



# Phenologically distinct phytoplankton regions on the Faroe Shelf

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



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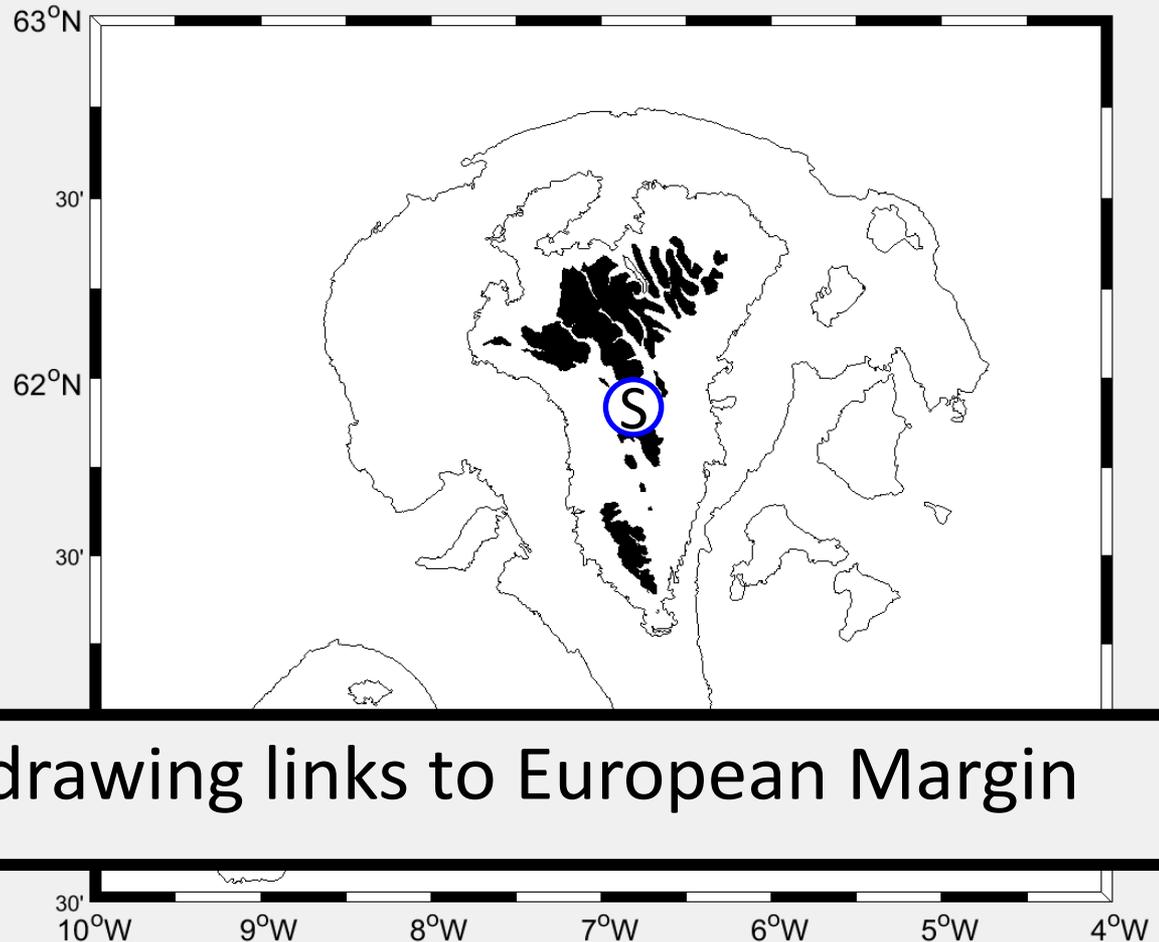
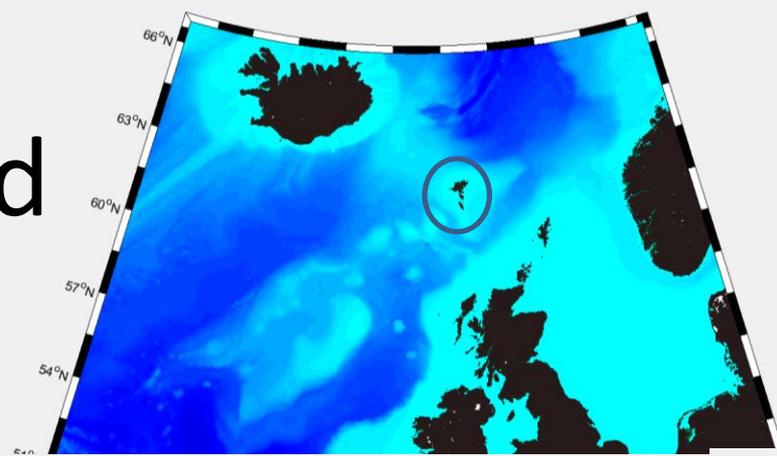
Hjalmar Hátún

Sólvá Káradóttir Eliassen



# 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

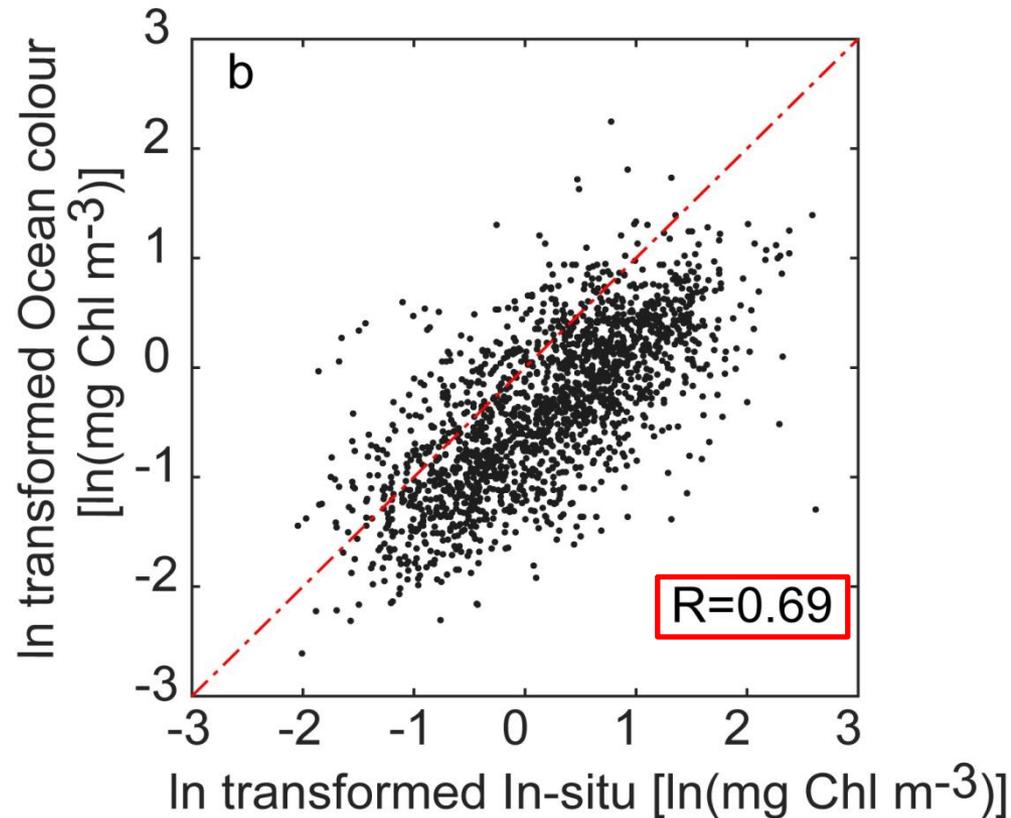
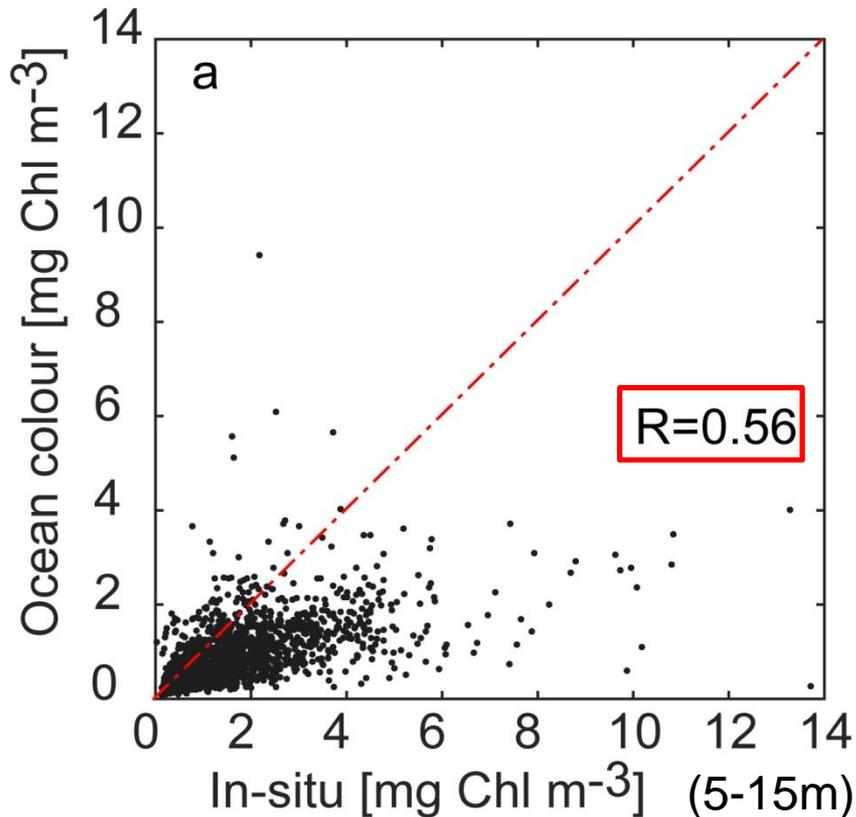
# Satellite data

- 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

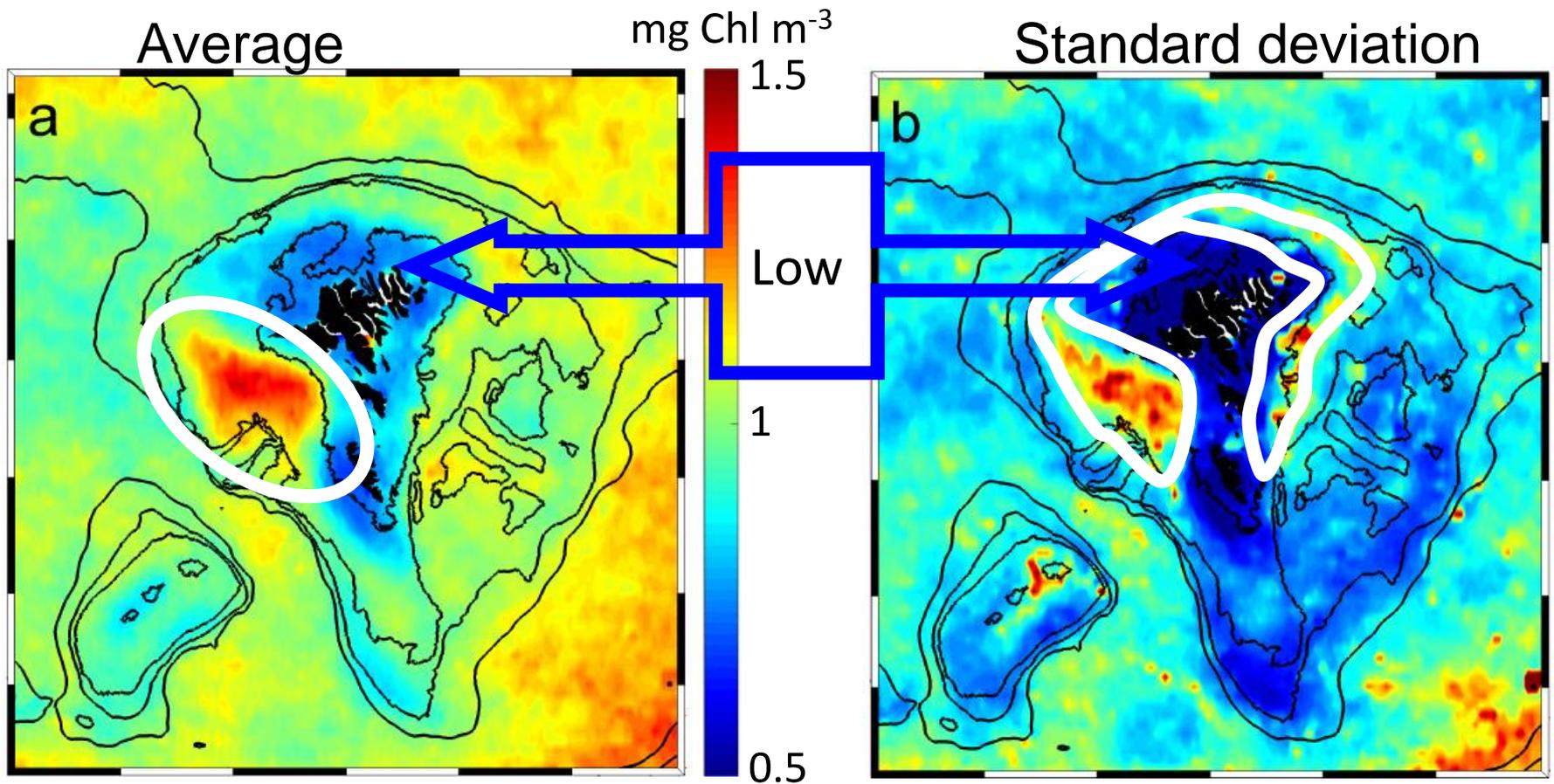
1739 flu-profiles coincide with ocean colour observation



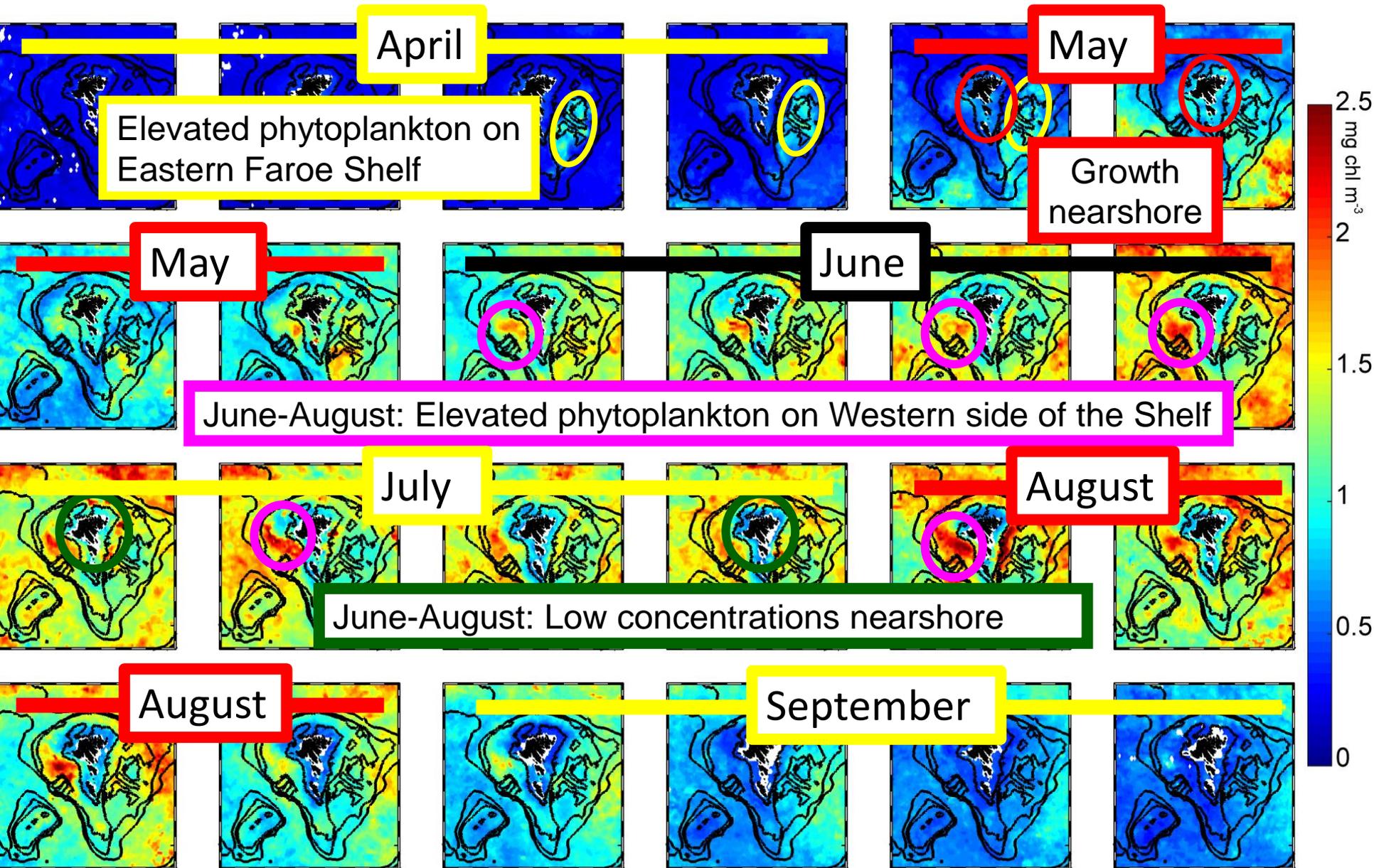
- Satellite data are generally lower, but capture relative differences

# Chlorophyll statistics

March-September 1998-2015



# 8-days Climatology

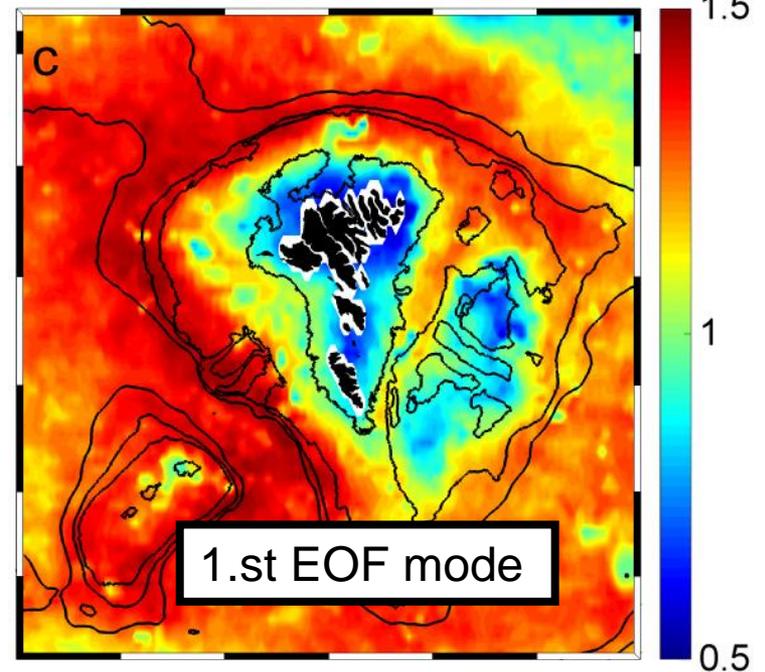
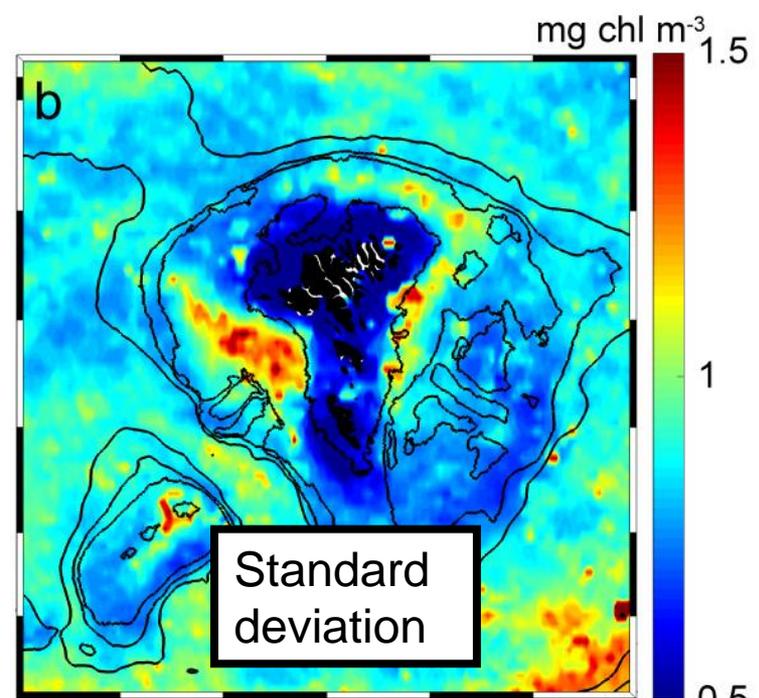
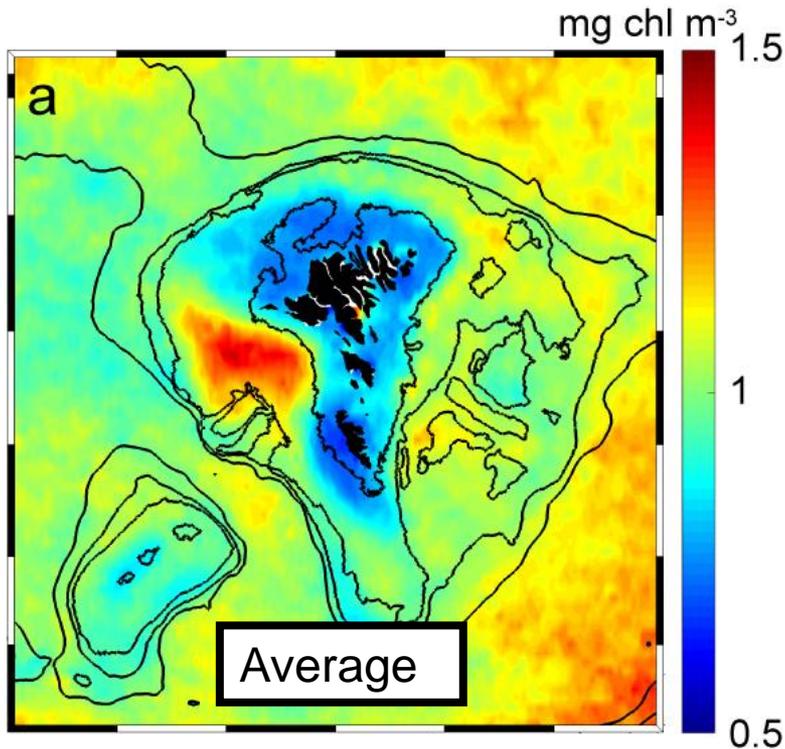


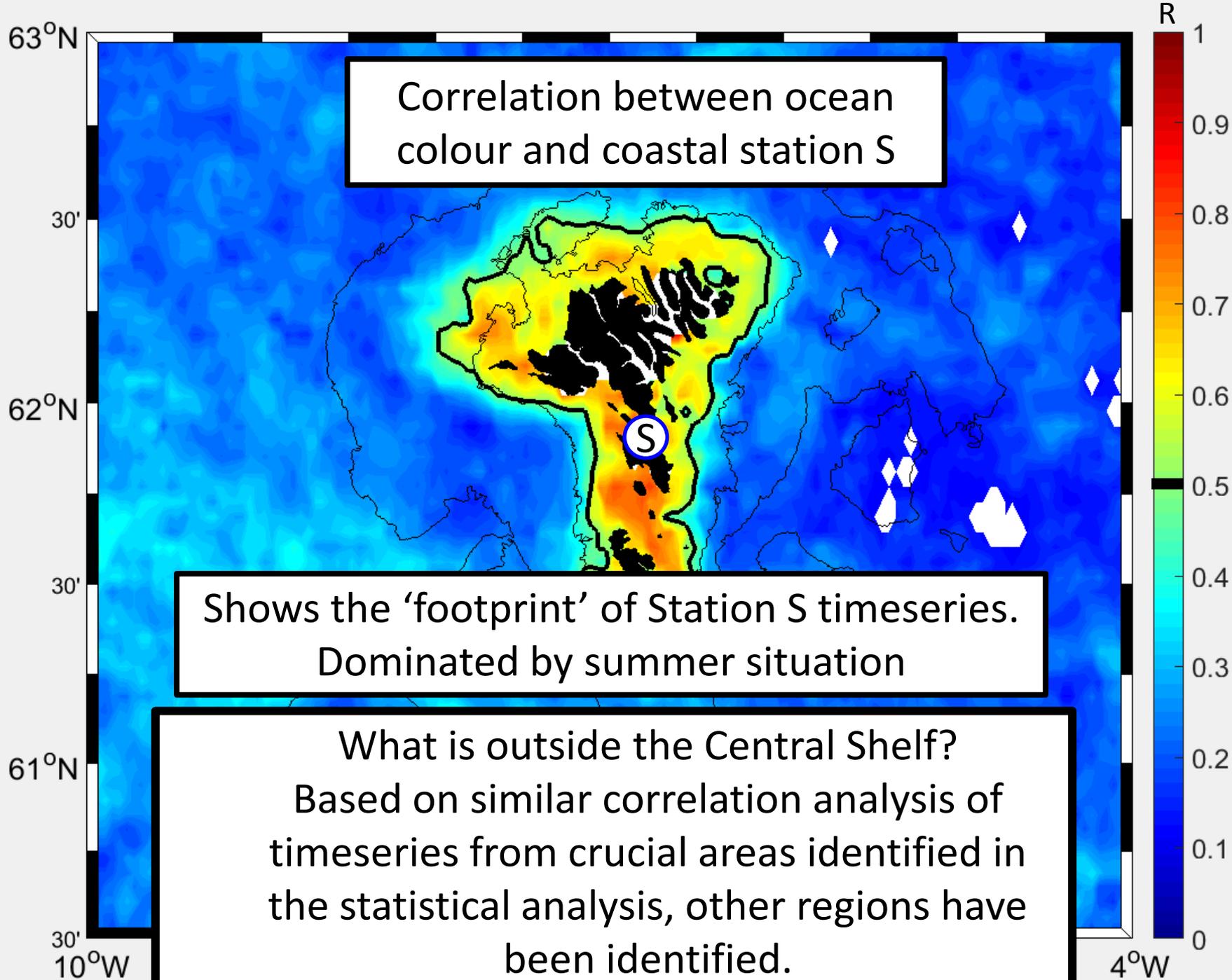
# Identification of distinct areas

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

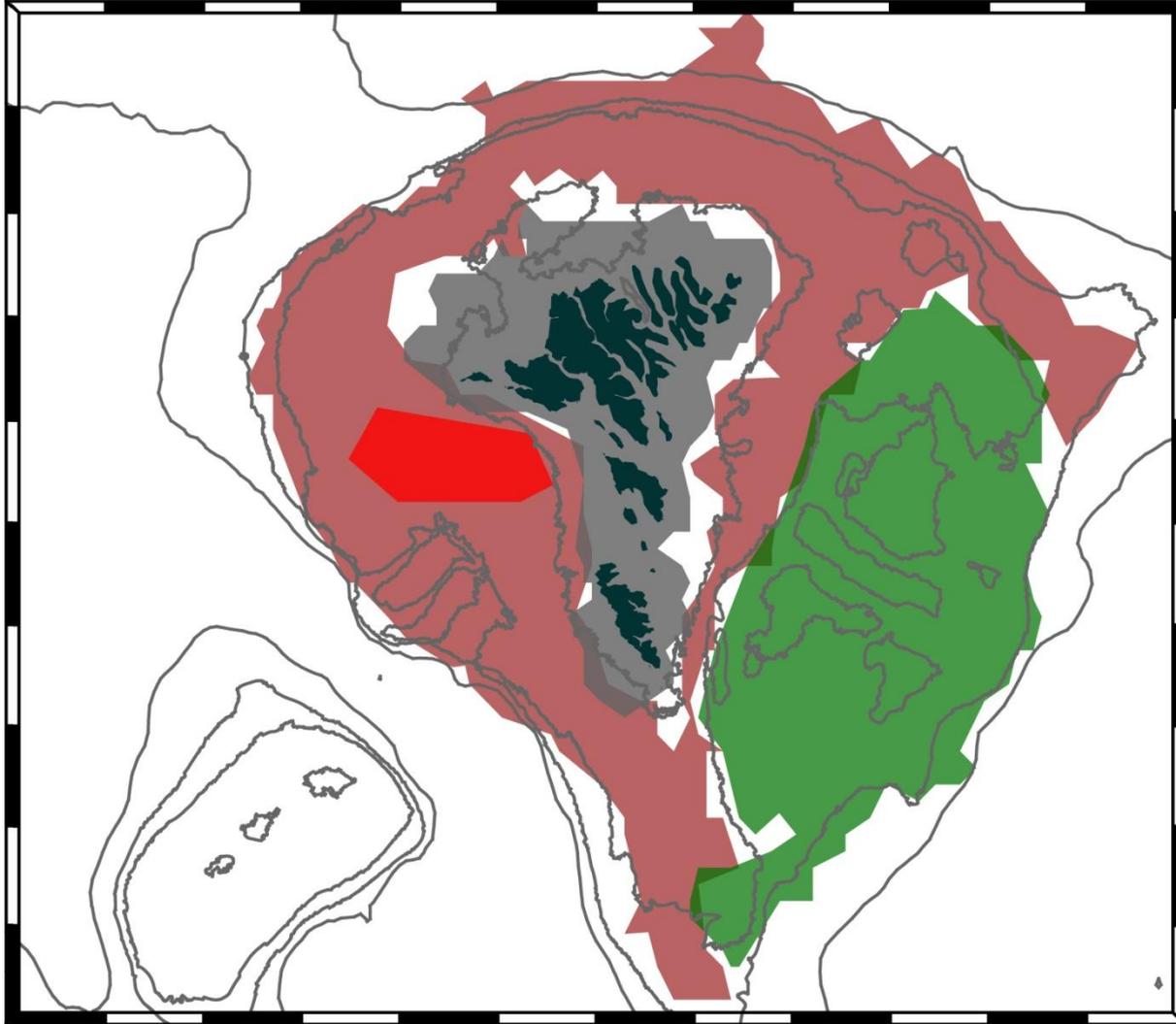
# Central Shelf

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





# Three main regions

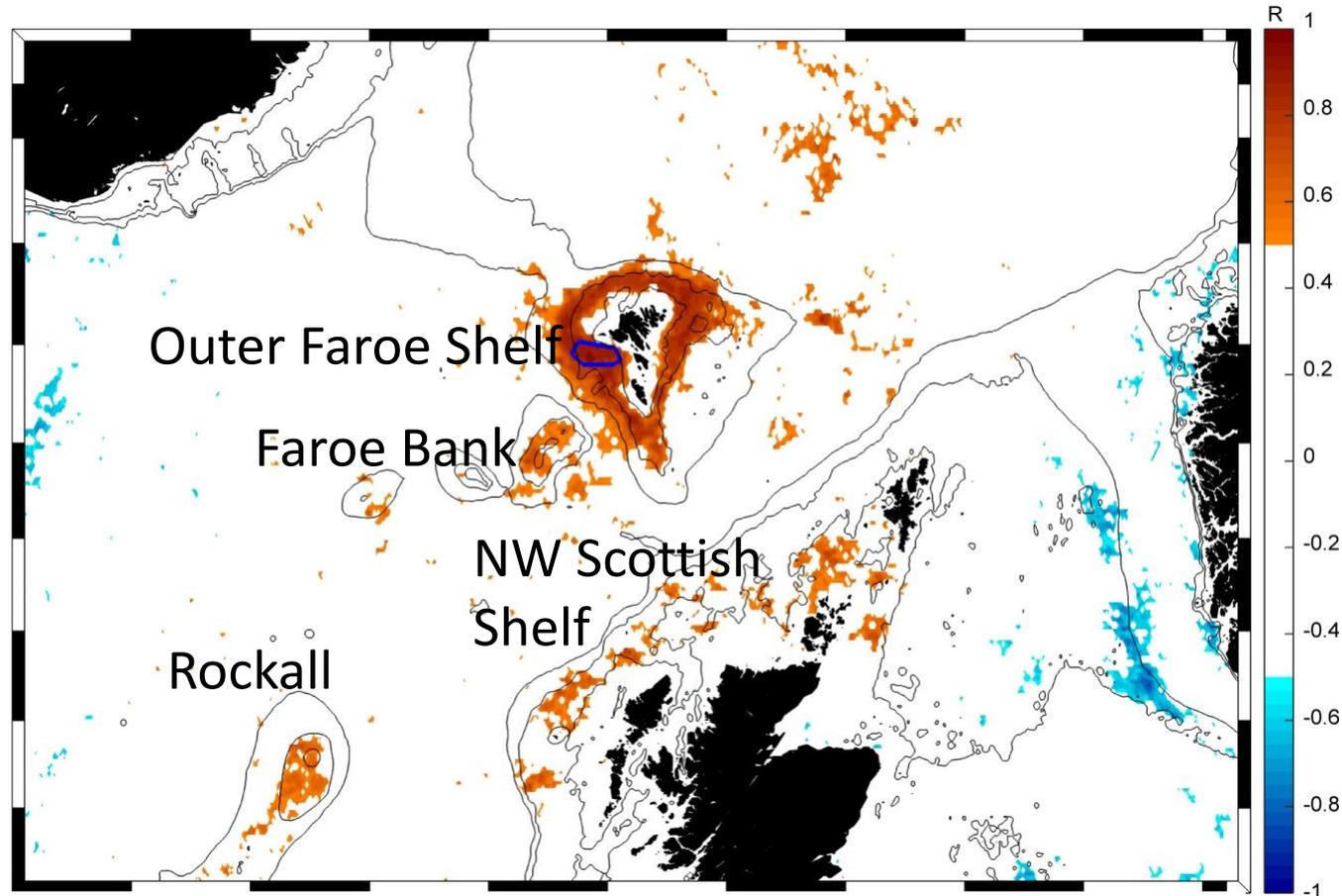


Central Shelf  
Eastern Banks  
Western Region  
- related to  
Outer Shelf

Altogether these  
cover the whole  
shelf within  
approximately  
300 m isobath

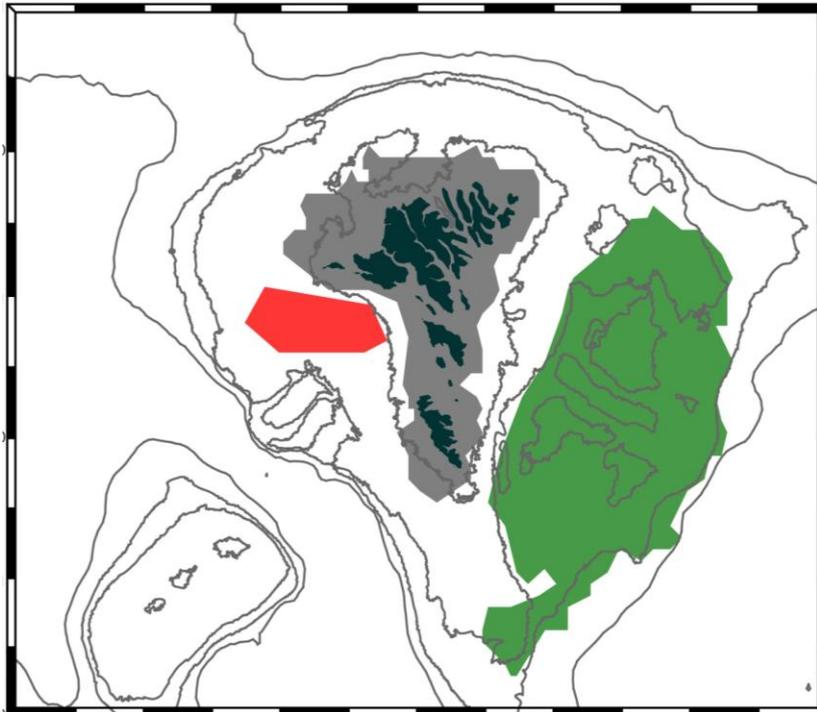
# Open Ocean

- 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?

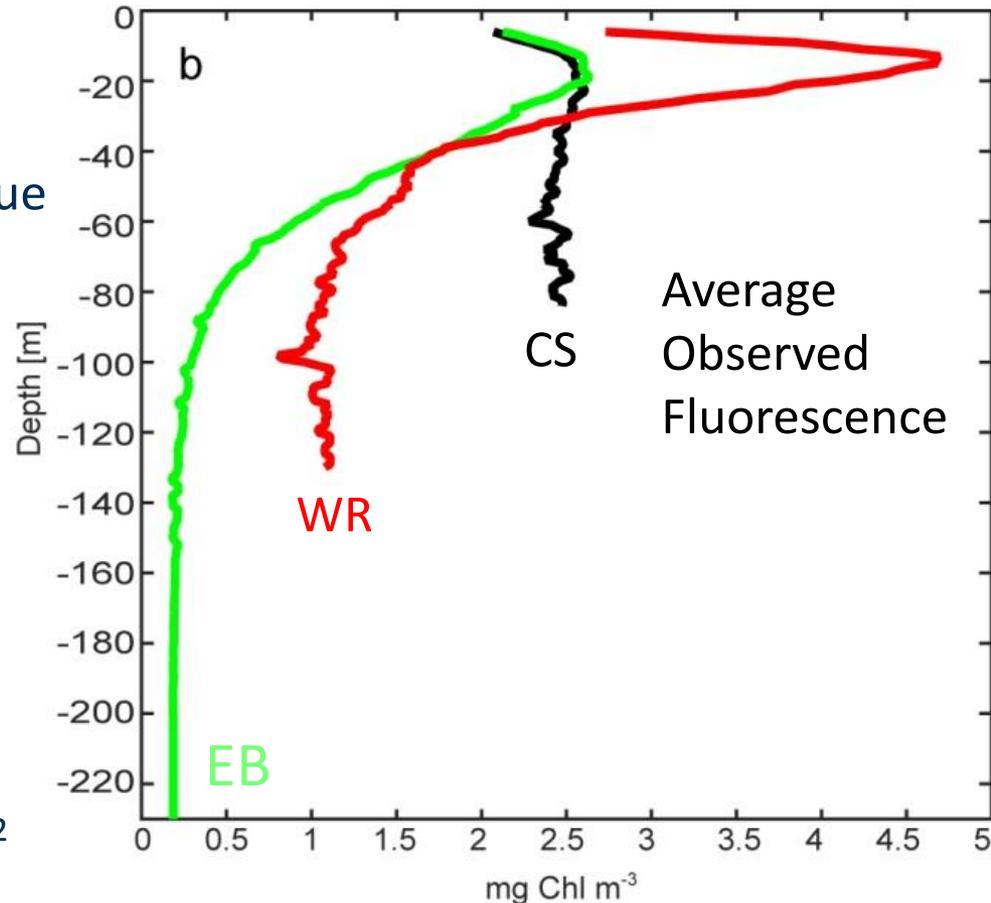
- Clear surface pattern from satellite data – how does it look sub-surface?
- Fluorescence profiles give a picture of vertical phytoplankton distribution



# 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:  $7.7 \pm 1.3 \text{ g C m}^{-2}$

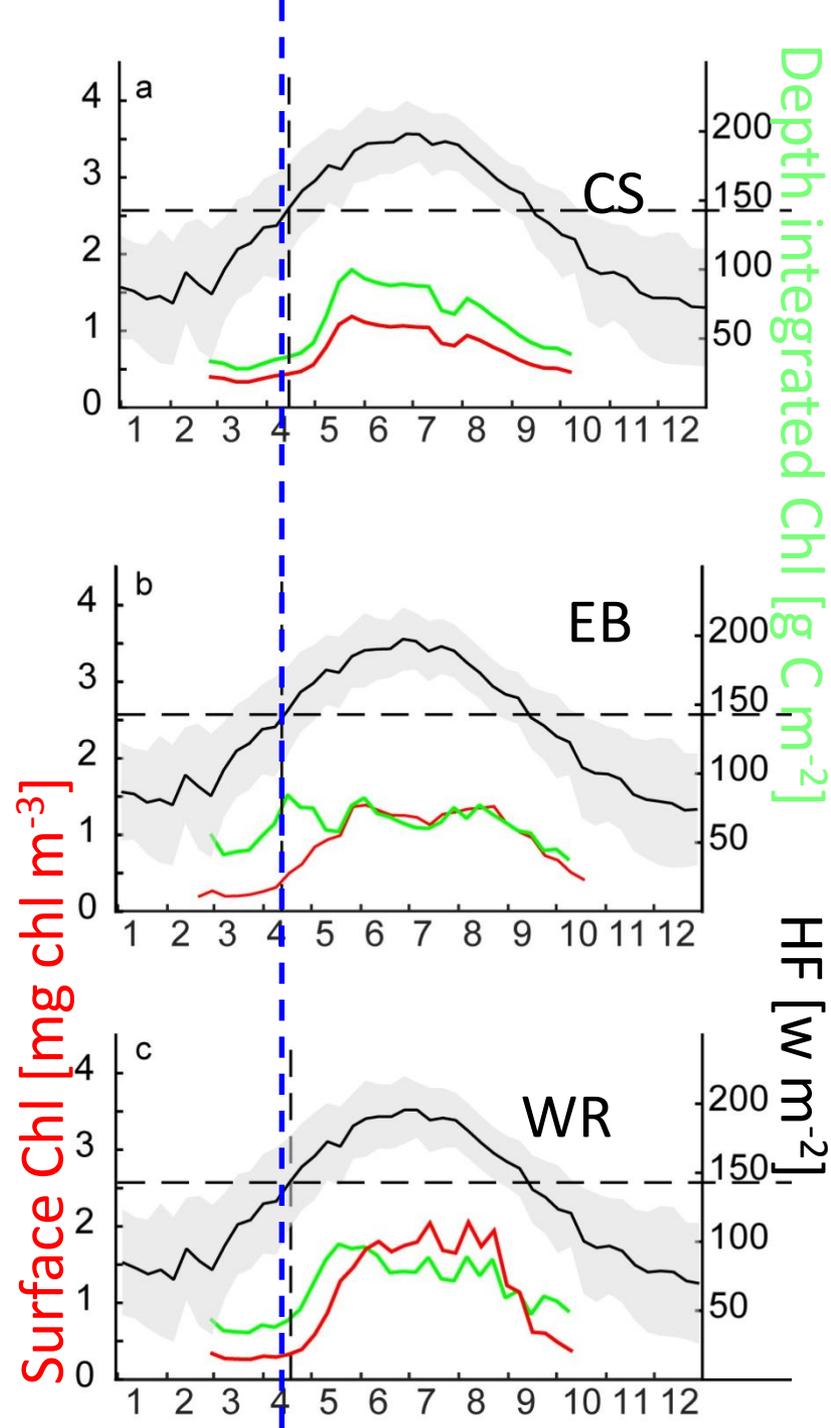


Integrated biomass of similar magnitudes  
in June in all three regions

Same throughout the year

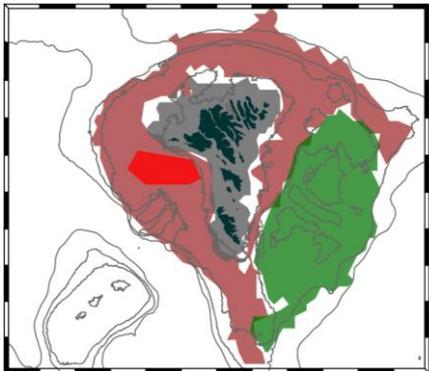
# Average conditions in the three regions

- 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.

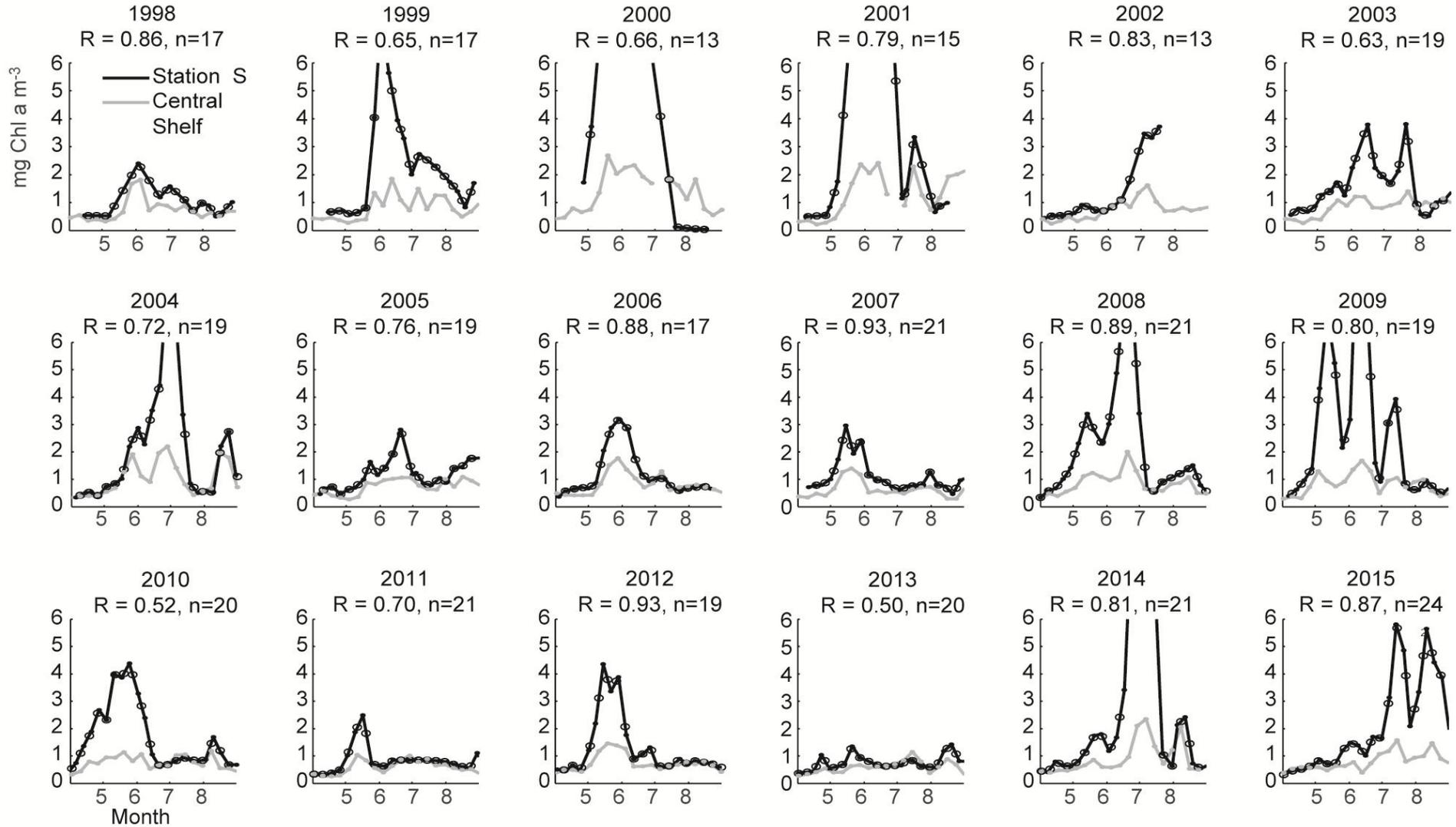
## Outlook:

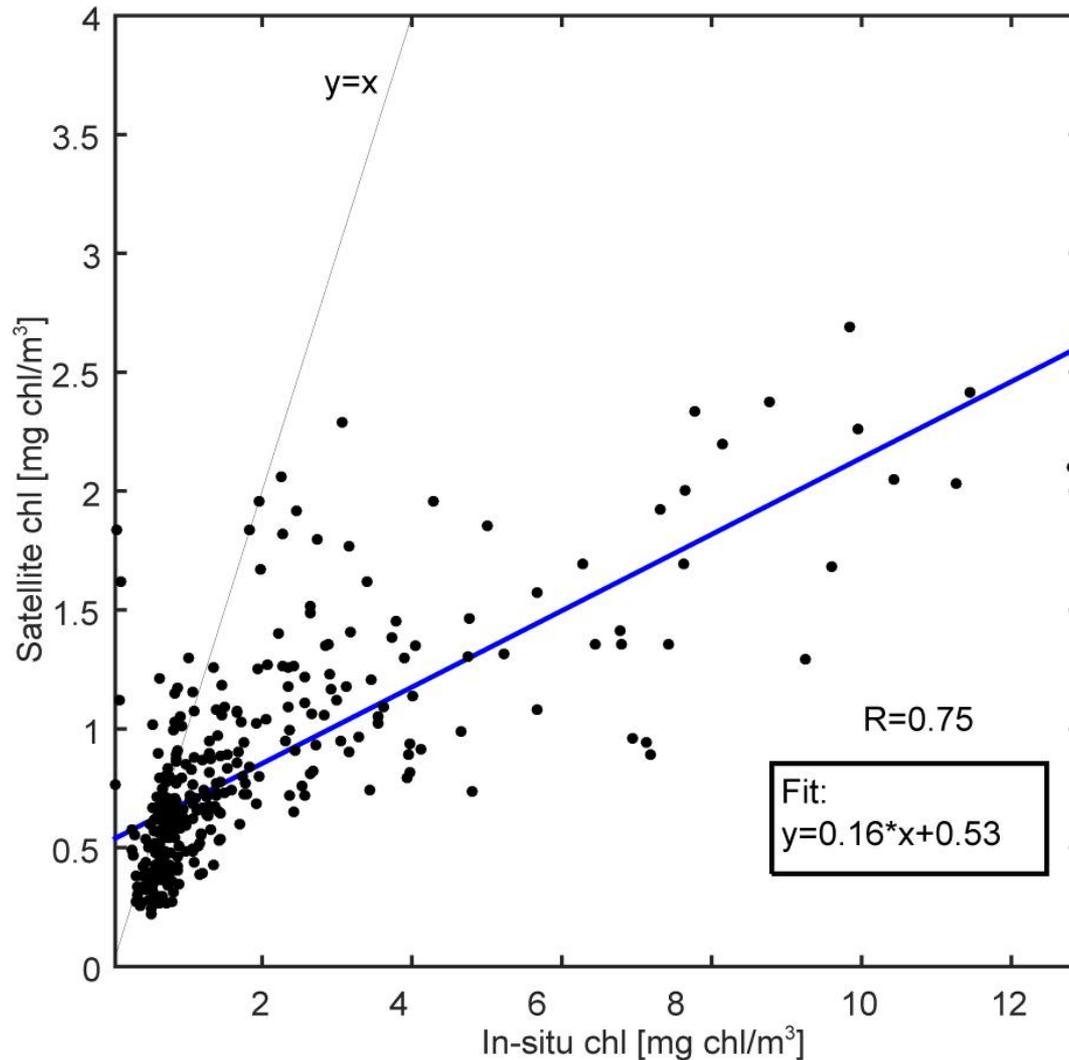
- Further investigation of bloom on the *Outer Shelf* - in progress
- Investigation of how water masses are exchanged between the *Outer Shelf* and the other regions
- The positive relationship between the Outer Faroe Shelf and the European margin should be further investigated

# 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*.

