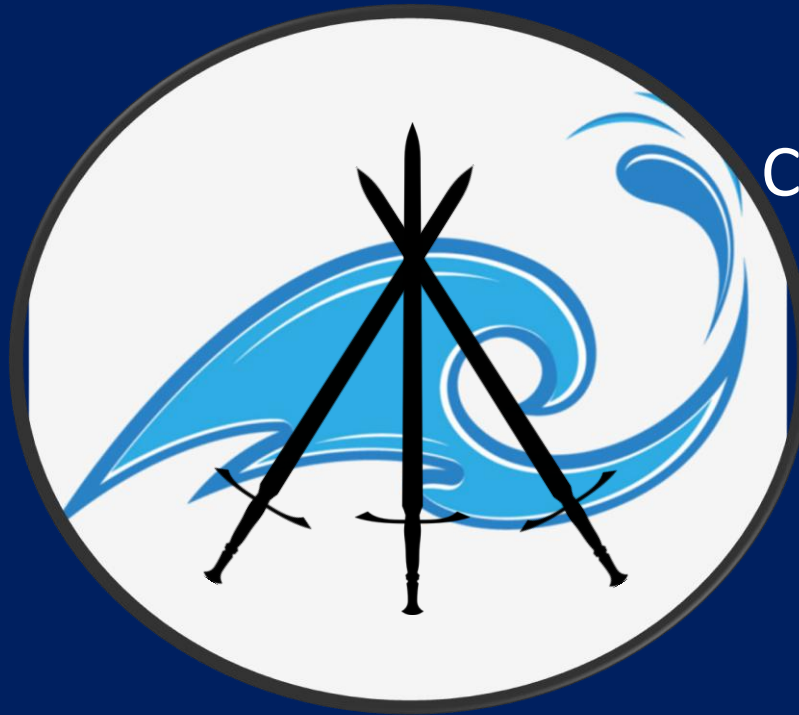


# AQUACULTURE SITES FEASIBILITY STUDY: KELP

D'ARTAGNAN  
AND THE THREE  
MOUSQUETAIRES



Carlos, Soumia, Sara, Giulia  
Mentor: Kate



# WHY CULTIVATE KELP?

*High in nutrients like fiber, iron, magnesium,  
niacin, and a range of vitamins.  
The perfect BIOFUEL for human and **machines**  
**too***

## KELP IS THE NEW GREEN



Kelp salad



Beer



Agar for pudding



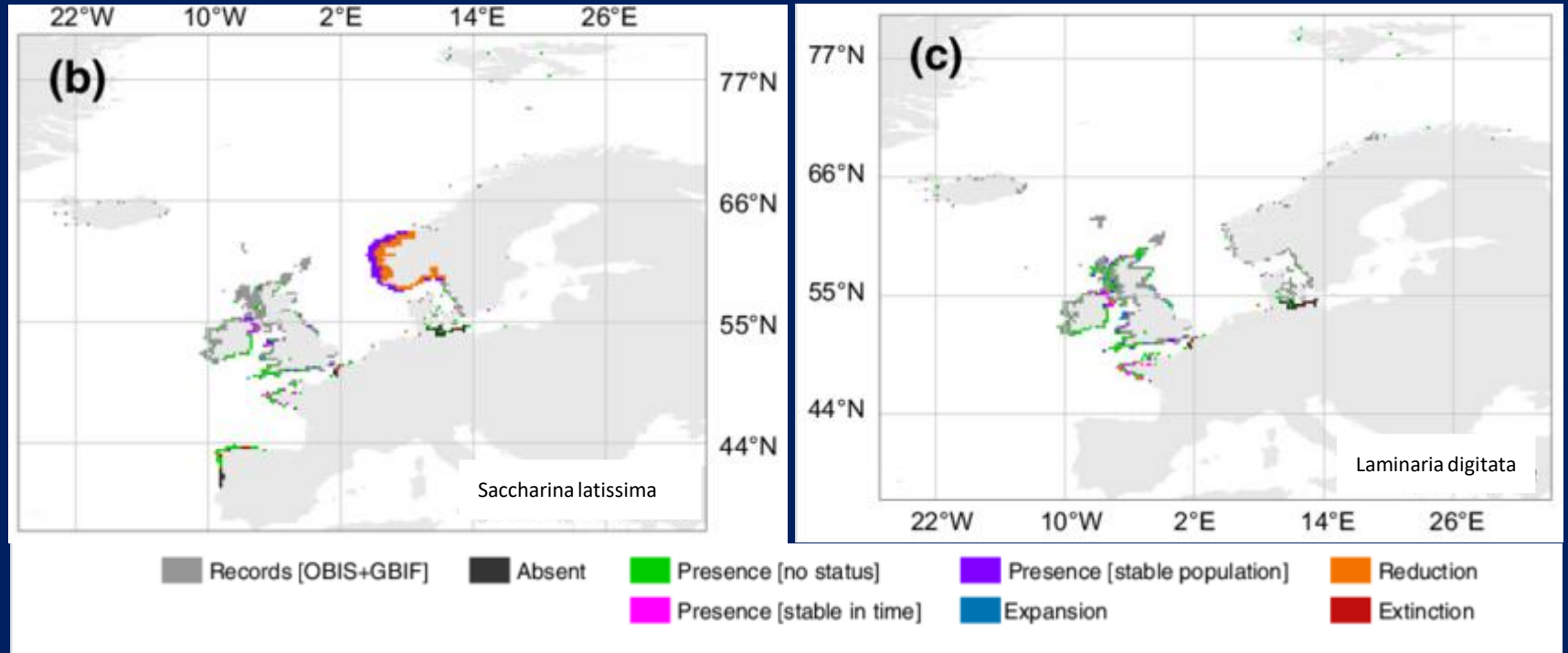
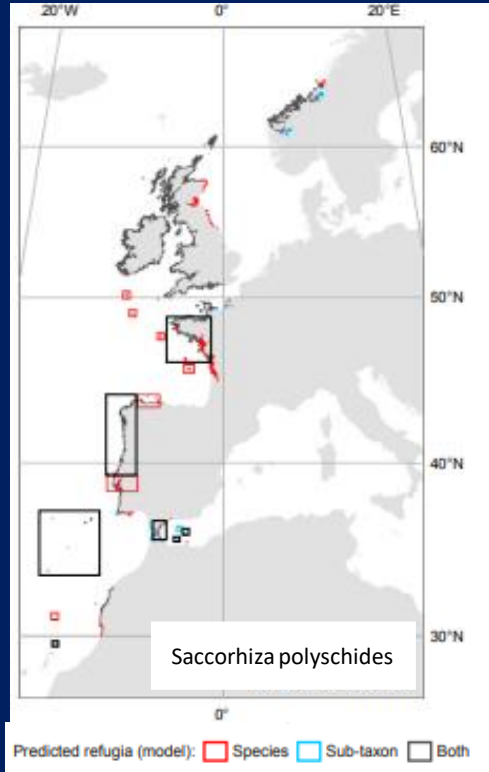
Biofuel



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# SPECIES: *Saccharina latissima*, *Laminaria digitata*, *Saccorhiza polyschides*



Op

h



# KELP'S PROBLEM:

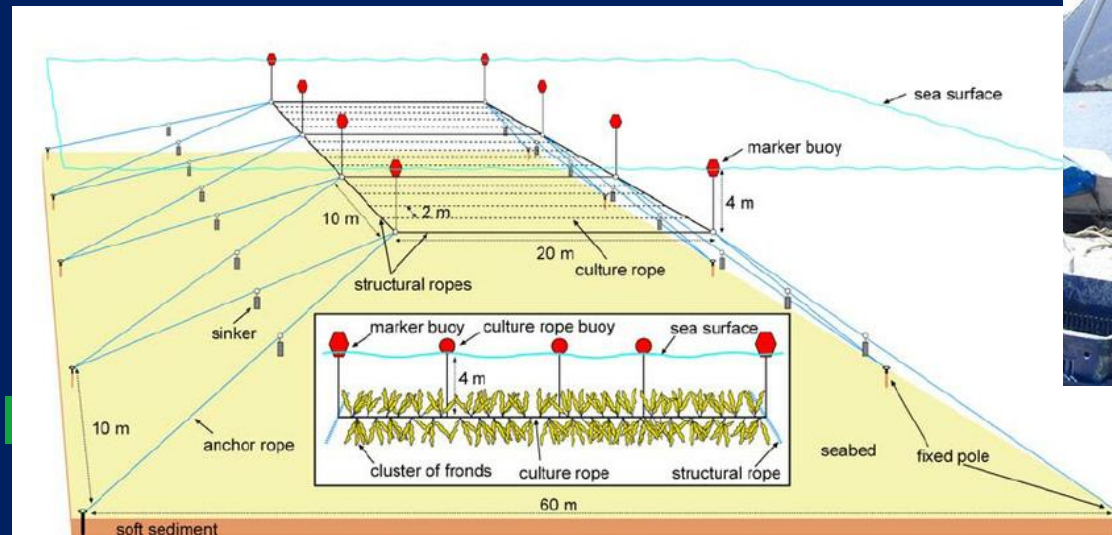
CLIMATE CHANGE → temperature increase



GRAZERS: The main grazers of natural kelp forests are benthic invertebrates such as sea urchins, snails, abalone and small crustaceans



SOLUTION:



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# RANKING OF PARAMETRES

1. TEMPERATURE → direct effect on the metabolic rate of seaweeds and also their ability to successfully reproduce → LIMITANT
  2. SALINITY → Semi-euryhaline
  3. NUTRIENTS → no fertilization, nutrients required
  4. BATHYMETRY → coastal area (generally 20 m)
  5. LIGHT → photosynthesis!
  6. CURRENTS → High
7. ANTHROPIC IMPACT → very little : just put kelp in the water
8. RIVERS AND SEWERS → far from pollution



# MATERIALS AND METHODS



OPERNICUS  
Europe's eyes on Earth

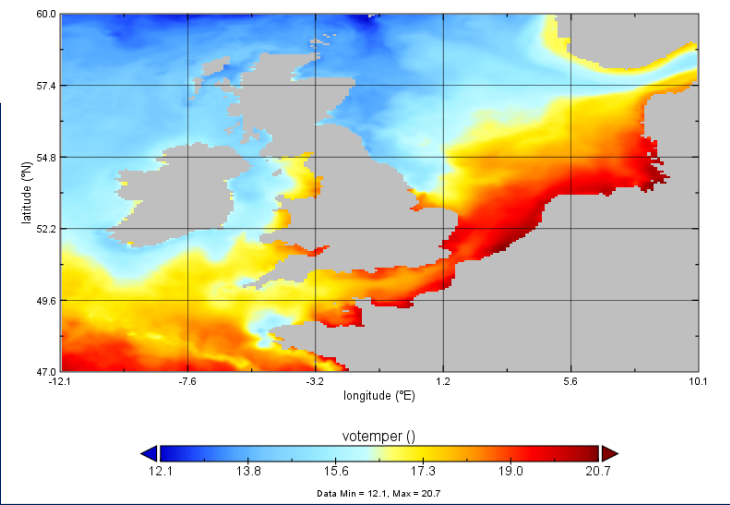
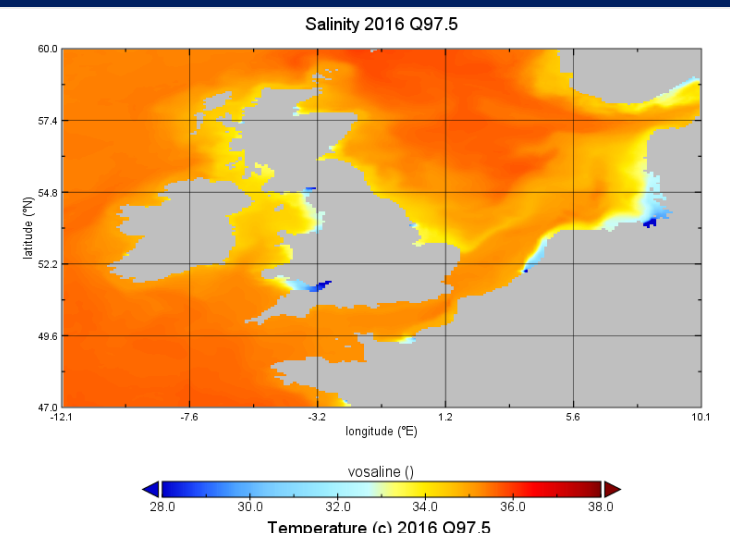
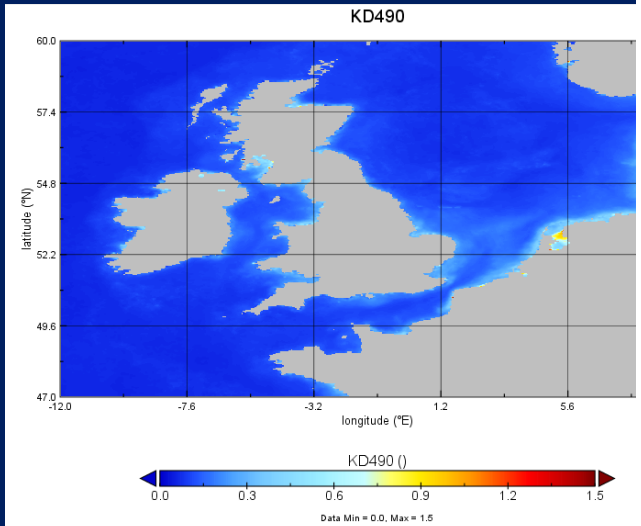
YOUR SEARCH  
Found 26 ocean products matching your criteria.

REGIONAL DOMAIN  
European North-West Shelf Seas

PARAMETERS  
TEMPORAL COVERAGE  
From 1992-01-01 To 2018-07-23

PRODUCT WITH DEPTH LEVEL

- Temperature
- Salinity
- Sea Surface Height
- Current Velocity
- Mixed Layer Thickness
- Sea Ice
- Wind
- Wave
- Plankton
- Oxygen
- Nutrients
- Primary Production
- Reflectance
- Turbidity
- Transparency



marine.copernicus.eu/services-portfolio/access-to-products/.../NORTHWESTSHELF\_ANALYSIS\_FORECAST

GEOGRAPHICAL AREA  
Interaction between product coverage and area defined by user

TIME RANGE  
START DATE: 2016-01-01 12:00:00  
END DATE: 2016-12-30 12:00:00

DEPTH  
(Default = Surface depth)

jupyter Jerico\_hackathon\_aquaculture Last Checkpoint: 2 hours ago (autosaved)

### Dartagnan and the 3 Musketeers

This script takes data downloaded from Copernicus and processes it to get yearly means, percentiles etc

```

Importing packages
In [ ]: import xarray as xr
import numpy as np
import pandas as pd
import os

Temperature
Reading temperature file
In [ ]: temperature = xr.open_dataset('Temperature_northsea_2016.nc')
In [ ]: temperature

to average over a dimension:
In [ ]: temperature_30m = temperature.mean(['depth'])
#selected_data.mean(['time'])
temperature_30m

calculating min and max of temperature
    
```

EMODnet

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# RESULTS

	Species		
Variable	Laminaria digiata	Saccharina latissima	Sacchoriza polyschides
T [°C]	5-15 °C	5-15 °C	5-17 °C
	no more than 24 for 5 days	no more than 20 for 5 days	no more of 20 for 5 days
S [psu]	20-35 psu	24-35 psu	30-35
	no less than 5 fo 5 days	not less than 5 for 7 days	not less than 25
Nitrate	10-40 $\mu\text{M NO}_3^-$	10-30 $\mu\text{M NO}_3^-$	> 5 $\mu\text{M NO}_3^-$
Depth	4-40 meters	5-20 meters	first 5 meters
Currents	> 25 cm/s	> 25 cm/s (the higher the better)	> 25 cm/s

Kerrison, P.D., M.S. Stanley, M.D. Edwards, K.D. Black, A.D. Hughes (2015).

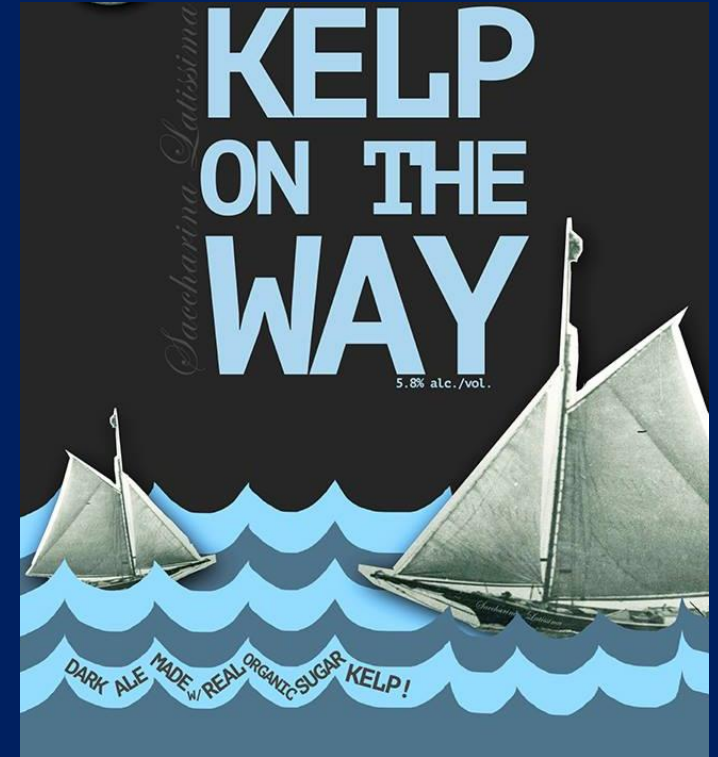
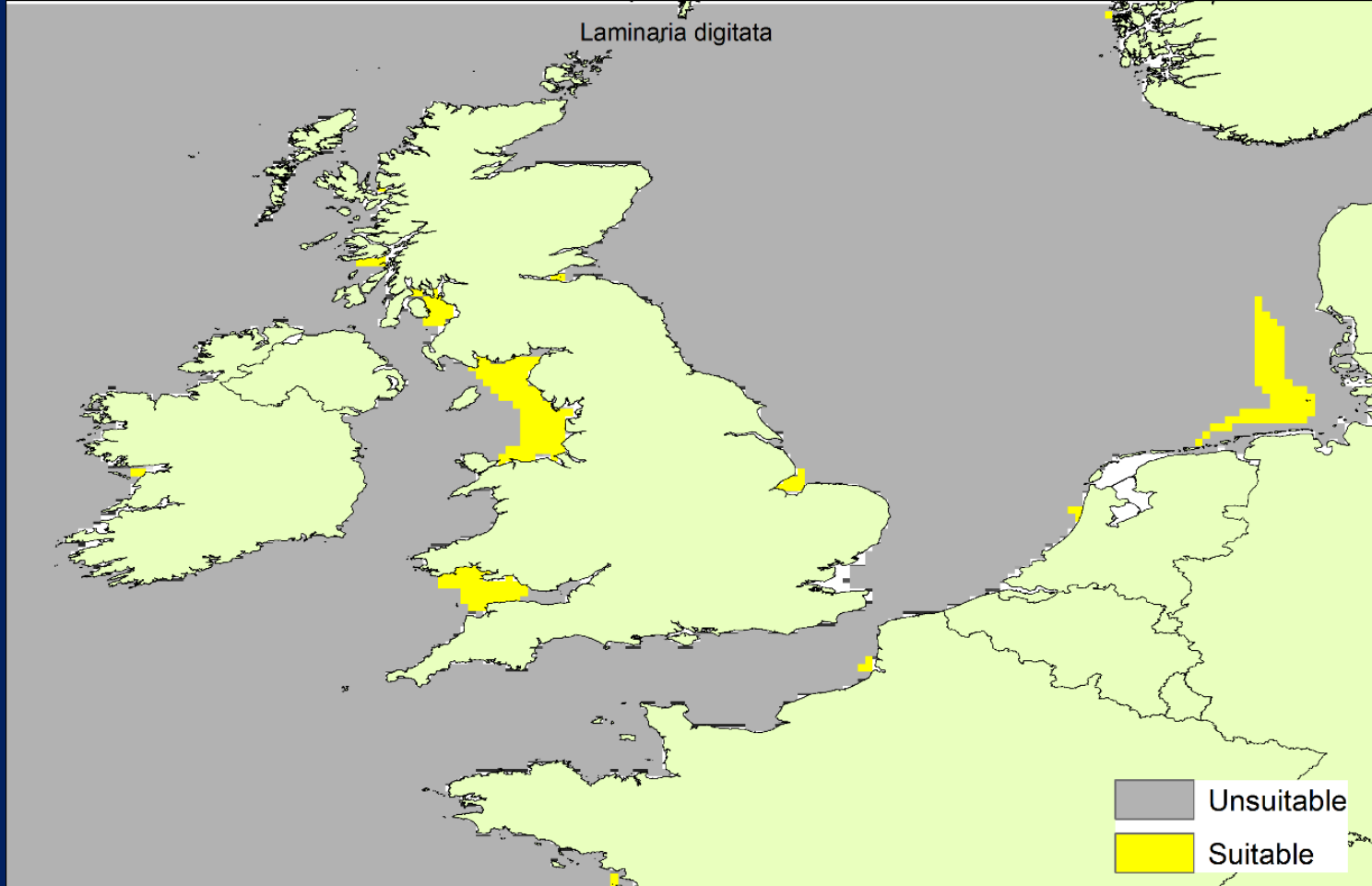
The cultivation of European kelp for bioenergy: Site and species selection. *Biomass Bioenergy*, 80, 229–242.



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# RESULTS



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# FUTURE STEPS

- Three species assessment
- Final index calculating
- More Blue jobs!



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# THANK YOU!



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