# See Seagrass from Space: From Analysis-Ready PlanetScope Satellite Imagery to Nationwide Seagrass Maps for the Nationally Determined Contributions of Seychelles

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IN NUMBERS
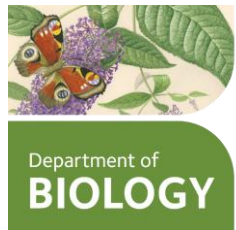
Aims

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.

25-50%
Reduction of Tidal Height

159

The countries which have seagrasses in their coastal extent.

350,000 km²

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

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.

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Global seagrass loss over the past century
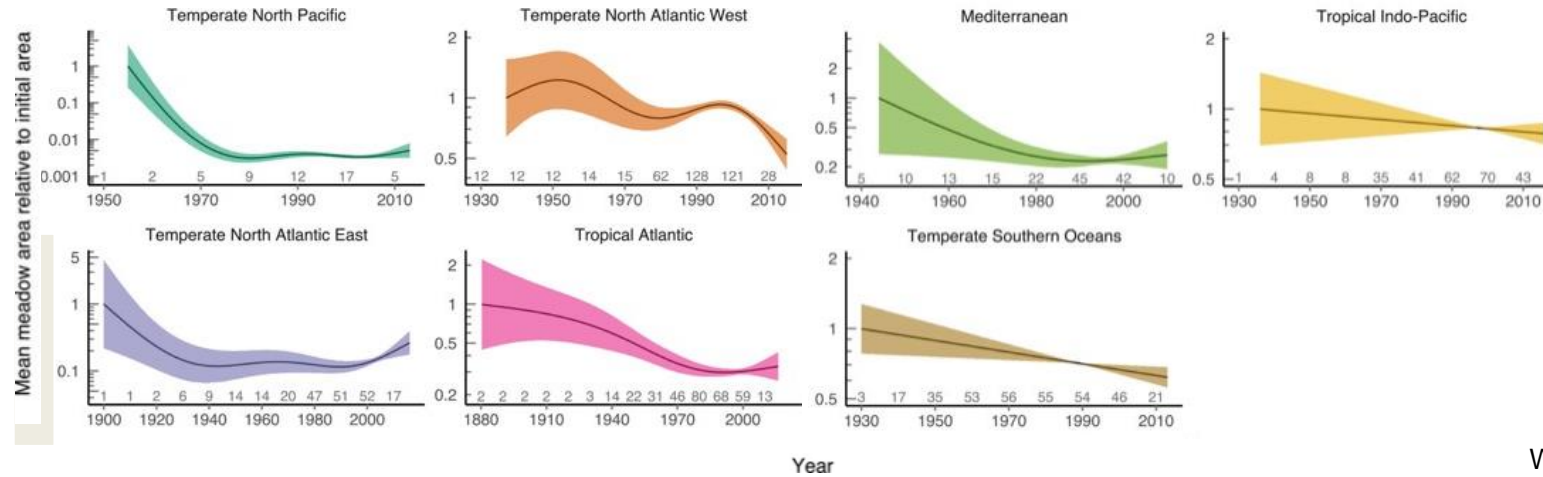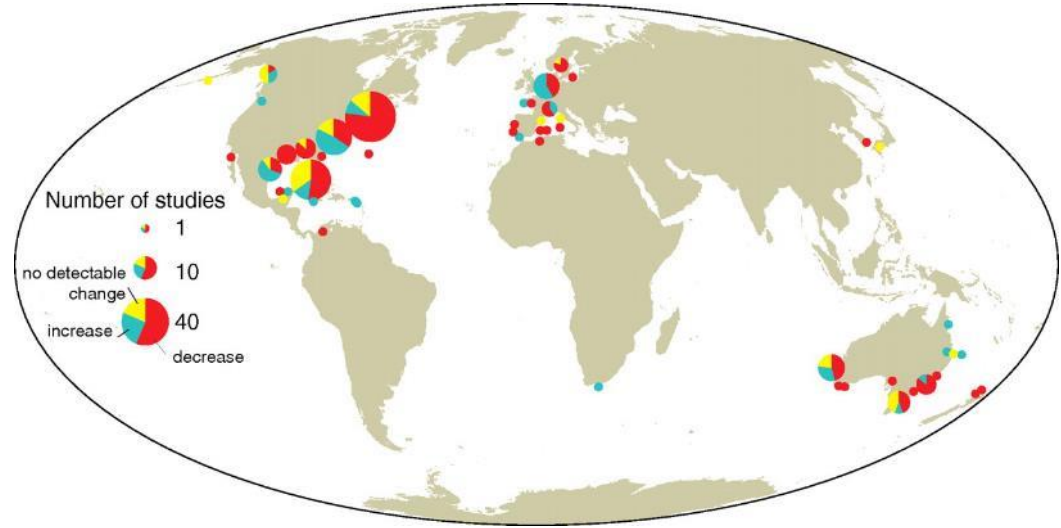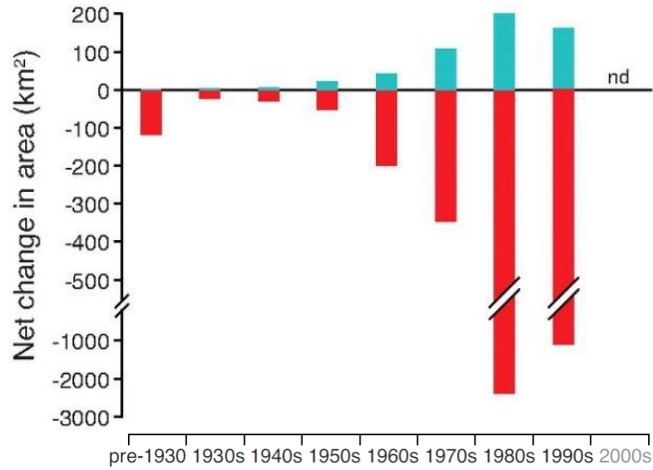
Waycott *et al.* (2009), Dunic *et al.* (2021)

SEYCHELLES' NATIONAL CLIMATE CHANGE POLICY

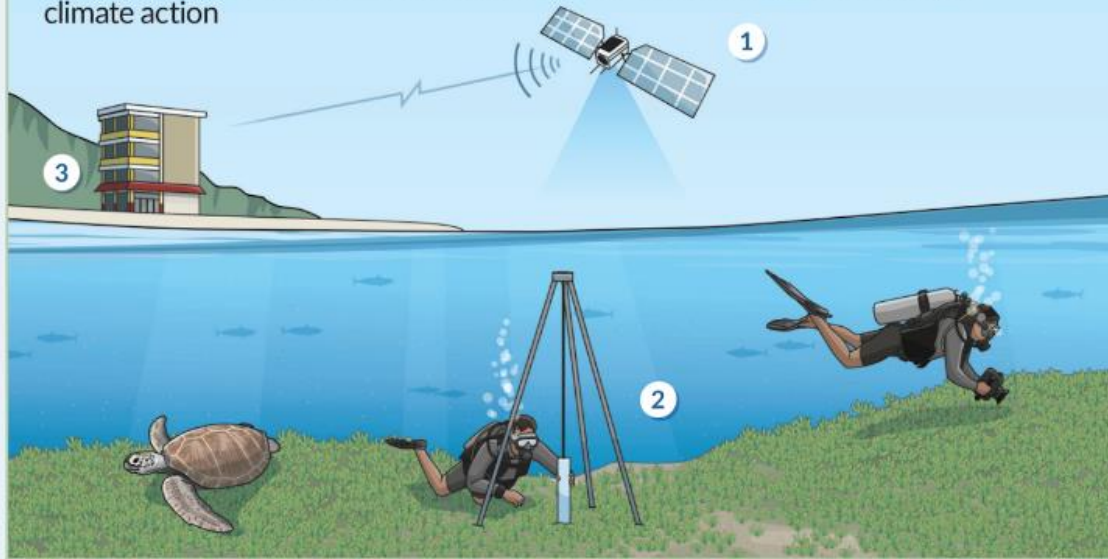"Making Seychelles Climate Resilient"

May 2020

SDG 14: Conserve and sustainably use the Oceans, Seas and Marine Resources for Sustainable Development.

☐ Protection of blue carbon such as mangroves and seagrasses

Seychelles Seagrass and Carbon Mapping Project

Project will provide the scientific information needed to support country's climate action
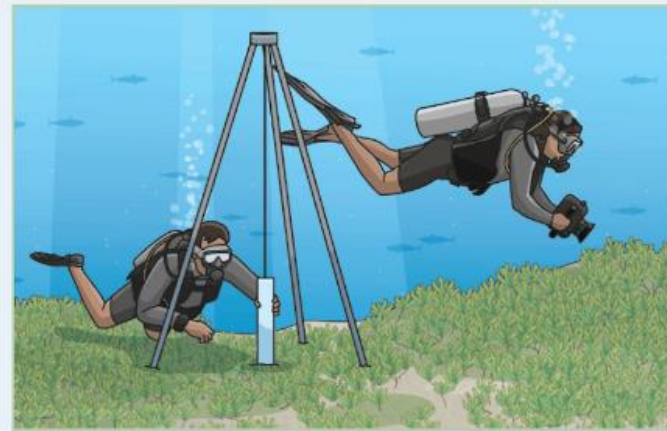

Seagrass meadows store vast amounts of atmosphere-warming carbon in their underlying soil and are a nature-based solution to climate change. To generate a validated countrywide map and carbon stock estimate for seagrass in Seychelles, researchers will use remote satellite imaging and field data collections. This information will serve as the scientific baseline for policymakers to include seagrass protections in the country's Nationally Determined Contribution (NDC) to the Paris Agreement.

2. Field data collections on seagrass meadows

Researchers collect seagrass data throughout Seychelles, gathering information on the different species and density of seagrass, and taking soil core samples to estimate the carbon stored beneath the meadows.

## 3. Data is analyzed to estimate seagrass extent and carbon stock

The satellite images and field data are analyzed and used to produce a high-accuracy, field-validated map of seagrass distribution and extent. The soil cores are analyzed for their carbon content and used to generate a first-time estimate of carbon stock for seagrass meadows in the country.

1. Mapping seagrass using satellite imagery

In the first phase of the project, researchers collect countrywide satellite images of the ocean. These images show the presence of seagrass, along with other ocean habitats, such as coral reefs. Because cloud cover and water clarity can affect the quality of the satellite imagery, field data is also collected to differentiate the images.
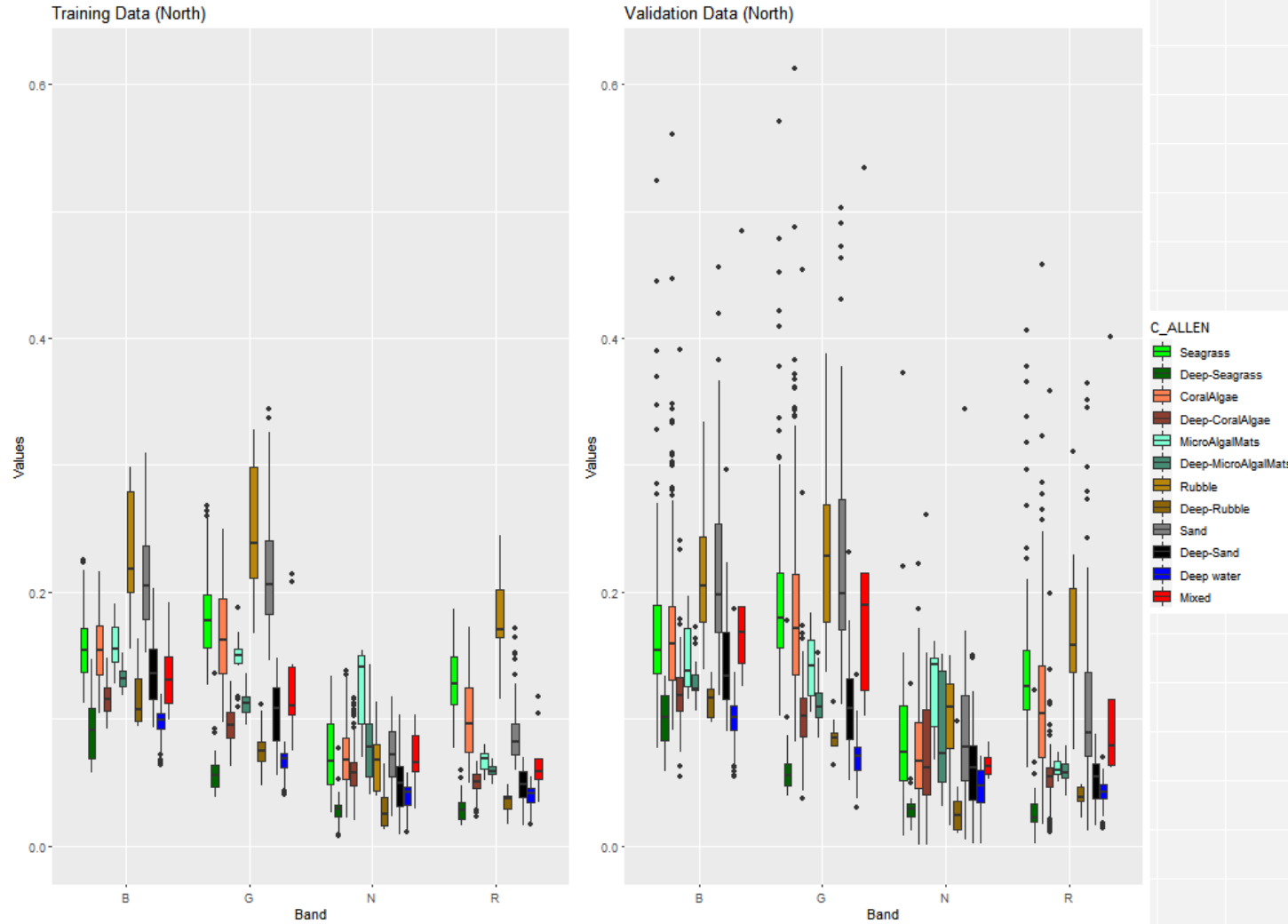
4. Scientific information informs policy decisions

This scientific information on the distribution of seagrass and its associated carbon stock gives policymakers the information they need to include the protection of seagrass in their NDCs as a nature-based solution to climate change.
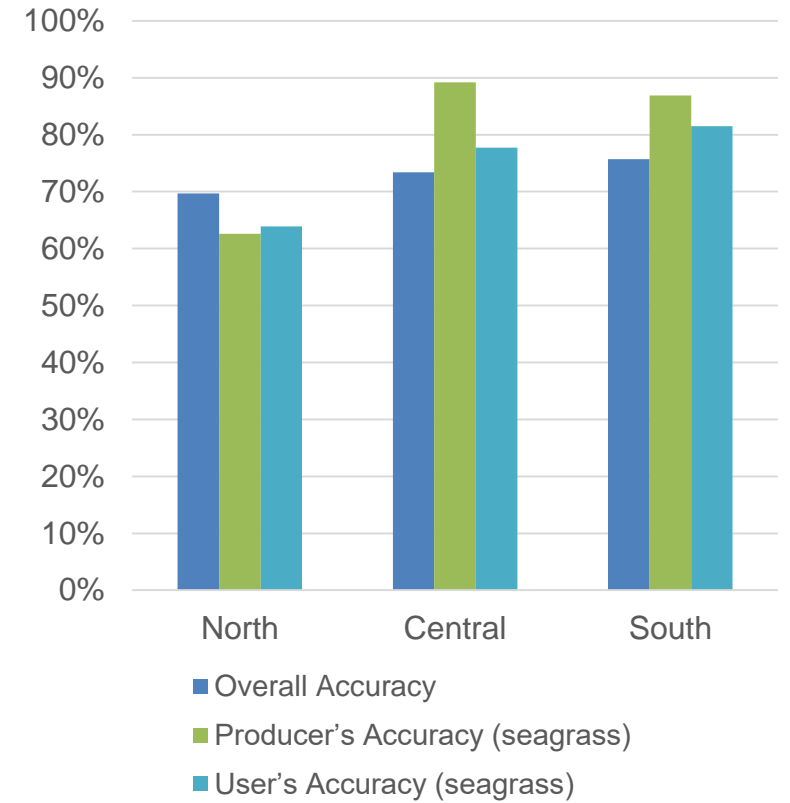
Work flow

Results

Training Data (North)
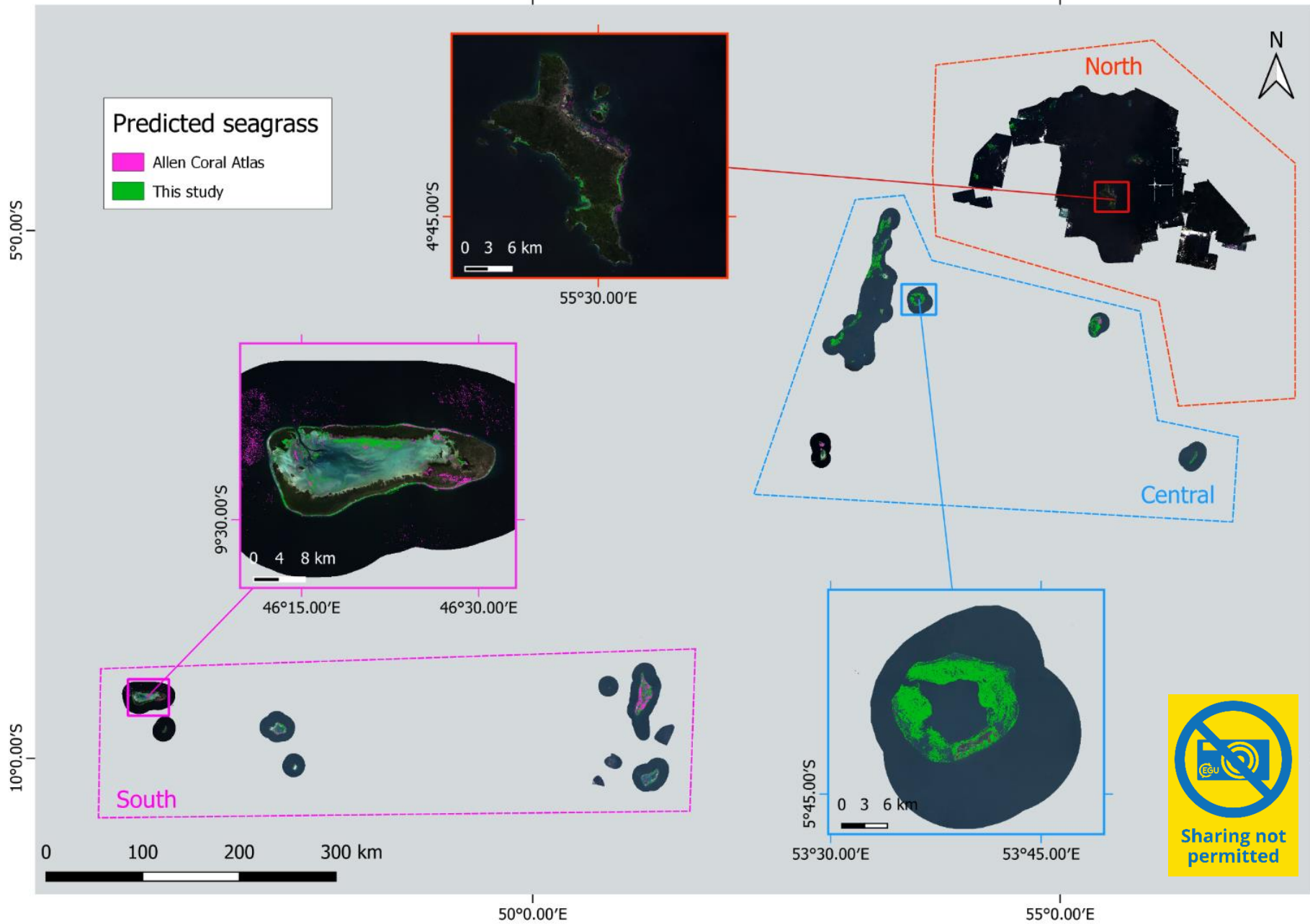
Validation Data (North)
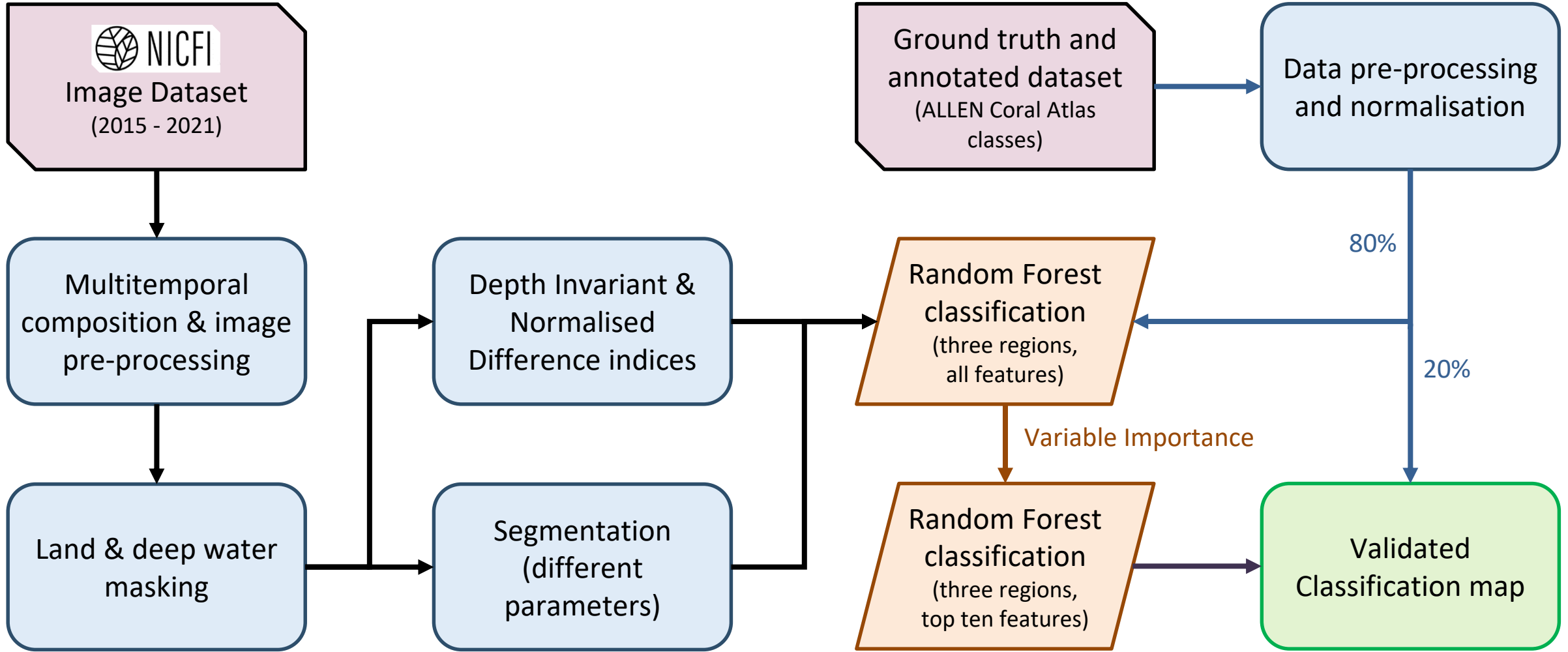
Classification Accuracies

Mapping of deeper "shallow water" seagrasses

Usually masked out

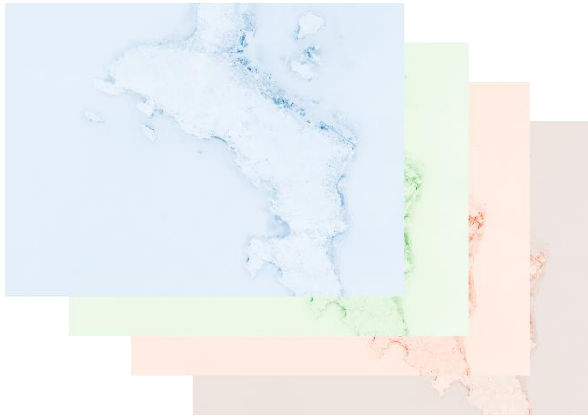Better estimate of the actual blue carbon
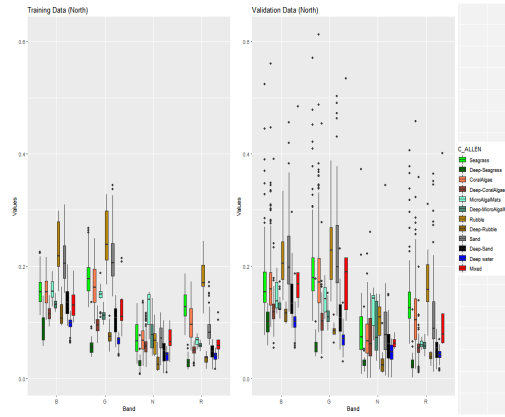
Easy to use/access

Predicted seagrass
- Allen Coral Atlas
- This study

North

Central

South

Sharing not permitted

Predicted Seagrass Areas

Region	Total predicted seagrass area (km^2)	
	Planet NICFI	Allen Coral Atlas
North	39.41	7.53
Central	428.18	24.83
South	331.38	174.67
Total	798.97	207.03

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Challenges

Four band spectral resolution

Reference dataset uncertainty

Image harmonisation of NICFI

Into the Future

- Holistic **systems-level approach** by fusing Earth Observation, Ecosystem Accounting and biophysical models

- Collaboration with scientists for **integration** of new big **field** reference **data**

- Collaboration with policy makers to streamline **spatially explicit and uncertainty** aware coastal conservation and restoration

- Collaboration with governments, industry and NGOs to improve funding for long-term, **holistic ecosystem service accounting**, reliant on ecology and translated into economic units and measurable targets

The Team

Thank you for your attention

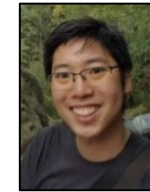Any questions? Contact me at chengfa.lee@dlr.de!

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