



# Phenologically distinct phytoplankton regions on the Faroe Shelf

- identified by satellite data and *in-situ* observations



Karin Larsen



**HAVSTOVAN**  
FAROE MARINE RESEARCH INSTITUTE



Bogi Hansen



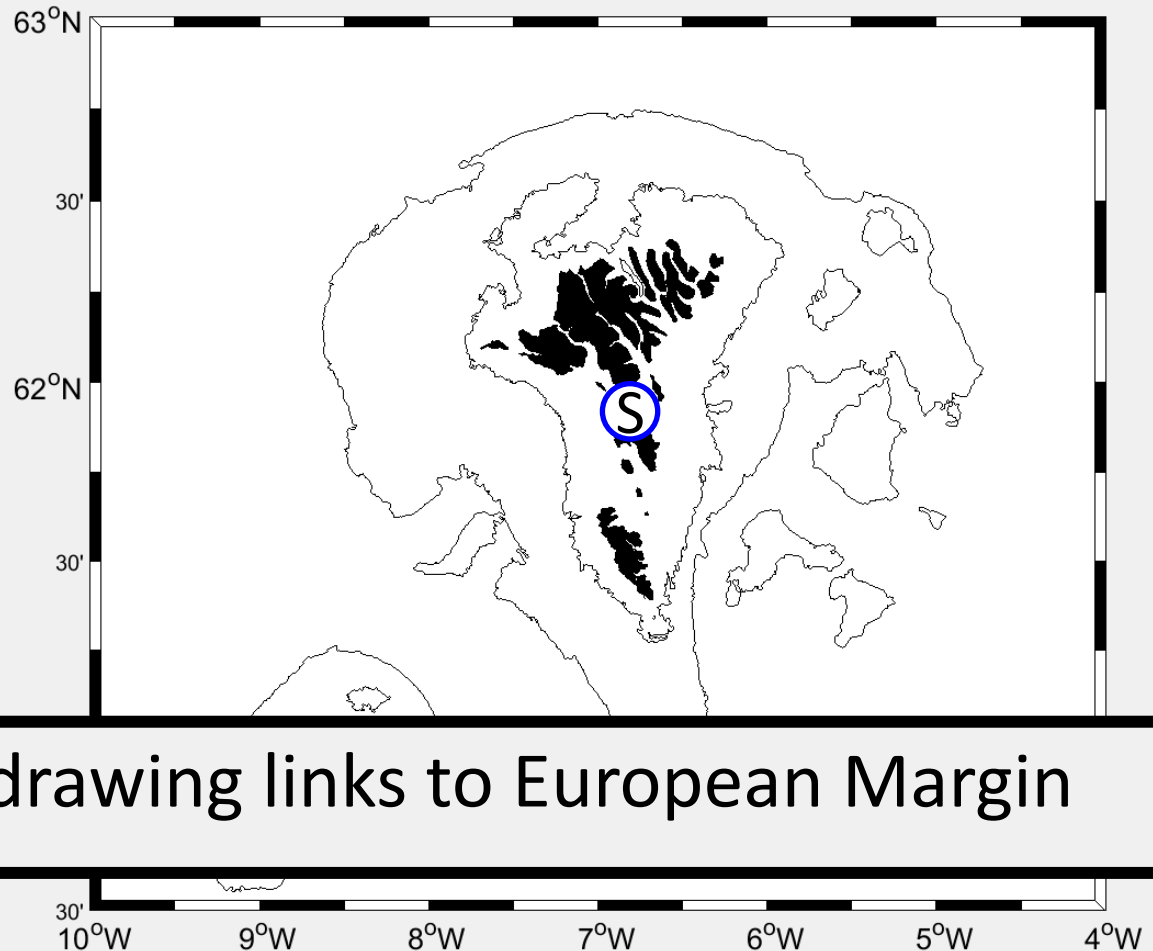
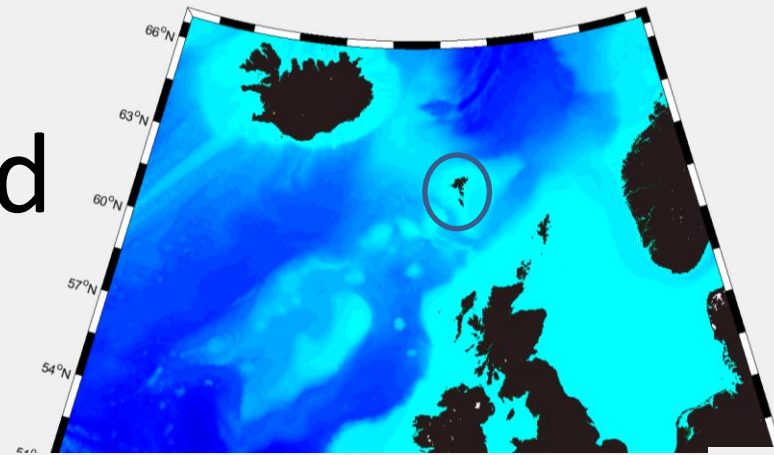
Sólvá Káradóttir Eliassen



Hjalmar Hátún

# Background

- Faroe Islands in NE. Atlantic
- Phytoplankton phenology well known at coastal station S
- Farther off-shore ?



- Useful local study drawing links to European Margin

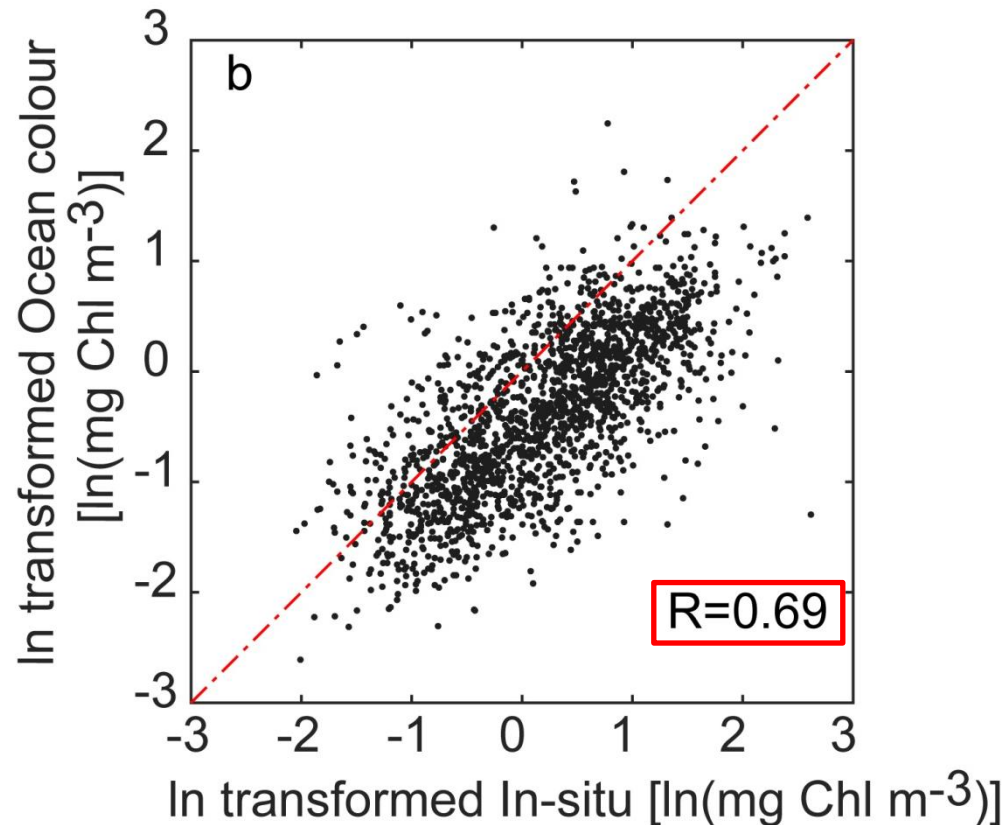
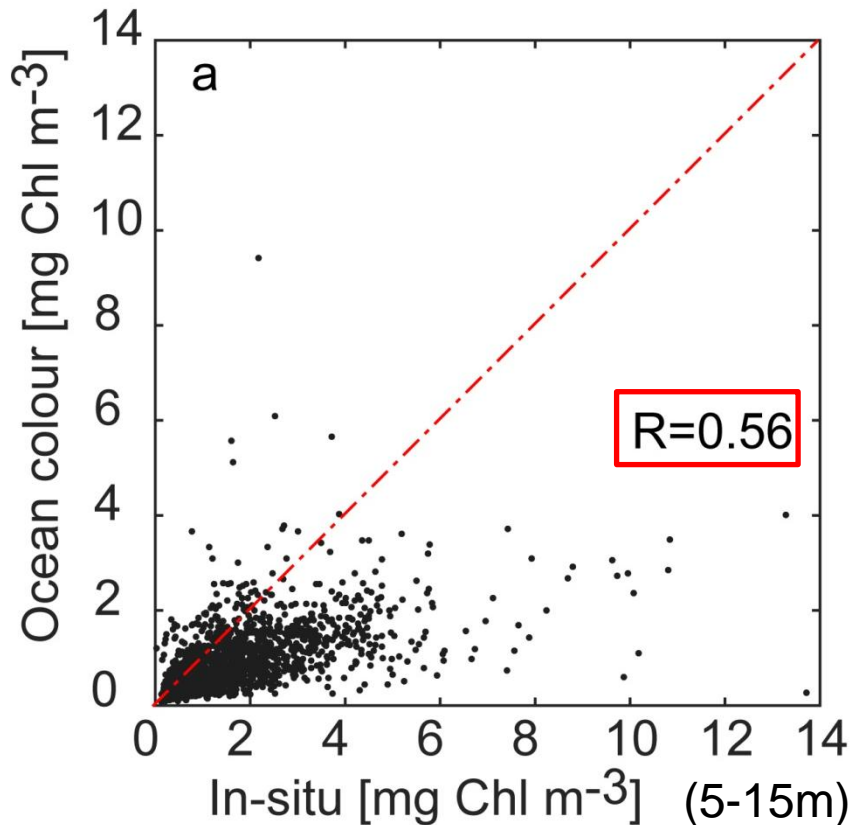
# Satellite data

- Satellite data 1998-2015
- 8-days average, 4-km grid spacing, merged data from <http://marine.copernicus.eu/>

# Results

- Comparison of *in-situ* data and Ocean Colour data

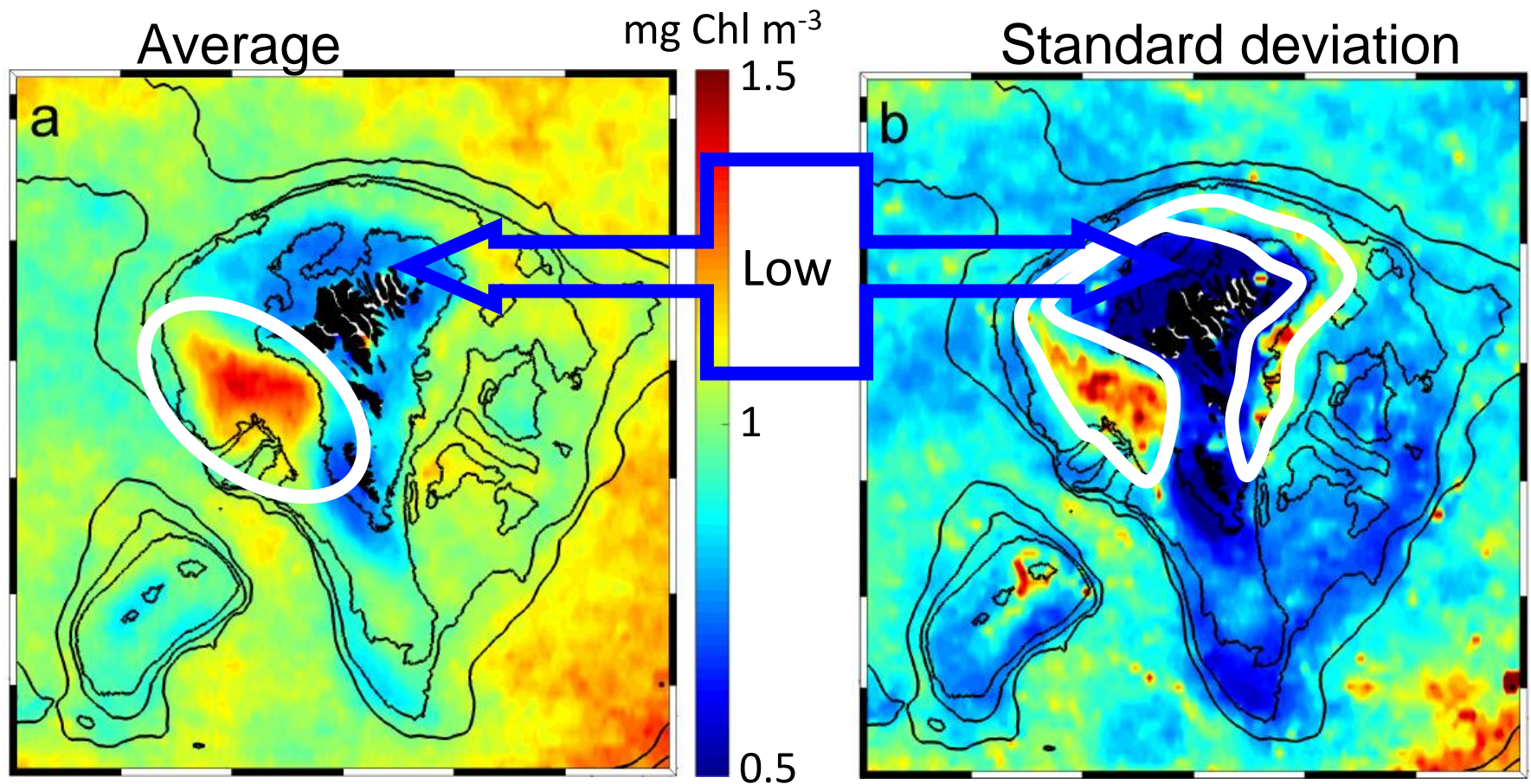
1739 flu-profiles coincide with ocean colour observation



- Satellite data are generally lower, but capture relative differences

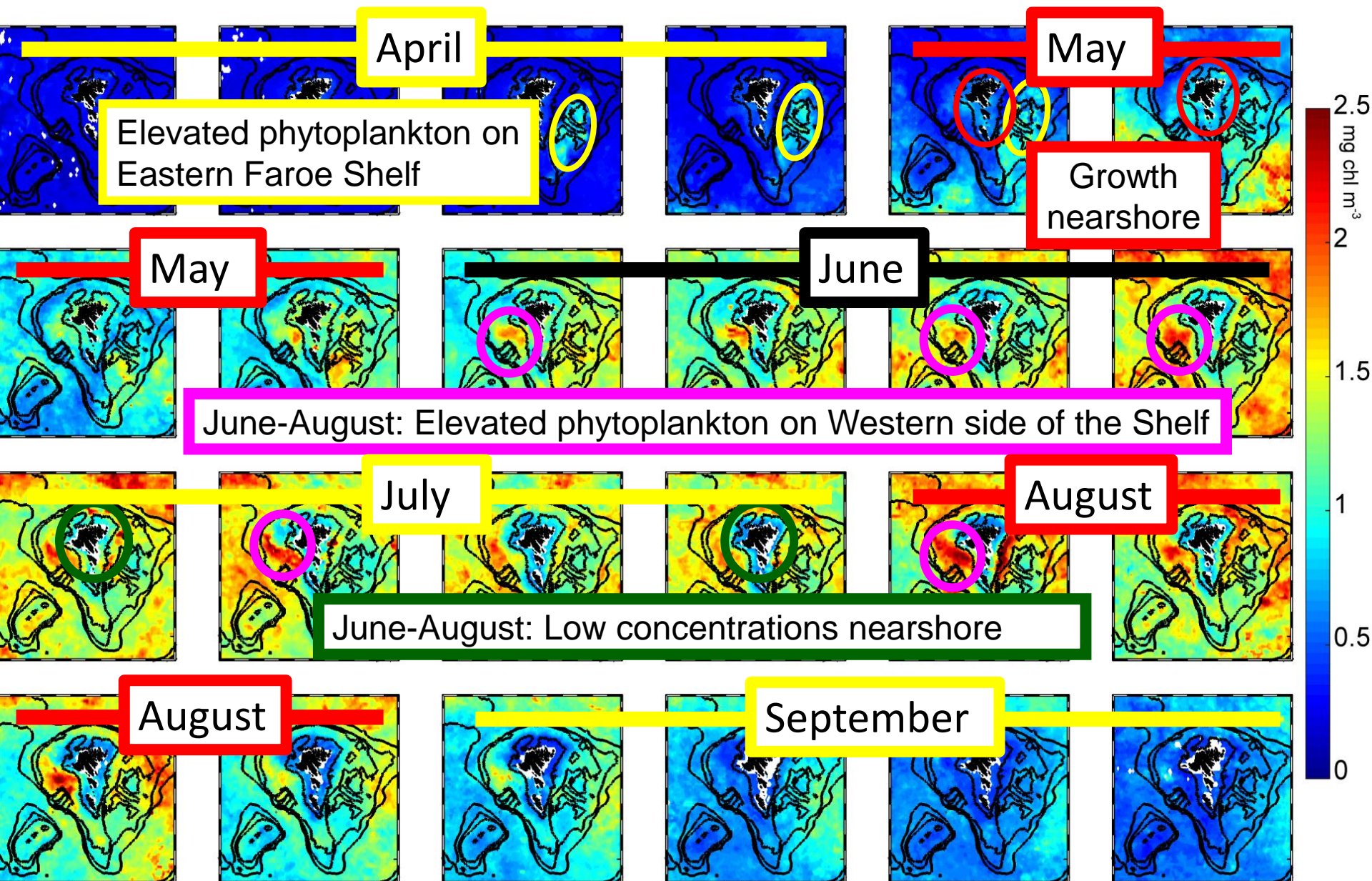
# Chlorophyll statistics

March-September 1998-2015





# 8-days Climatology



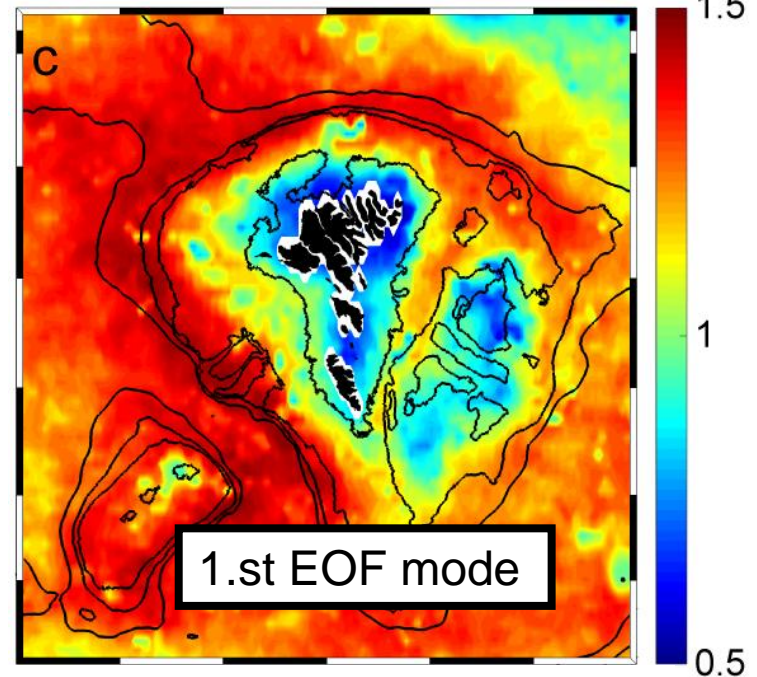
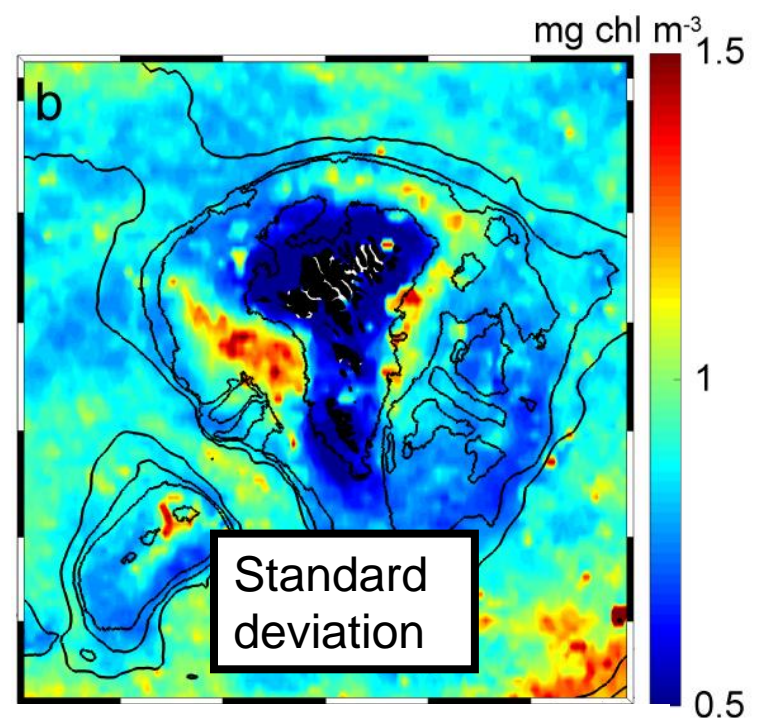
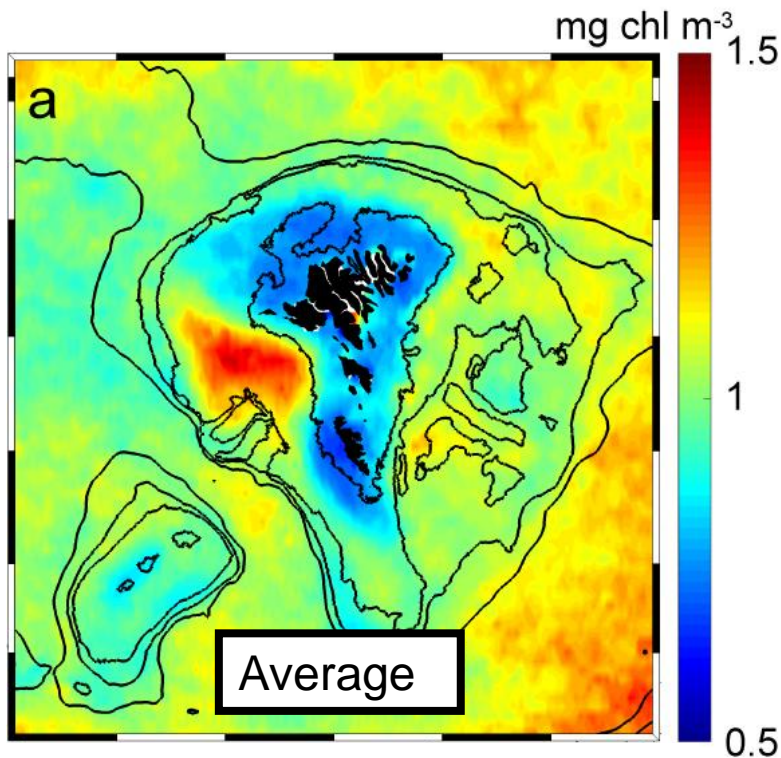
# Identification of distinct areas

- Central Shelf
- Eastern Banks
- Western Region
  - related to Outer Shelf

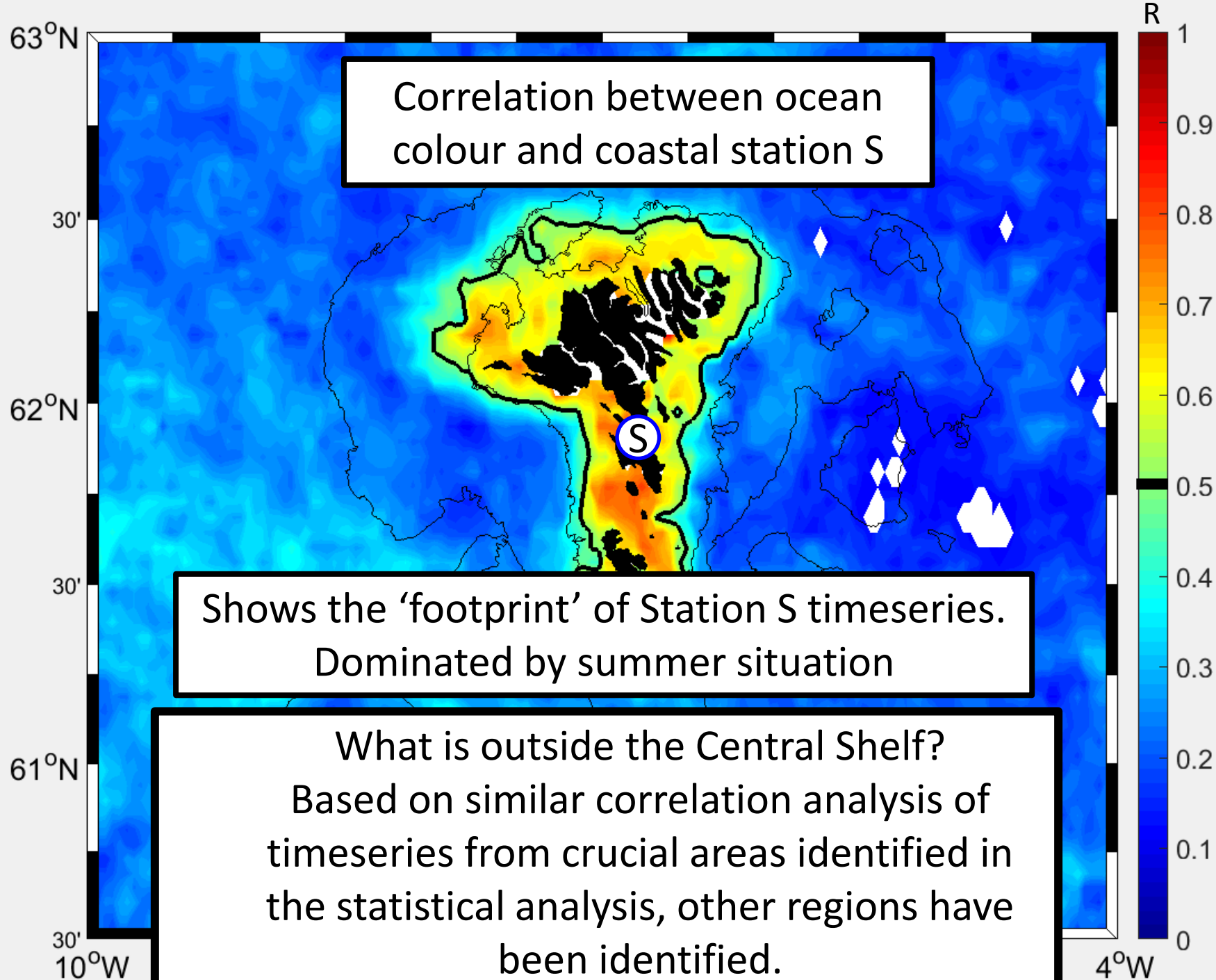


# Central Shelf

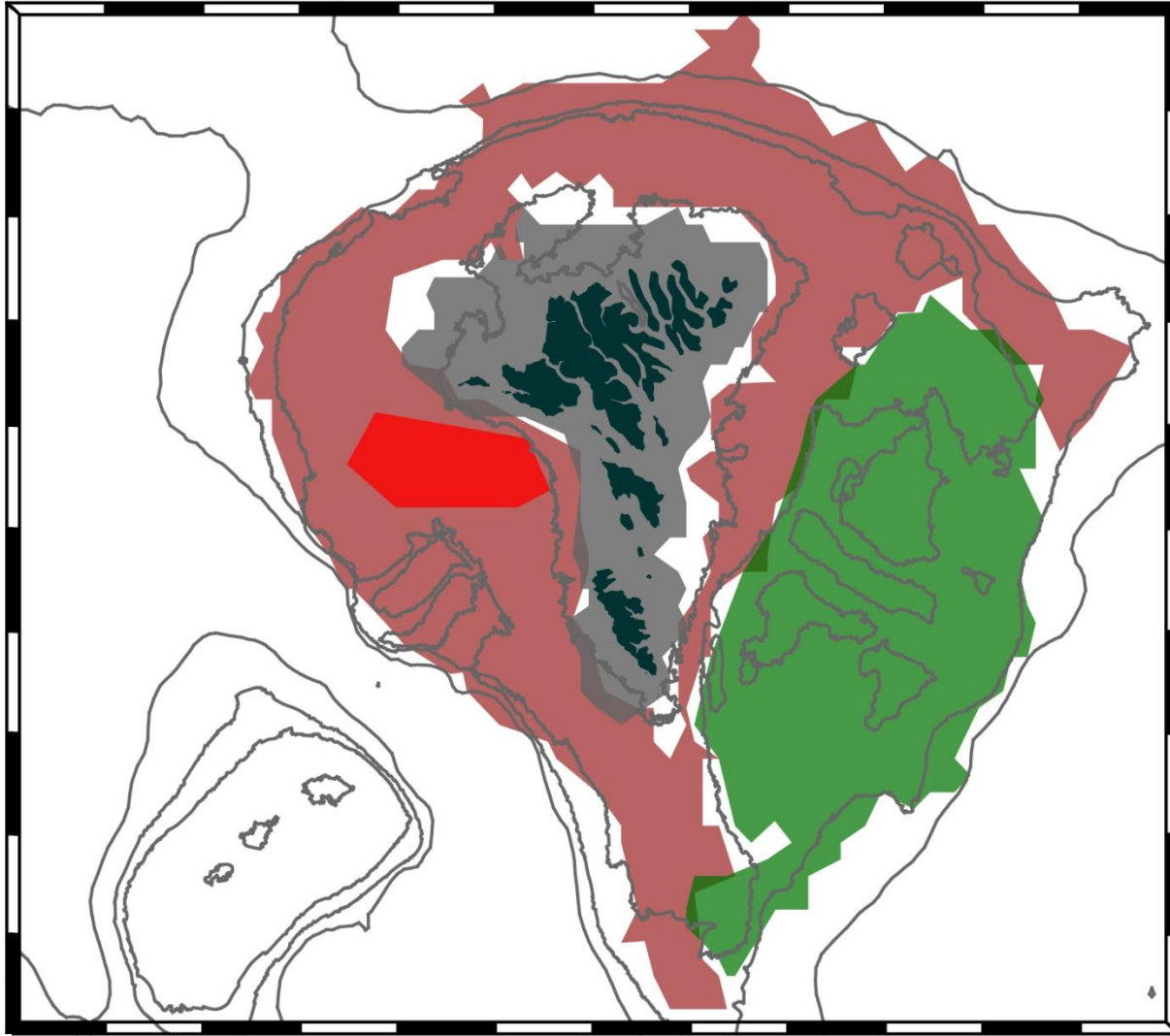
- Low average chlorophyll
- Low standard deviation
- Visible in first EOF mode
- How far out does it extend?







# Three main regions

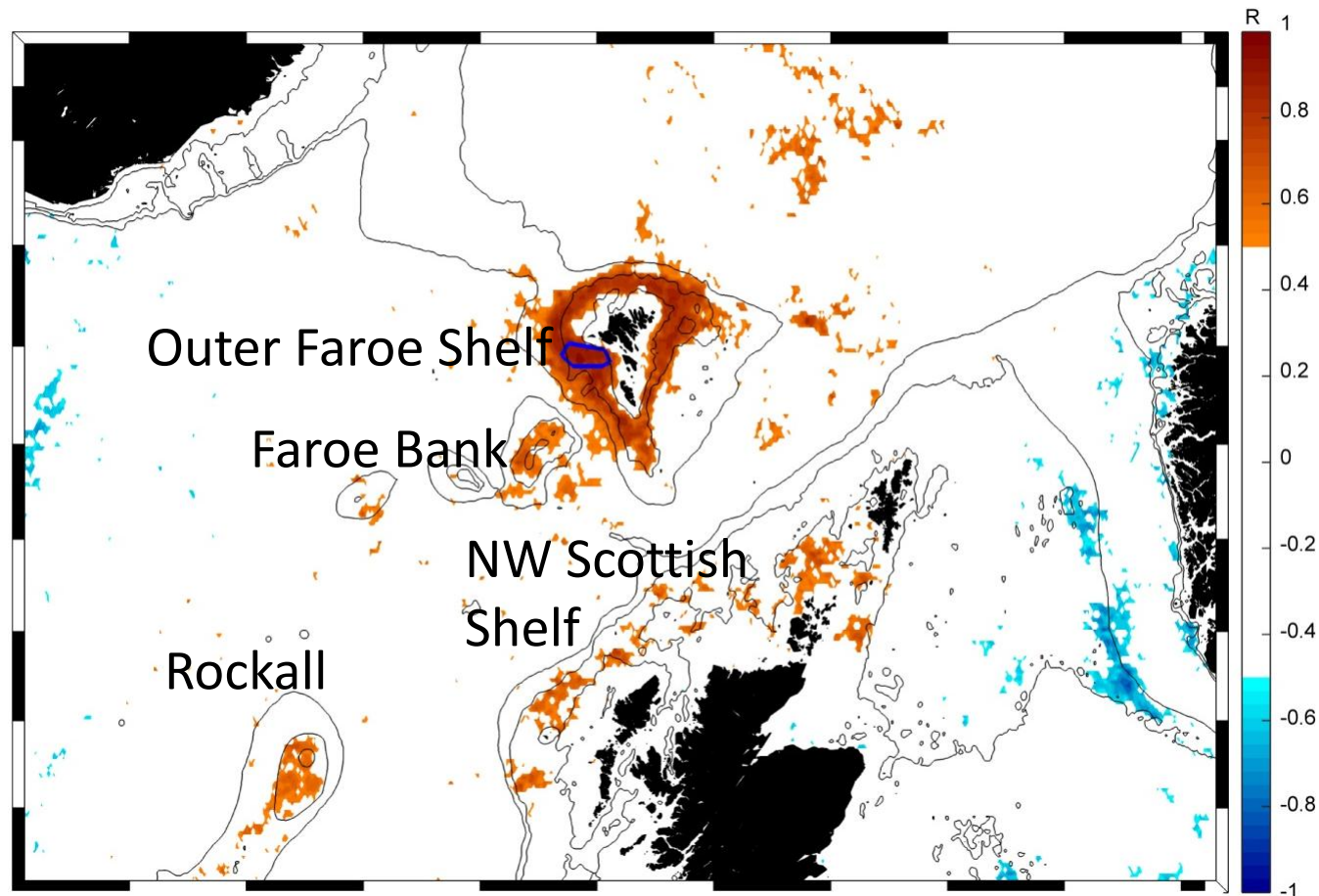


Central Shelf  
Eastern Banks  
Western Region  
- related to  
Outer Shelf

Altogether these  
cover the whole  
shelf within  
approximately  
300 m isobath

# Open Ocean

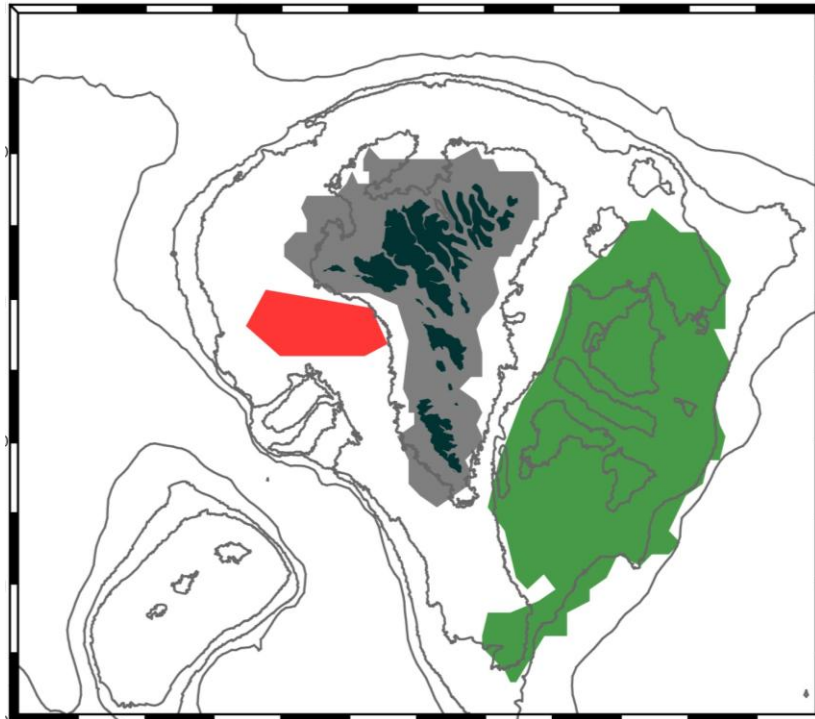
- Are there any similarities with areas around us?
- Annual mean from Western Region correlates to:



- Interesting link to European margin
- Possibly due to the same oceanic water masses supplying nutrients to both Faroe and NW Scottish Shelf?



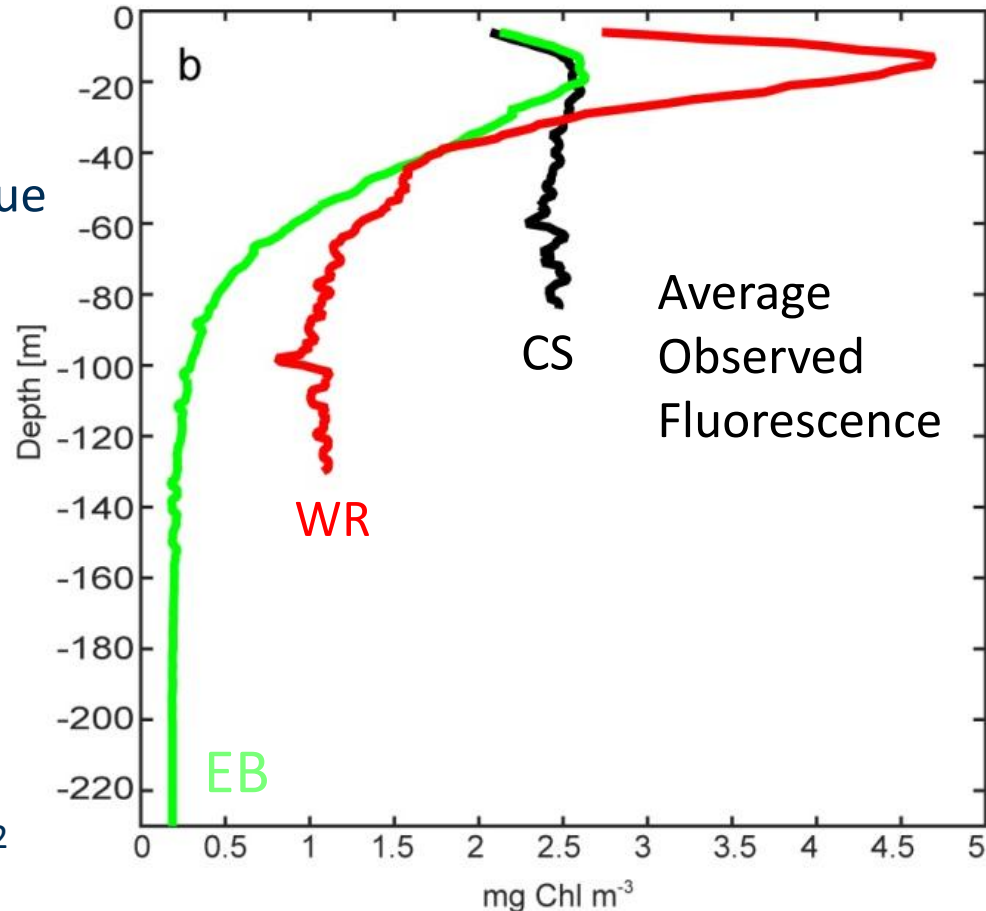
- Clear surface pattern from satellite data – how does it look sub-surface?
- Fluorescence profiles give a picture of vertical phytoplankton distribution



# Vertical June picture

## Central Shelf, Eastern Banks and Western Region

- Central Shelf phytoplankton is well-mixed in water column.
- Eastern Banks and Western Region: phytoplankton only in upper layer due to stratification
- Particularly high phytoplankton concentration in upper layer in Western Region
- Biomass =  $\langle D \rangle * \langle chl \rangle$
- In June
  - Central Shelf:  $7.4 \pm 0.5 \text{ g C m}^{-2}$
  - Eastern Banks:  $6.1 \pm 0.7 \text{ g C m}^{-2}$
  - Western Region:  $7.7 \pm 1.3 \text{ g C m}^{-2}$

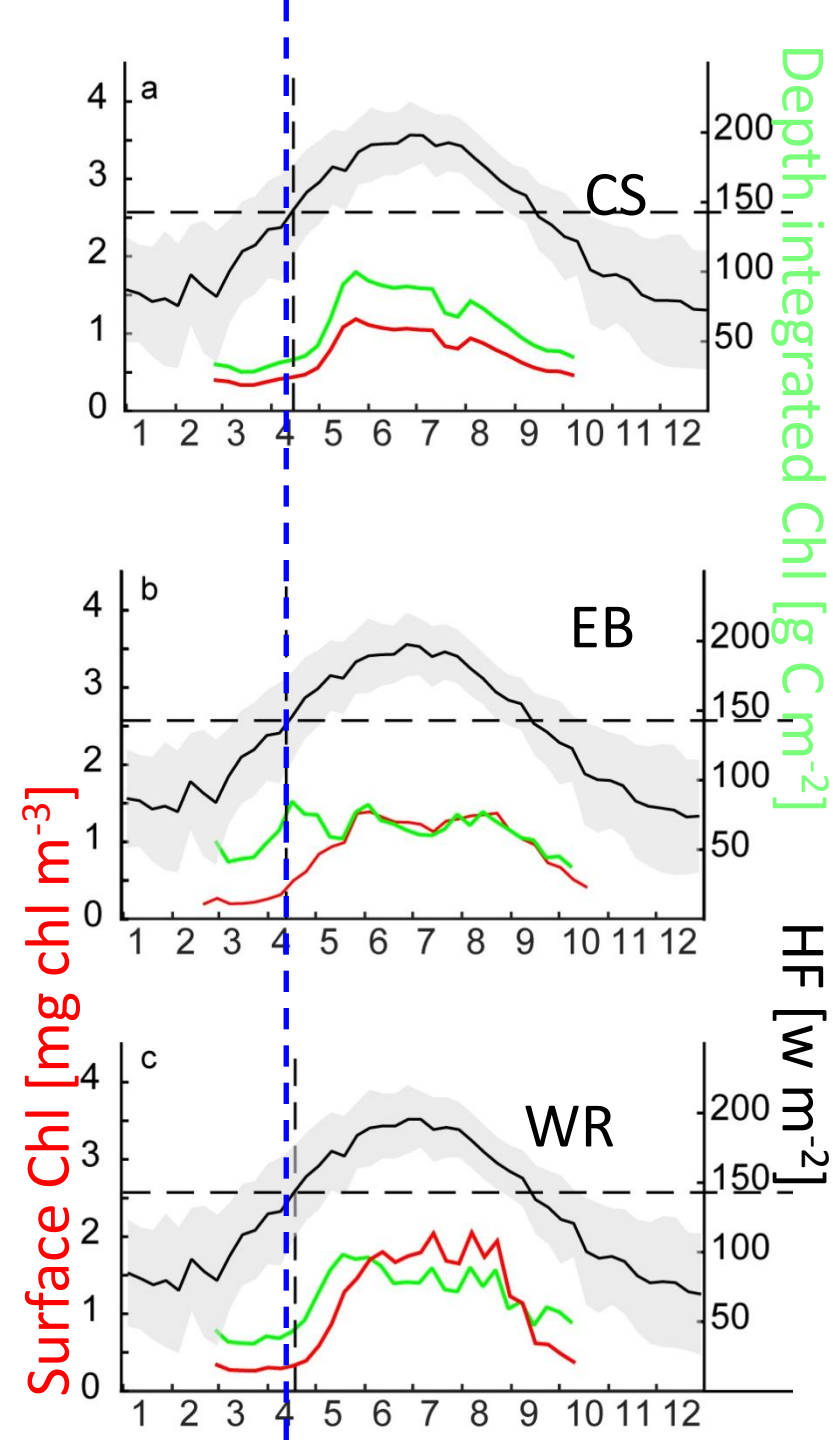


Integrated biomass of similar magnitudes  
in June in all three regions

Same throughout the year

# Average conditions in the three regions

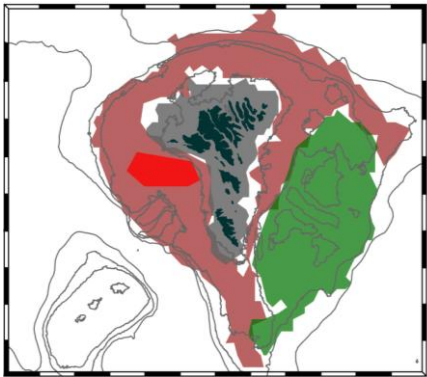
- Positive HF initiates bloom in EB





# Conclusions and Outlook

Ocean Colour  
corresponds to *in-situ* observations  
-Perhaps too low



Regions help explain differences in  
geographical patterns of fish

Unique regions are identified on the  
Faroe Shelf based on Ocean Colour  
data

Different surface patterns but  
depth-integrated biomass of  
comparable magnitude.

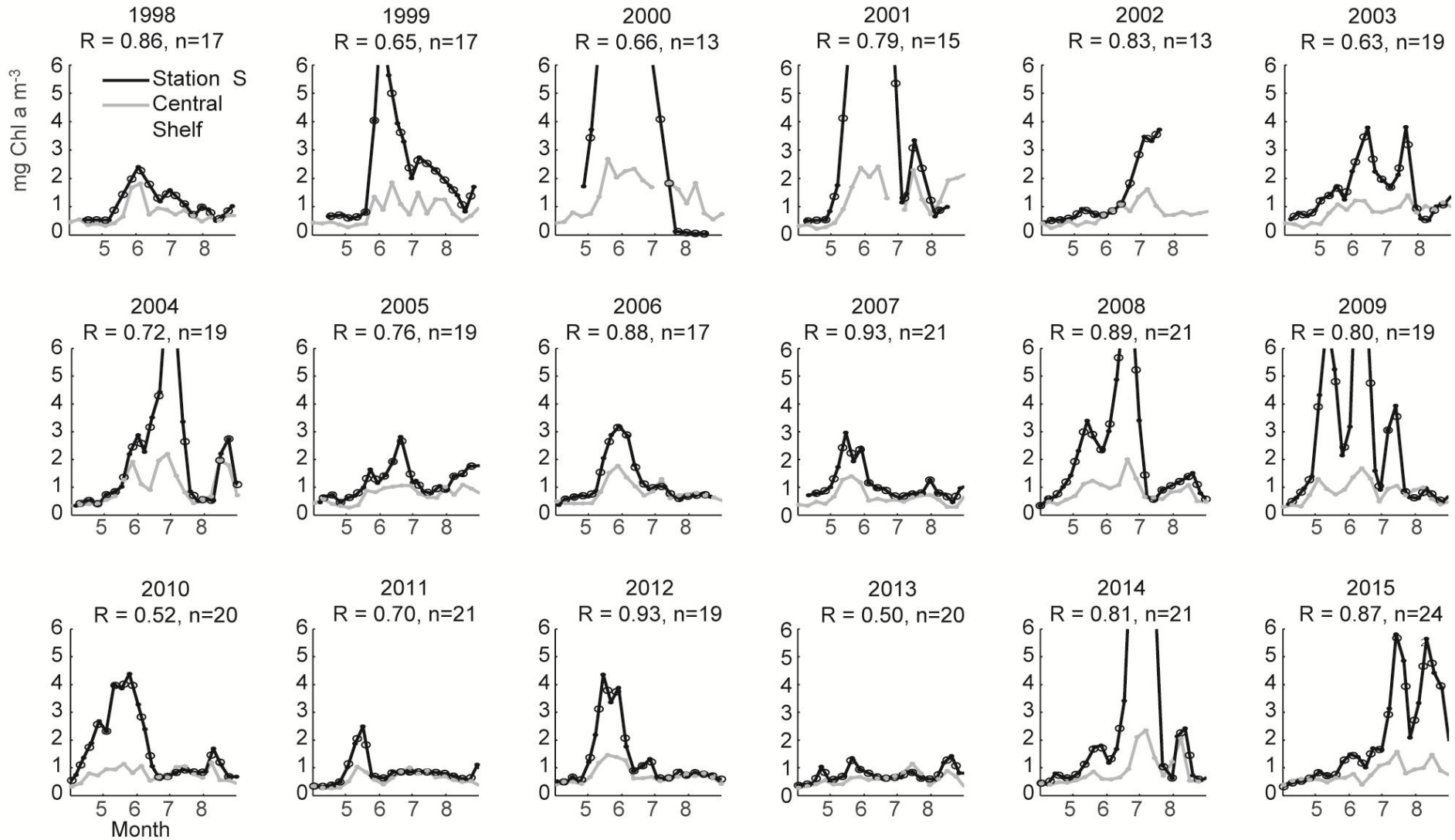
## Outlook:

- Further investigation of bloom on the *Outer Shelf* - in progress
- Investigation of how water masses are exchanged between the *Outer Shelf* and the other regions
- The positive relationship between the Outer Faroe Shelf and the European margin should be further investigated

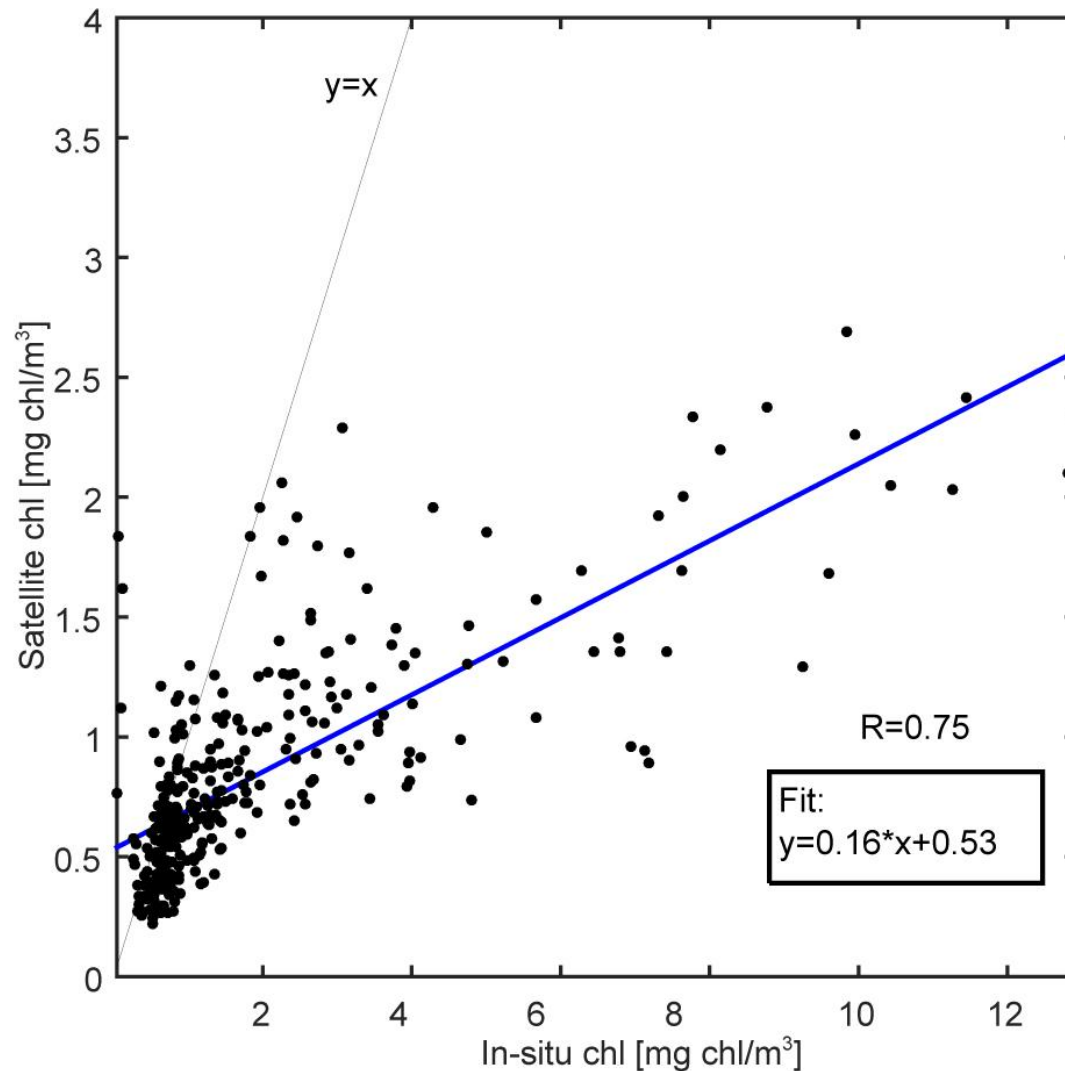
# Thank you



# Relationship between Station S and ocean colour inside R=0.5 isoline







### Comparison of all *insitu*

observations from station S and corresponding satellite chl observations averaged over the *Central Shelf*, 1998-2015.

