Imperial College London

Seagrass Mapping Using Satellite Data on Google Earth Engine

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The Objective of the Project

A workflow based on the Google Earth Engine

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Map and monitor seagrass habitats using remote sensing data

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Emphasize the importance of seagrass protection

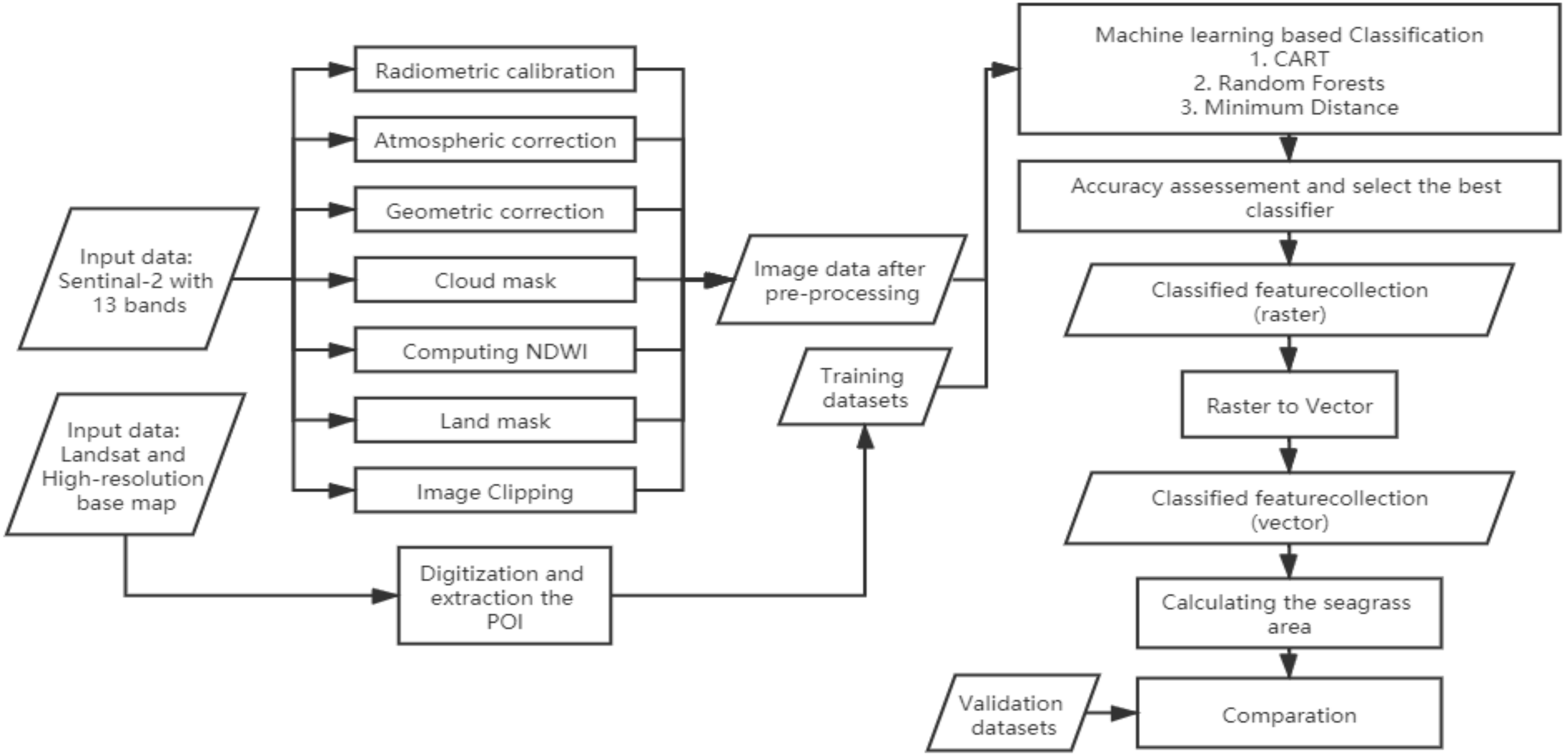
Study Area


Lemnos
Vr.Sergitsi
Ak.Agrilios
Ak.Pharaklon
O. POURNIAS
Ak.Trigies
Ak.Zotiris
O. A. Charalabos
Ak. Plaka
Fl(3)30s55m22M
FR36m13M
Ak.Polaikastro
Plaka
Panagia
Ak.Petsia
Ak.Petalidi
Yph. Petalida
Lm. Poutnias
Atsiki
AERO RC
Kontopoulion
Ak.Keros
O. Keros
Ak.Kavallaris
Ak.Mourtzephlos
Fl(2)14s59m13M
Vigla
Ak.Kalogeroi
O. Kaspaka
Kaspakas
A. Dimitrios
Nea Koutali
L. Moudrou
Vr.Koukkonisi
Moudros
Ak.Petasi
Ak.Kastro
Fl6s83m11M
Myrina
Lm. Myrinas
QG10m3M
Vr.Diavates
O.Platy
Kontias
Lm.Kontias
Ns.Alogo
Ak.Sagrada
Ak.Aspros Kavos
Fl3s5M
Ak.Limni
O.Kontias
Fl3s6m5M
Paradeisi
Ak.Voroskopos
Ns.Tigani
O.Thanou
Ak.Asprokavos
O. A.Pavlou
O.Kontias
Chersonisos
Phakos
Skopos
O. Moudrou
Ak.Stavros
Ak.Phakos
Vr.Kompi
Q(2)6s61m10M
Vr.Kastri
Ak.Valanidia
Ak. A.Sozon
Ak. A.Eirini

Data Source

1. *Remote sensing data*
2. *Training data*
3. *Validation data*

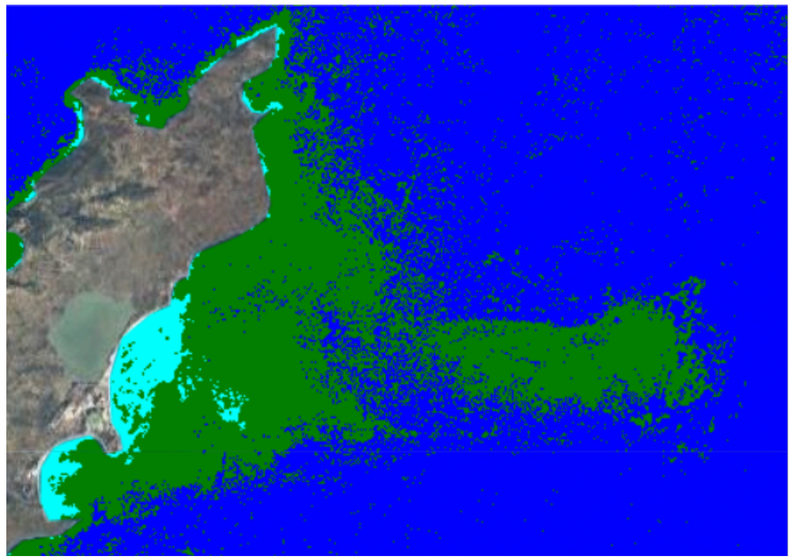
Workflow


Input data:
Sentinal-2 with
13 bands
Input data:
Landsat and
High-resolution
base map
Radiometric calibration
Atmospheric correction
Geometric correction
Cloud mask
Computing NDWI
Land mask
Image Clipping
Digitization and
extraction the
POI
Image data after
pre-processing
Training
datasets
Machine learning based Classification
1. CART
2. Random Forests
3. Minimum Distance
Accuracy assessement and select the best
classifier
Classified featurecollection
(raster)
Raster to Vector
Classified featurecollection
(vector)
Calculating the seagrass
area
Validation
datasets
Comparation

Pre-Processing

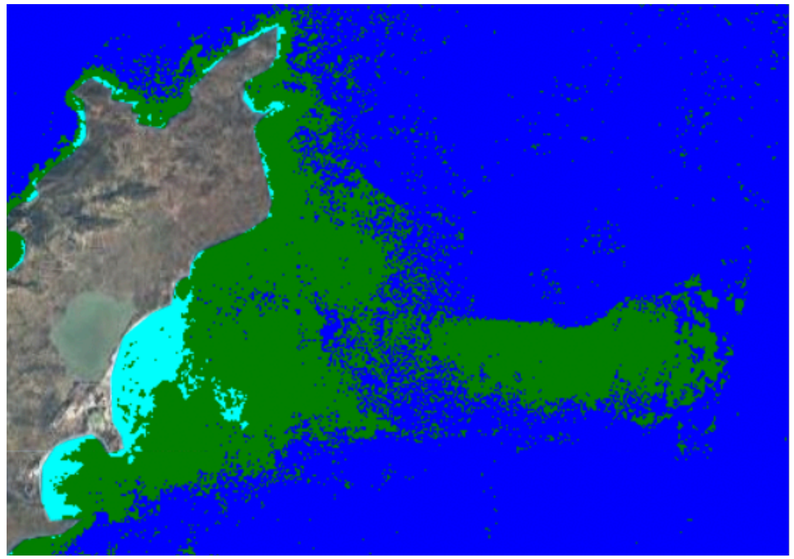
1. *Cloud mask*
2. *Computing NDWI*
3. *Land mask*
4. *Image clipping*

Classification



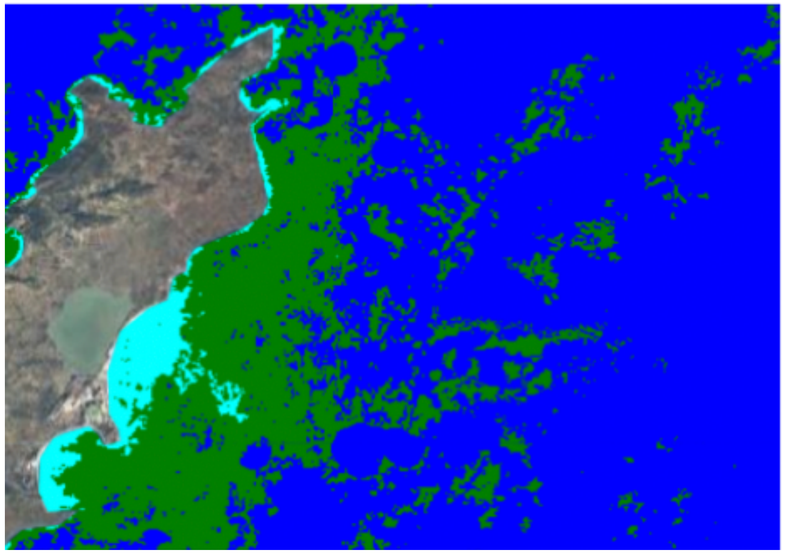
CART

Accuracy: 93.19%



Radom Forest

Accuracy: 93.19%



Minimum distance

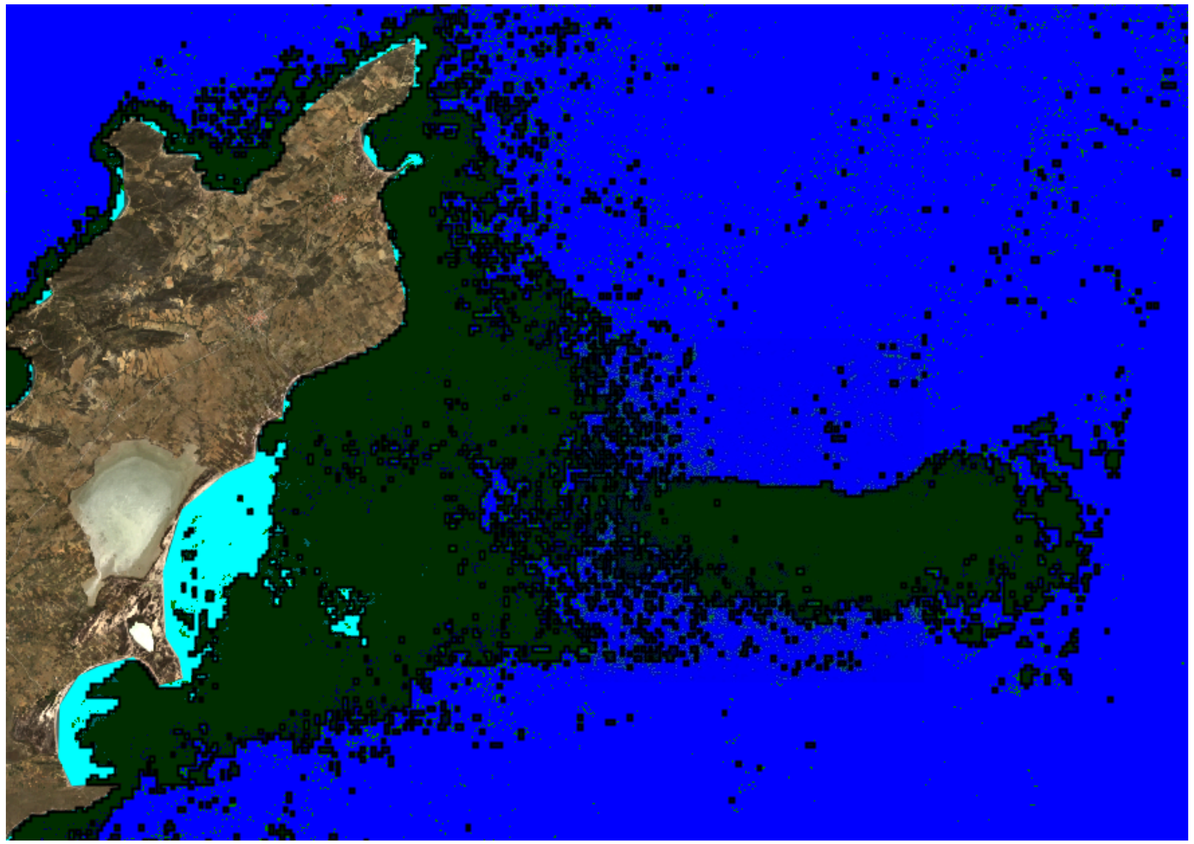
Accuracy: 59.15%

Area Calculation

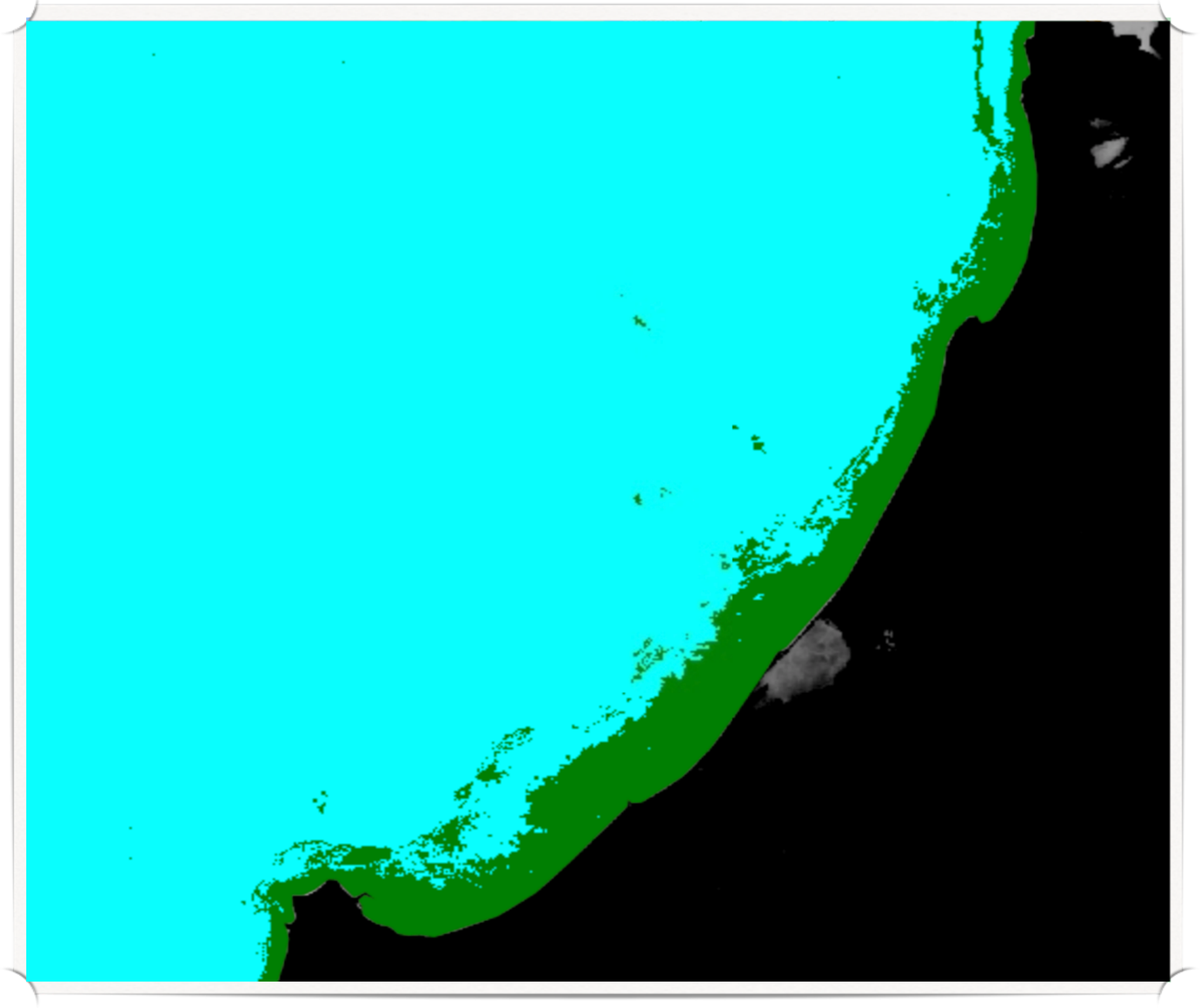
1. *Raster to polygon*
2. *Compute the area each vector unit*
3. *Sum the area of all the vectors*

Detected area: 112.59km2

Field trip record: 115.07km2



Test on Another Site



Detected Seagrass: 64.3km2

Field trip record: 51.54km2

Conclusion and Limitation

Conclusion:

This workflow can be extended to the automatic drawing and monitoring of seaweeds on a large scale or even globally. In this way, the areas where the area of seagrass continues to be reduced will be protected specifically and will ultimately provide support for global ecological protection.

Limitation:

The water depth, the sun's altitude angle, and the clarity of the water body will all have an impact on the classification results, and this workflow does not consider the above three elements.

Future Work

1. Local condition
2. Structured and systematized
3. Spatial resolution

Thank You for Your Listening