## WG4 New Methods/Technology Mapping of marine habitats

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## SeaBee

Norwegian infrastructure for drone-based research, mapping and monitoring in the coastal zone Duration: 2020-2025 + 2025-2030? (5+5 years)

Seabee Norway















#### Aim of infrastructure project

SeaBee will establish a national center for drone-based services for use in coastal and aquatic research, mapping and monitoring for future environmental challenges



# KELPMAP (2022-2024)

For Norwegian Environment Agency and Norwegian Space Center

Norsk

Assignment: To investigate whether it is possible to map kelp forests with drones and scale up using satellite images

DIREKTORATE'

orsk Roms

Norwegian Space Agency

Norsk institutt for vannforskning



Hagen et al/SeaBee

#### **Process**

#### 1. Ground truth





#### 3. Annotation



#### 4. Analysis





5. Upscaling

#### What can we map using drones?

#### Vegetation

- Kelp
- Seaweed
- Eelgrass
- ...

#### Fauna

- Mussel
- Barnacles
- •

#### Abiotic habitat

- Sand
- Stone (sand, gravel, boulder, rock)
- Deep areas
- ...



- Mostly interested in biotic habitats, but all objects in the picture are relevant – even those on land
- Seabed down to approx. 10 m (or as deep as the light can reach)



#### SeaBee's habitatklasser (v1.0)





NIC

We already have good experience with many of these, others remain to be tried out.

Some can be translated into national Norwegian NiN types

#### HYPSO-1 Hyperspectral Cube-satellite



- Developed at NTNU
- Part of the ØKOSAT project
- Particularly interesting for cyanobacteria signatures
- Used in conjunction with hyperspectral in situ data from land or autonomous vehicles
- Reflectance data + water samples



# Upscaling using the satellite imagery

#### Upscaling:

The prediction map based on the drone images was used in the next round as training data for the satellite images

- 1. VHR
- 2. Sentinel-2

Due to reduced resolution and limited pixel count, upscaling could only be done at level 1





#### Horizon EU: Use of new technologies for more cost-effective mapping and monitoring in Europe





## OPPSKALERING VHR (2 m)





Great potential for improvement, including annotating deep regions and land and merging datasets

## OPPSKALERING VHR (10 m)







Great potential for improvement here too...

# Upscaling using the satellite imagery

#### **Upscaling**:

The prediction map based on the drone images was used in the next round as training data for the satellite images

- 1. VHR
- 2. Sentinel-2



Sentinel-2 18. August 2022



**T32WPT** T32WPT 20220818T104631\_TCI\_10m.jp2

**T32WPU** T32WPU\_20220818T104631\_TCI\_10m.jp2

Not easy to find days without clouds and other disturbances for such large areas...



### Pleiades (VHR)

1. Juli 2018

#### COPERNICUS PANDA R1C1 COPERNICUS PANDA R2C2

Ended up with a fairly old photo – but I guess the habitats haven't changed much

MIL

# OPPSKALERING VED BRUK AV SATELLITBILDER

