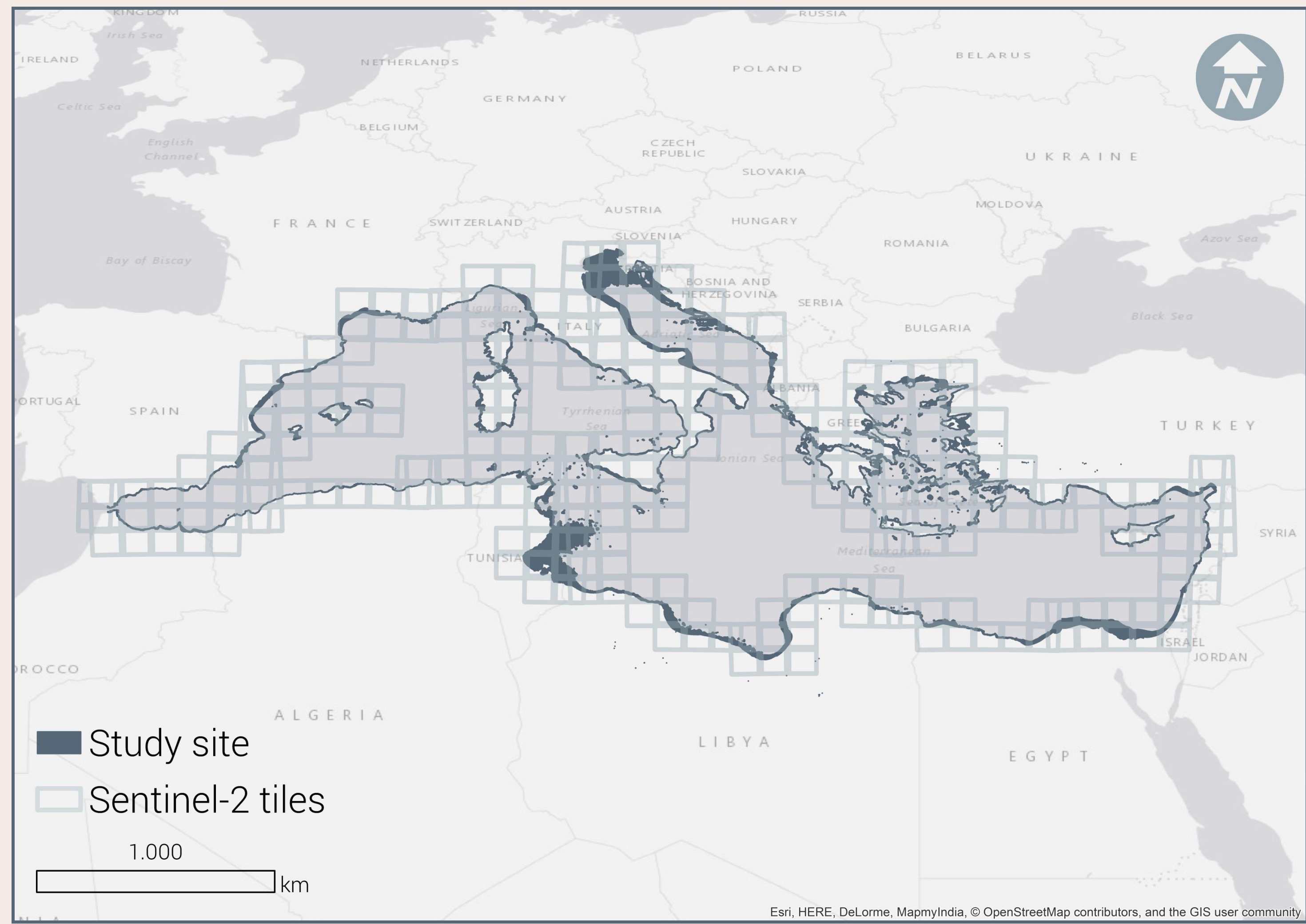
PROBLEM

- Loss of **33.6%** in the last **50 years**
- Slow horizontal growth of **1 cm yr⁻¹**
- High risk of further loss at **1.5 and 2°C** global warming scenarios (medium confidence)

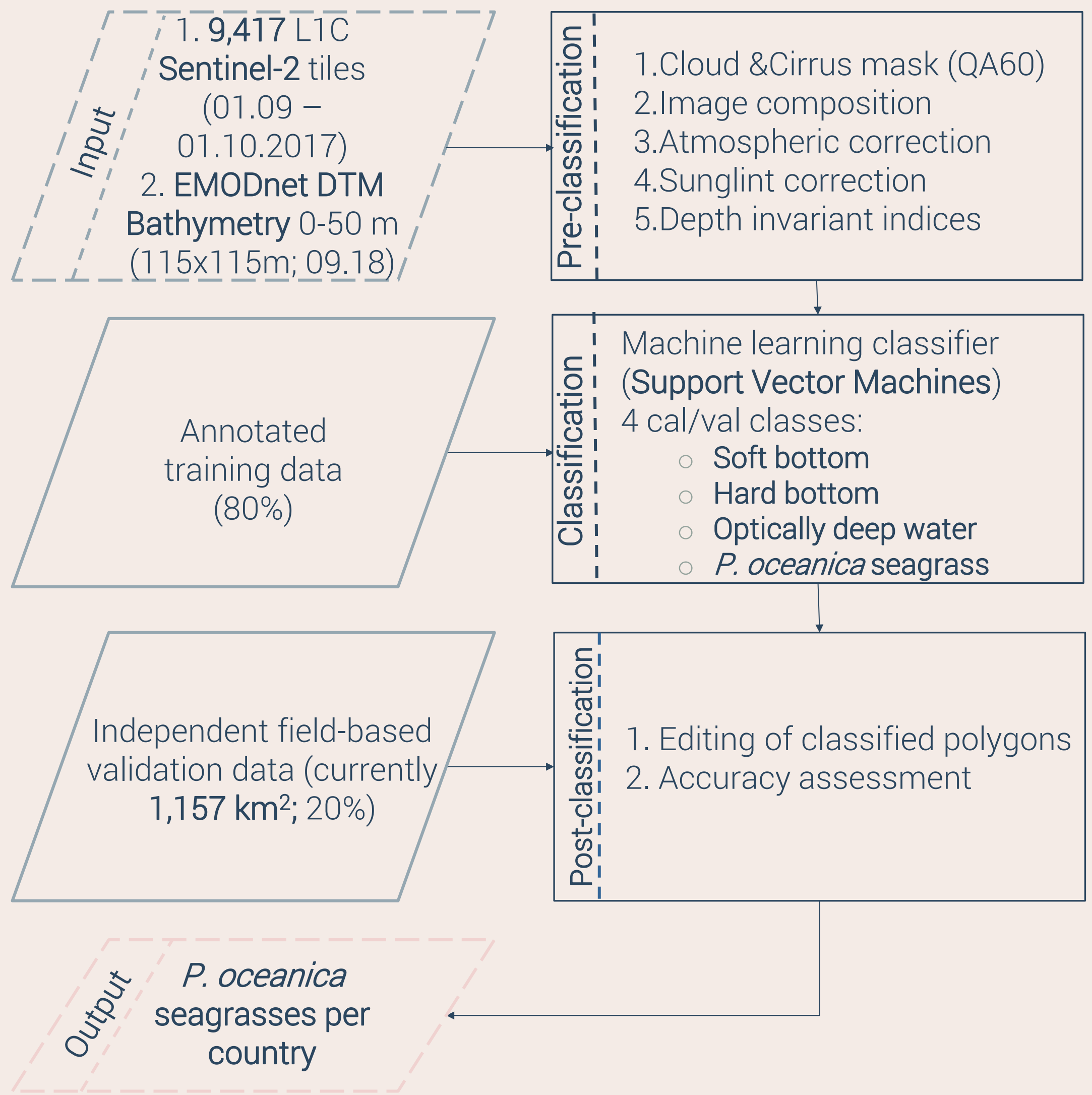
SOLUTION

Cloud-based (Google Earth Engine) basin-scale, high spatio-temporal baseline seagrass mapping using **10-m** optical image time series of the full, free and open archive of Sentinel-2 [1, 2]

STUDY AREA, DATA AND METHODOLOGY

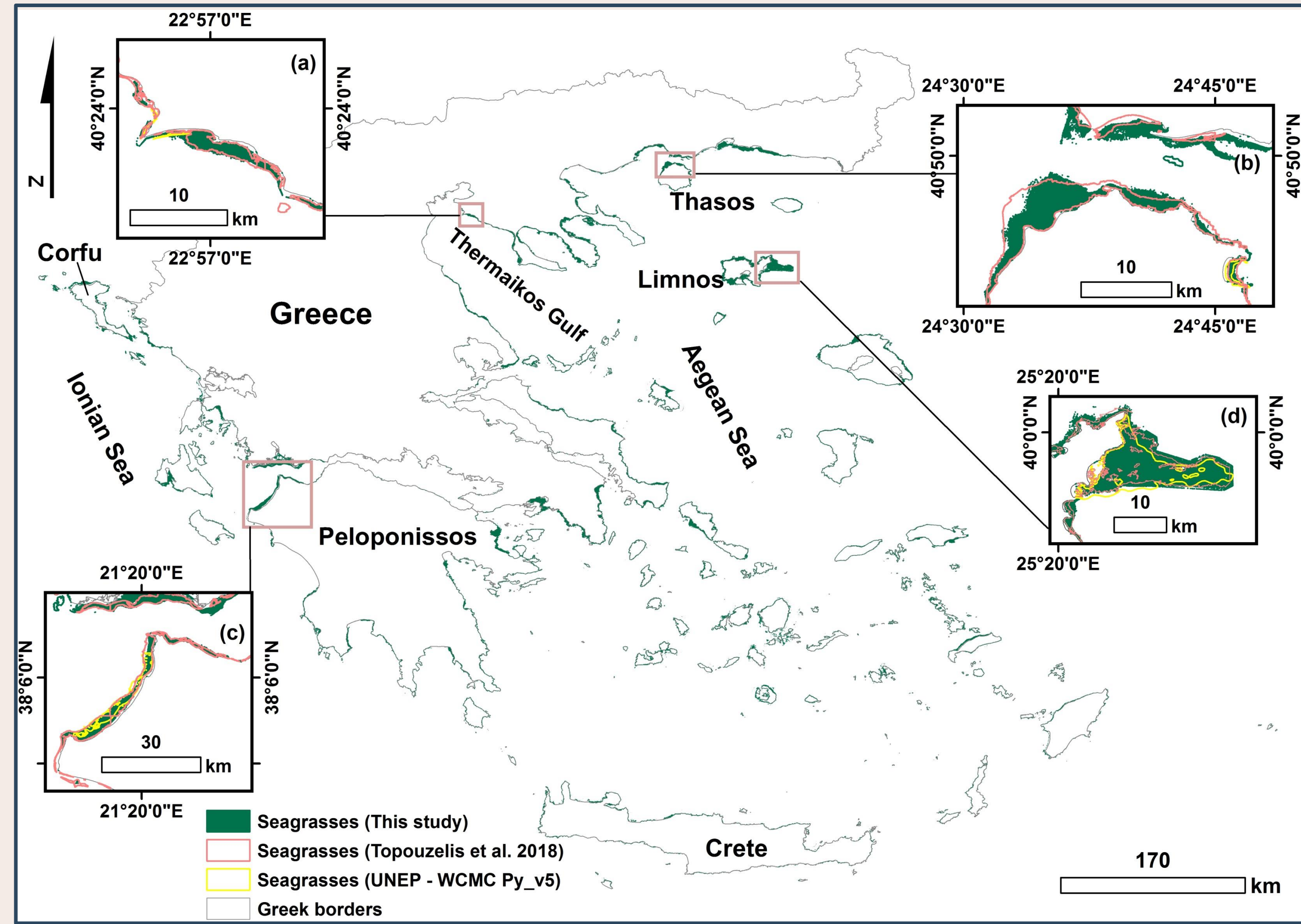


Study area (281,543 km²) and input data

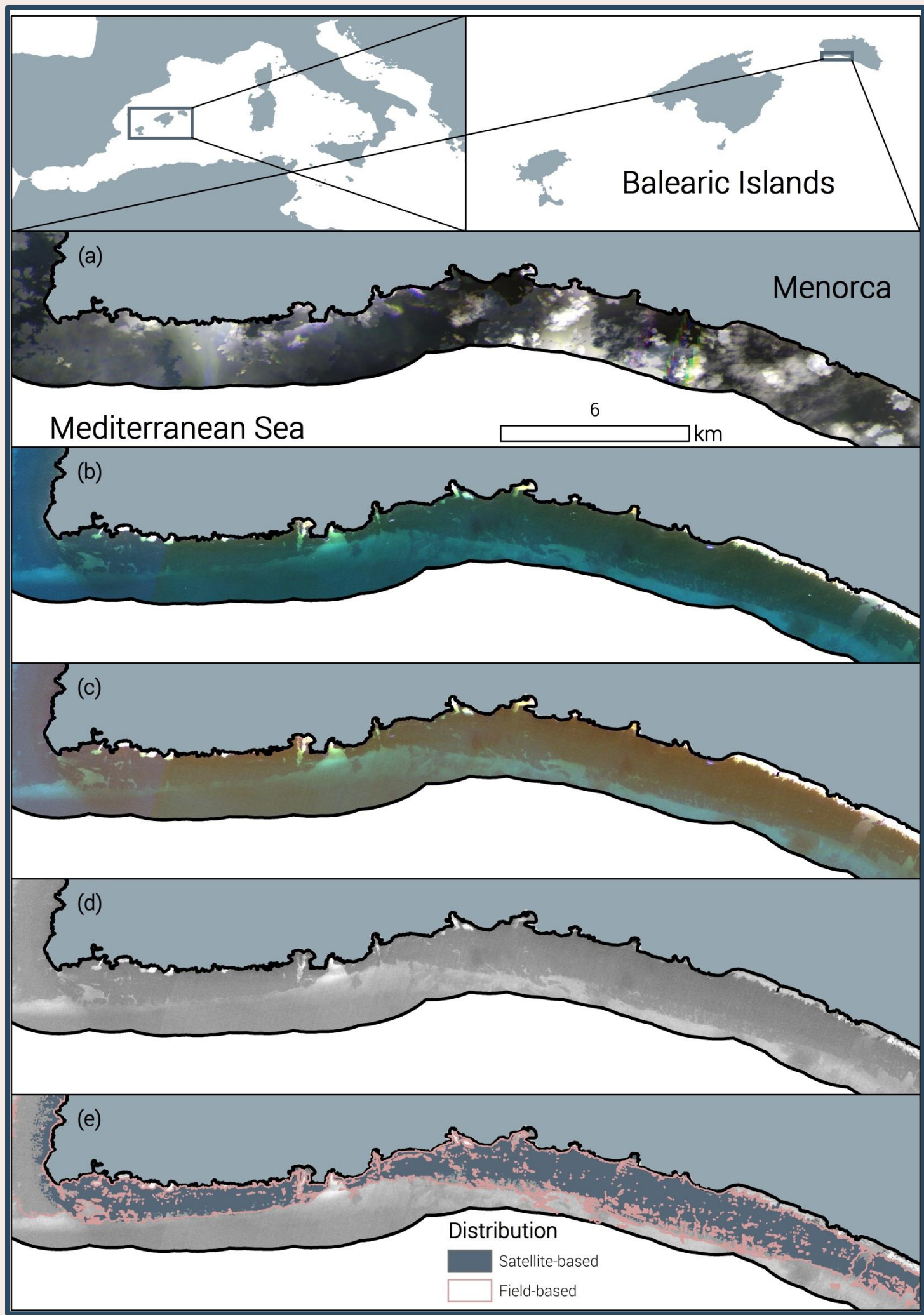


Flowchart of the proposed methodological workflow

RESULTS



Greek-wide seagrass area of 2,510.2km² – 72% user accuracy [1]



Successive methodological steps in Menorca

CONCLUSIONS

THE GOOD

- Scalability** in space (regional-, country- to basin-scale), time (monthly to interannual) and data input (Landsats, PlanetScope, WorldView series)
- Utilization** of all available images within selected time period instead of single images
- Reproducibility** for annual basin-scale monitoring

THE BAD

- Method-wise:** Considerable manual effort for image-based algorithm and machine learning tuning, and training data annotation
- Data-wise:**
 - Insufficient cloud cover masking
 - Visible striping at the Sentinel-2 tile limits
 - Sparse validation data suitable for coastal aquatic Earth Observation analysis

THE FUTURE

- By **2029, 15 years** monitoring of annual pan-Mediterranean seagrass extent by Sentinel-2
- Incorporation** of object-based classification and analytical water column correction algorithms
- Estimation** of seagrass blue carbon stocks and relevant SDGs for effective climate change mitigation and adaption

REFERENCES

[1]: Traganos, D.; Aggarwal, B.; Poursanidis, D.; Topouzelis, K.; Chrysoulakis, N.; Reinartz, P. Towards Global-Scale Seagrass Mapping and Monitoring Using Sentinel-2 on Google Earth Engine: The Case Study of the Aegean and Ionian Seas. *Remote Sens.* **2018**, *10*, 1227.
[2]: Traganos, D.; Poursanidis, D.; Aggarwal, B.; Chrysoulakis, N.; Reinartz, P. Estimating Satellite-Derived Bathymetry (SDB) with the Google Earth Engine and Sentinel-2. *Remote Sens.* **2018**, *10*, 859.