

# *Species distribution modeling* z wykorzystaniem ogólnodostępnych baz danych

Species distribution modeling using global  
data platforms



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# Marine Species Distribution Modelling Course

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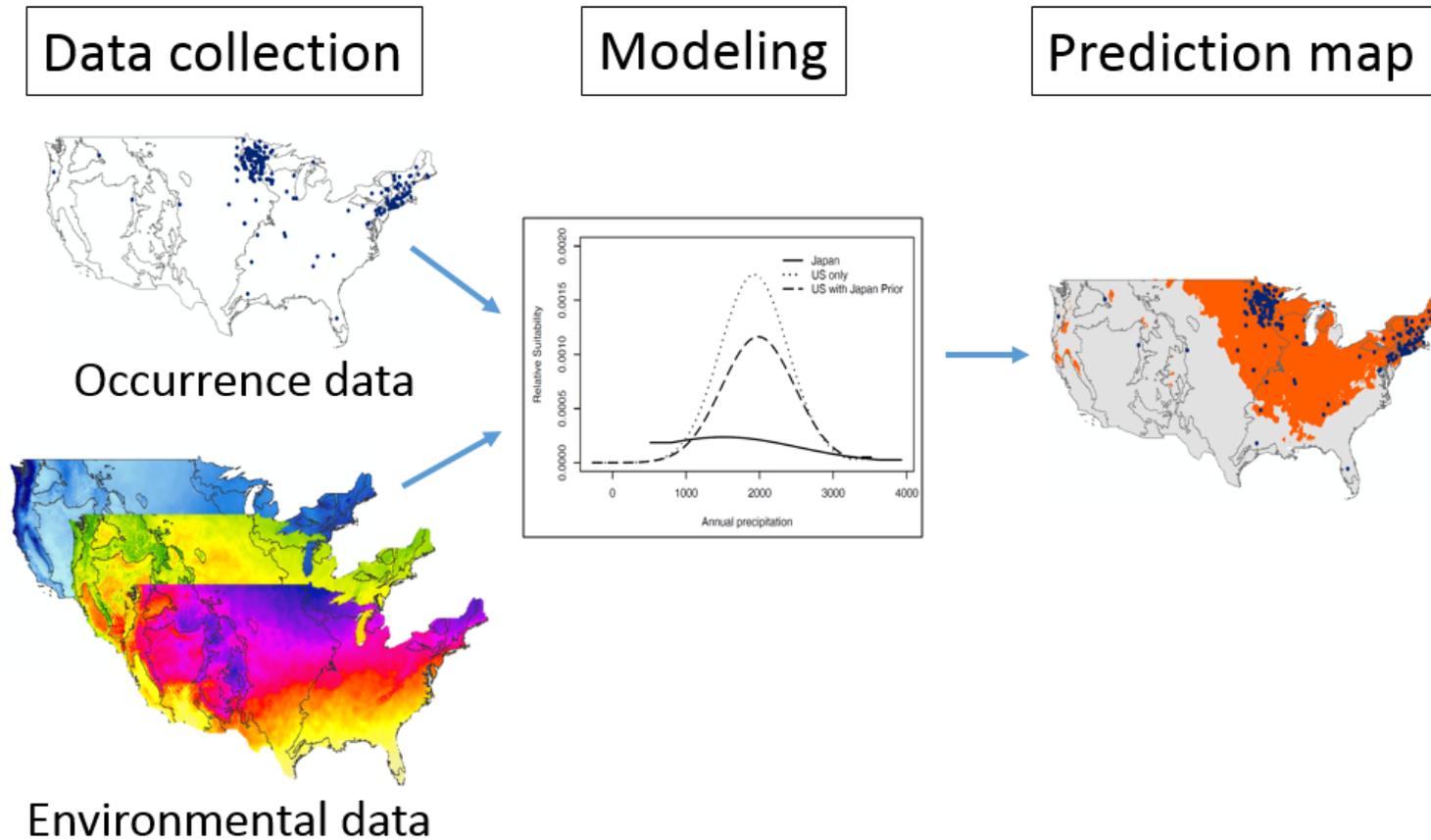
# Species distribution models – SMDs

## Environmental niche modelling

„SDMs are CORRELATIVE MODELS aimed to estimate the environmental conditions that are suitable for a species by associating environmental variables (predictors) and species' occurrence records (presence data, sometimes absence data)”

# Species distribution models – SMDs

## Environmental niche modelling



# Species distribution model – SMD

## Environmental niche modelling

Methods based on presence & absence data:

- Mathematical probabilistic models (GLMs – logistic regression)

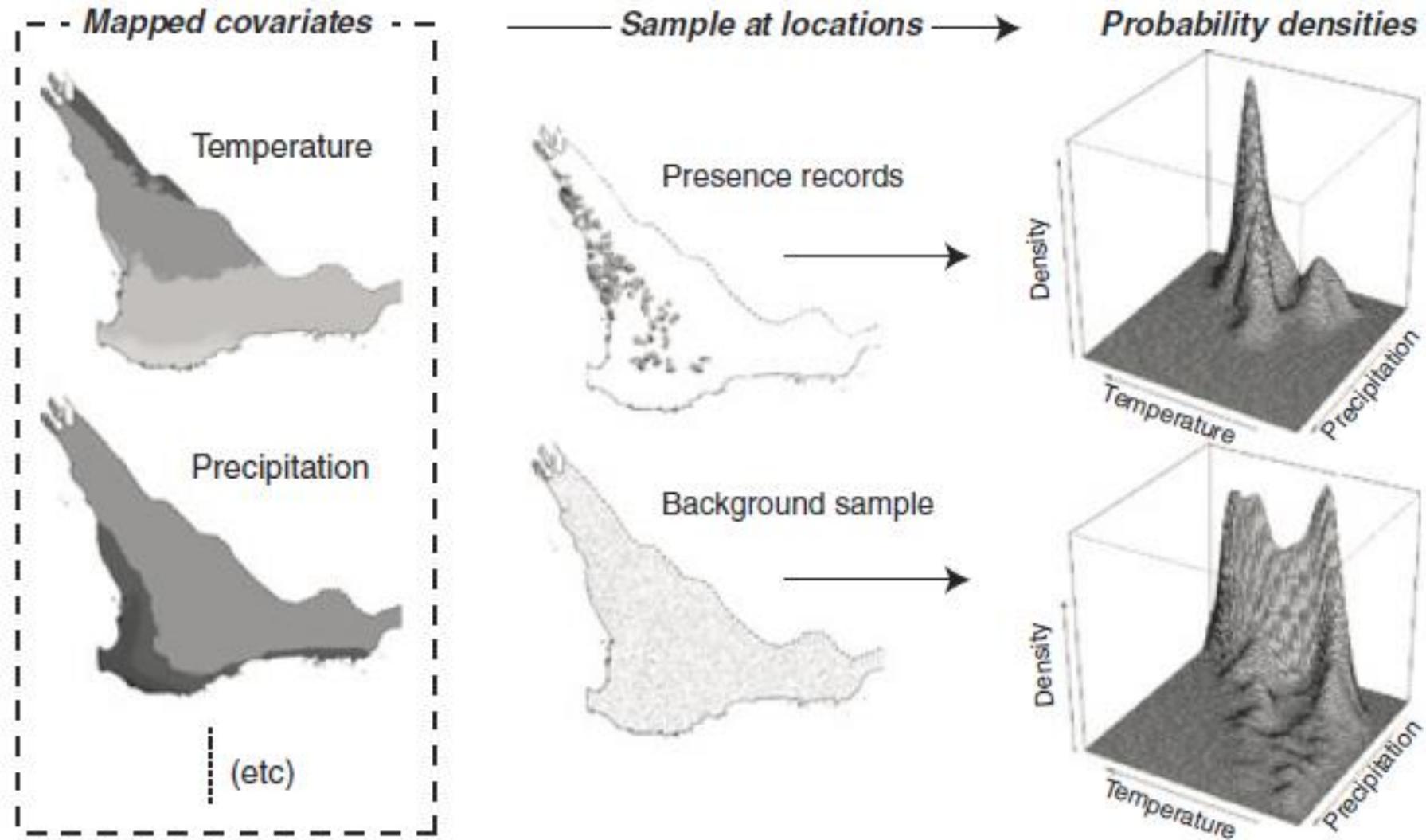
Methods based on presence-only data and:

- Use of „pseudo-absences” models (eg. BIOMOD)
- **Use of „background” environmental data (eg. MaxEnt)**
- Presence only records (eg. BIOCLIM)

# MaxEnt – Maximum entropy model

- One of the most extensively used modeling technique
- Standalone application (java), R package or Python toolkit
- Efficiently handles complex interactions between response and predictor variables
- Little sensitivity to small sample size
- Calculates probability distribution of maximum entropy: the distribution closest to uniform based on environmental conditions of occurrence (constrained to the known response curves)

# MaxEnt – Maximum entropy model



# MAXENT example



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## First records of *Lacydonia eliasoni* Hartmann-Schröder, 1996 (Polychaeta: Phyllodocida) in the European Arctic

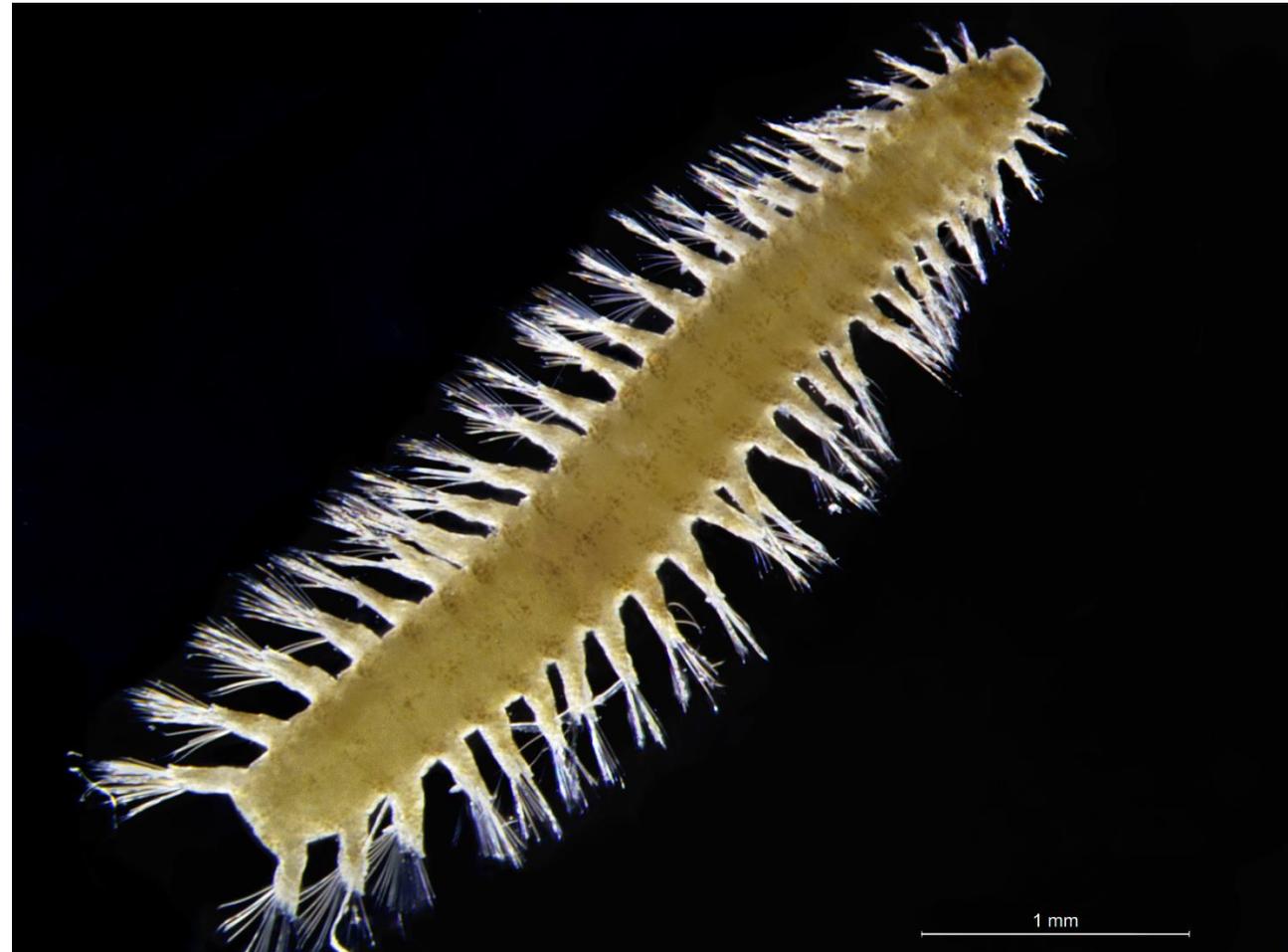
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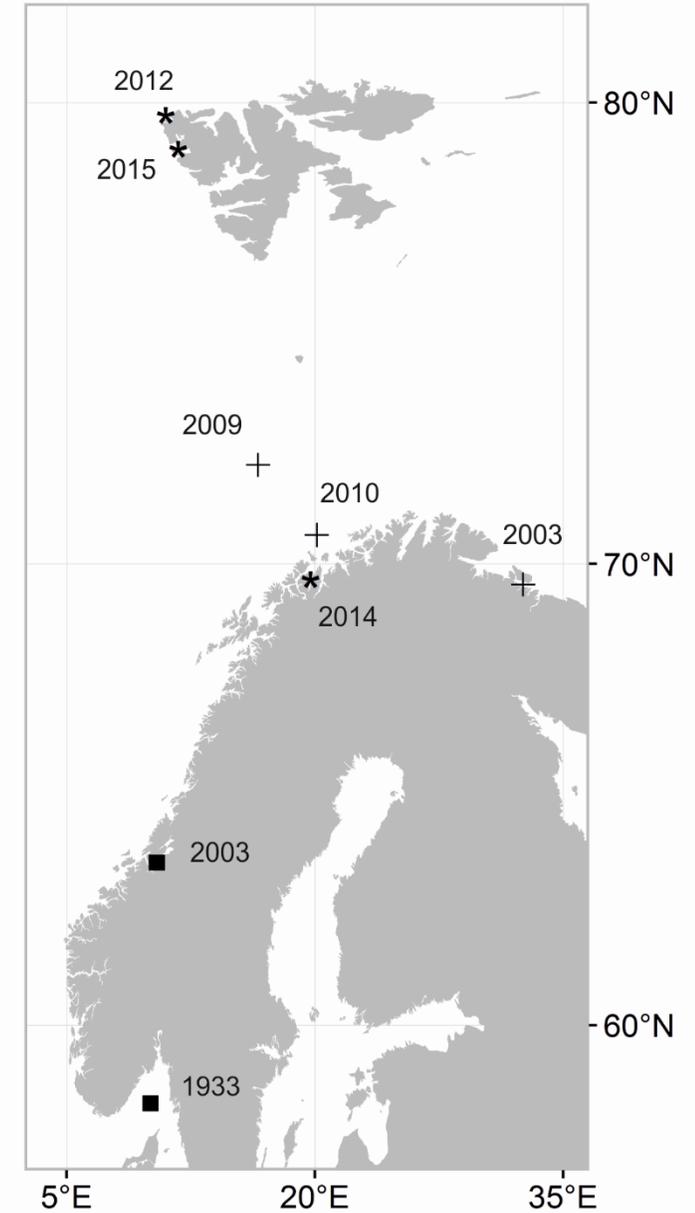
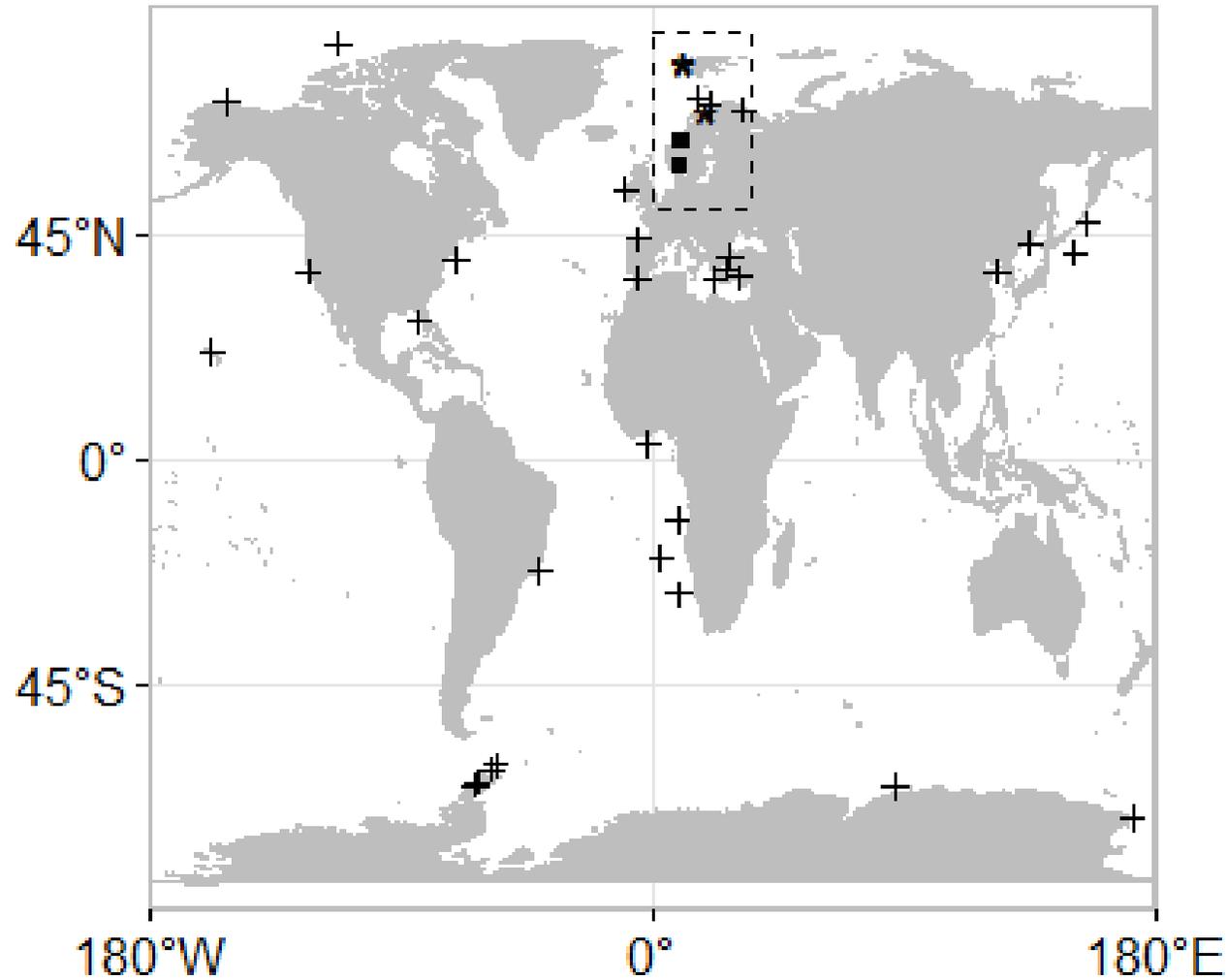
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**Abstract:** *Lacydonia* (Polychaeta: Phyllodocida) is a poorly known genus containing 16 species that are sporadically collected in low densities all over the world oceans. During three cruises (in June 2014 in Ullsfjorden, northern Norway, in January 2015 in Kongsfjorden, and in June 2012 in Smeerenburg, Svalbard) nine specimens of *Lacydonia eliasoni* were found on sandy and muddy sediments at depths from 180 to 350 m. All specimens were incomplete and consisted of 10 to 29 chaetigers. This study presents the

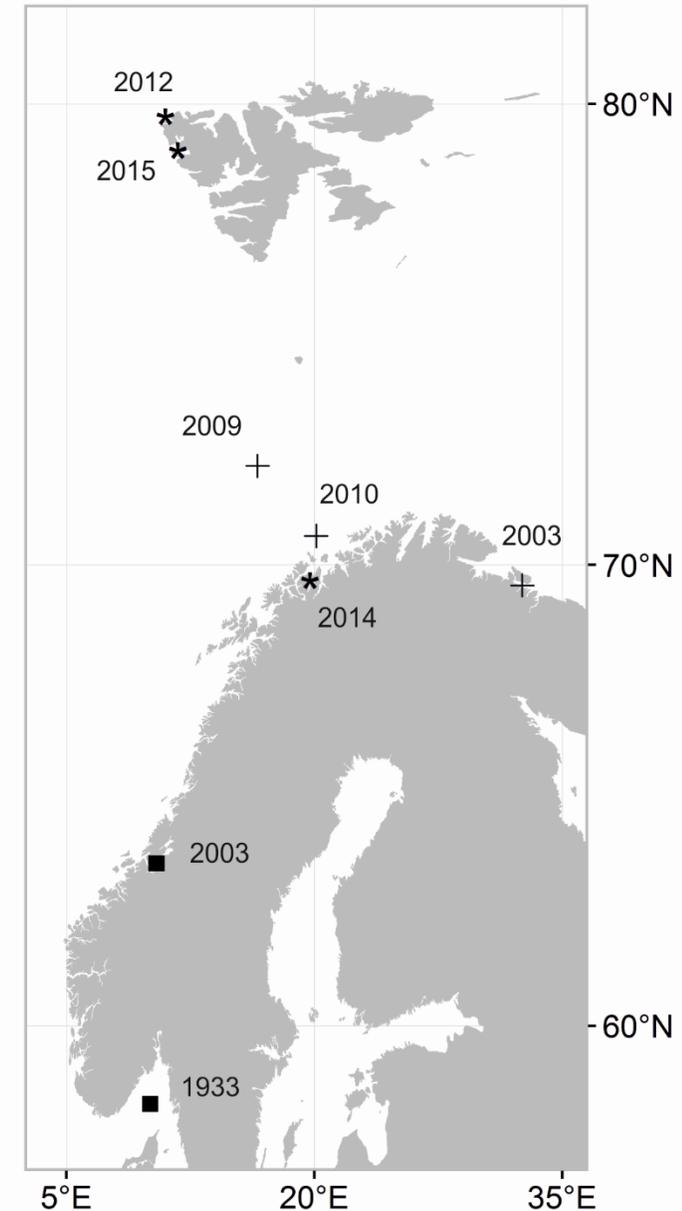


# World distribution of *Lacydonia* spp.



# Questions

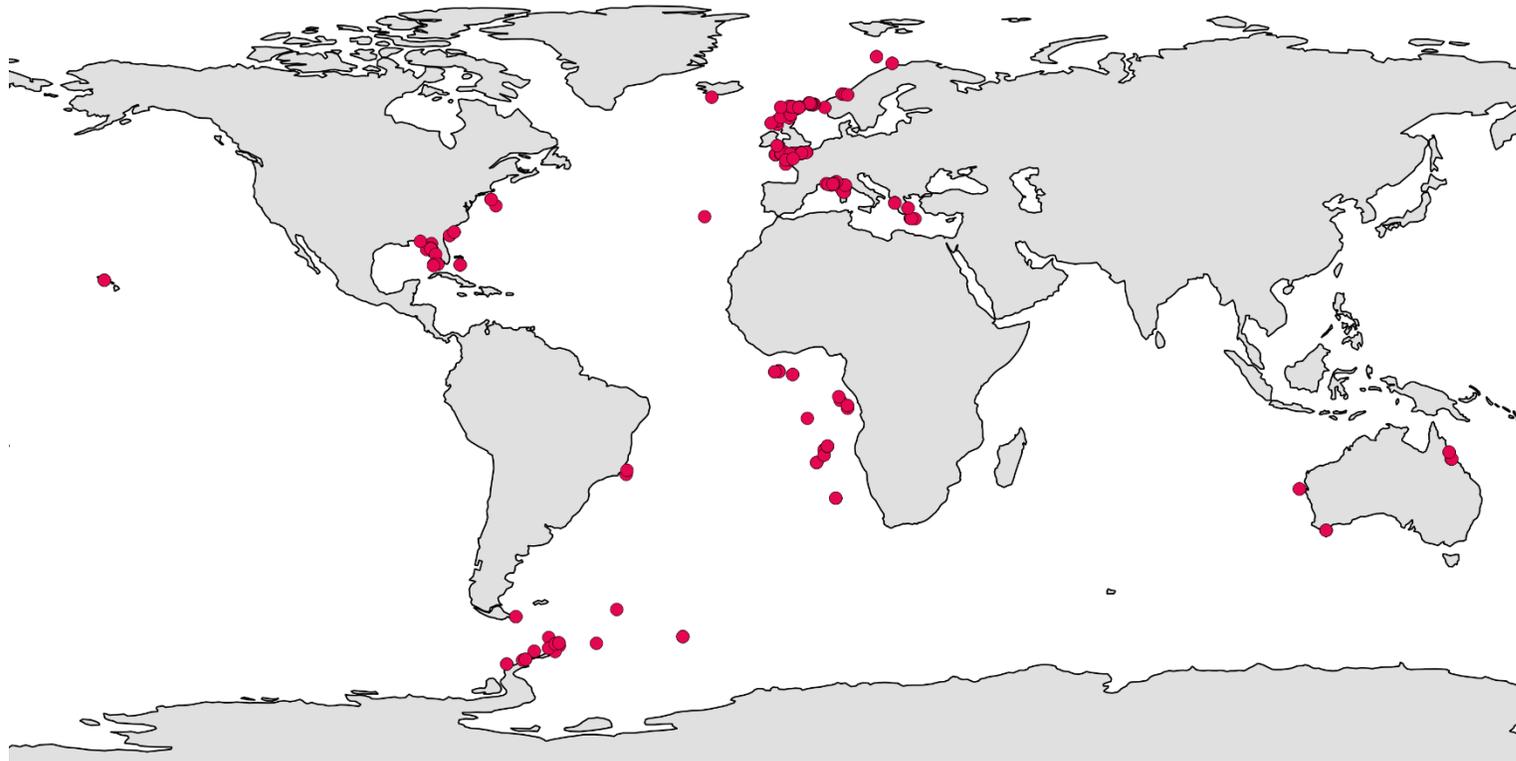
- ❖ What is the range of suitable conditions for *L. eliasoni* in North Atlantic?
- ❖ Is there a continuity of suitable condition between Norway and Svalbard?



# New occurrence data collection

OBIS and GBIF databases

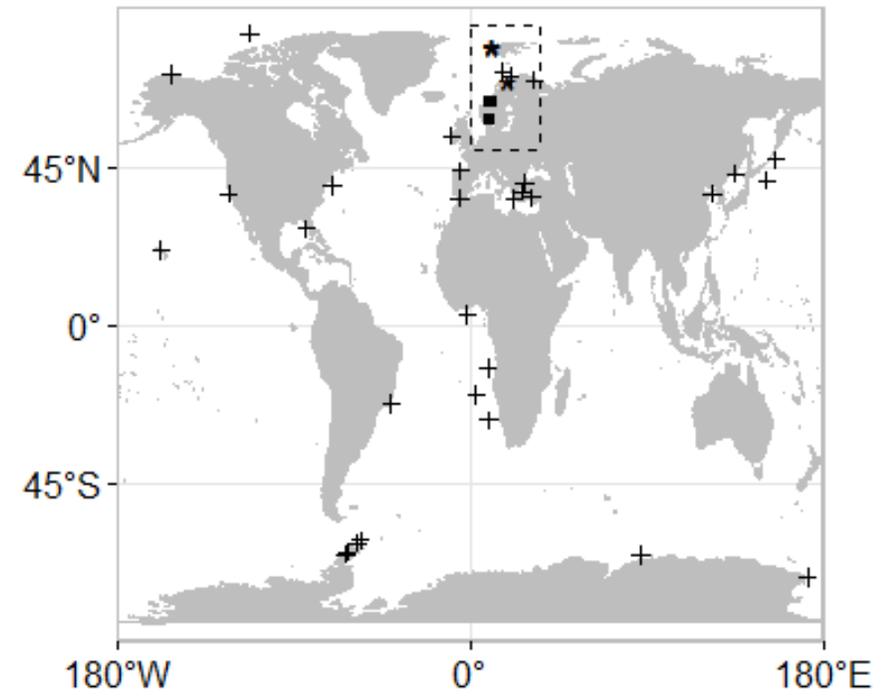
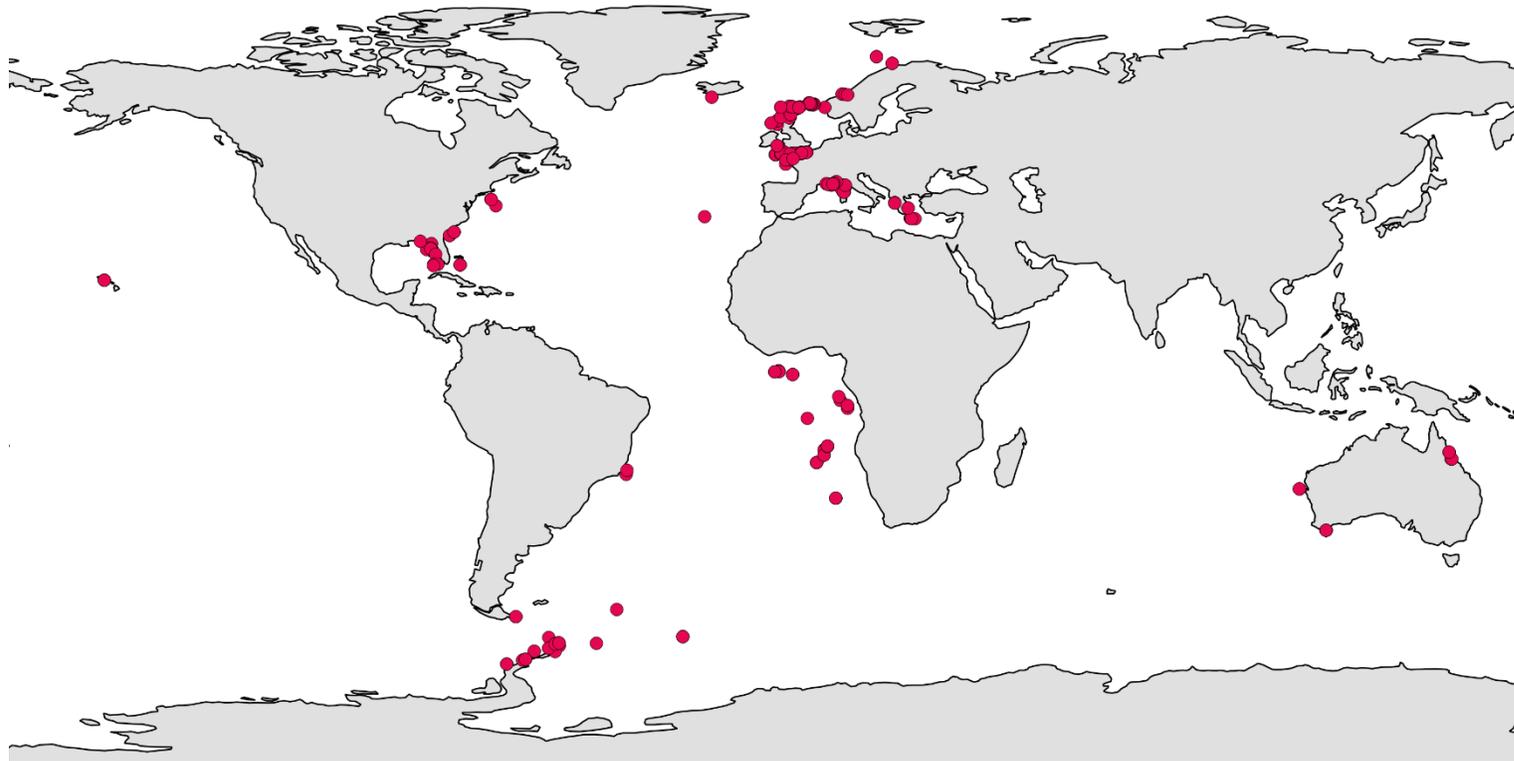
340 records



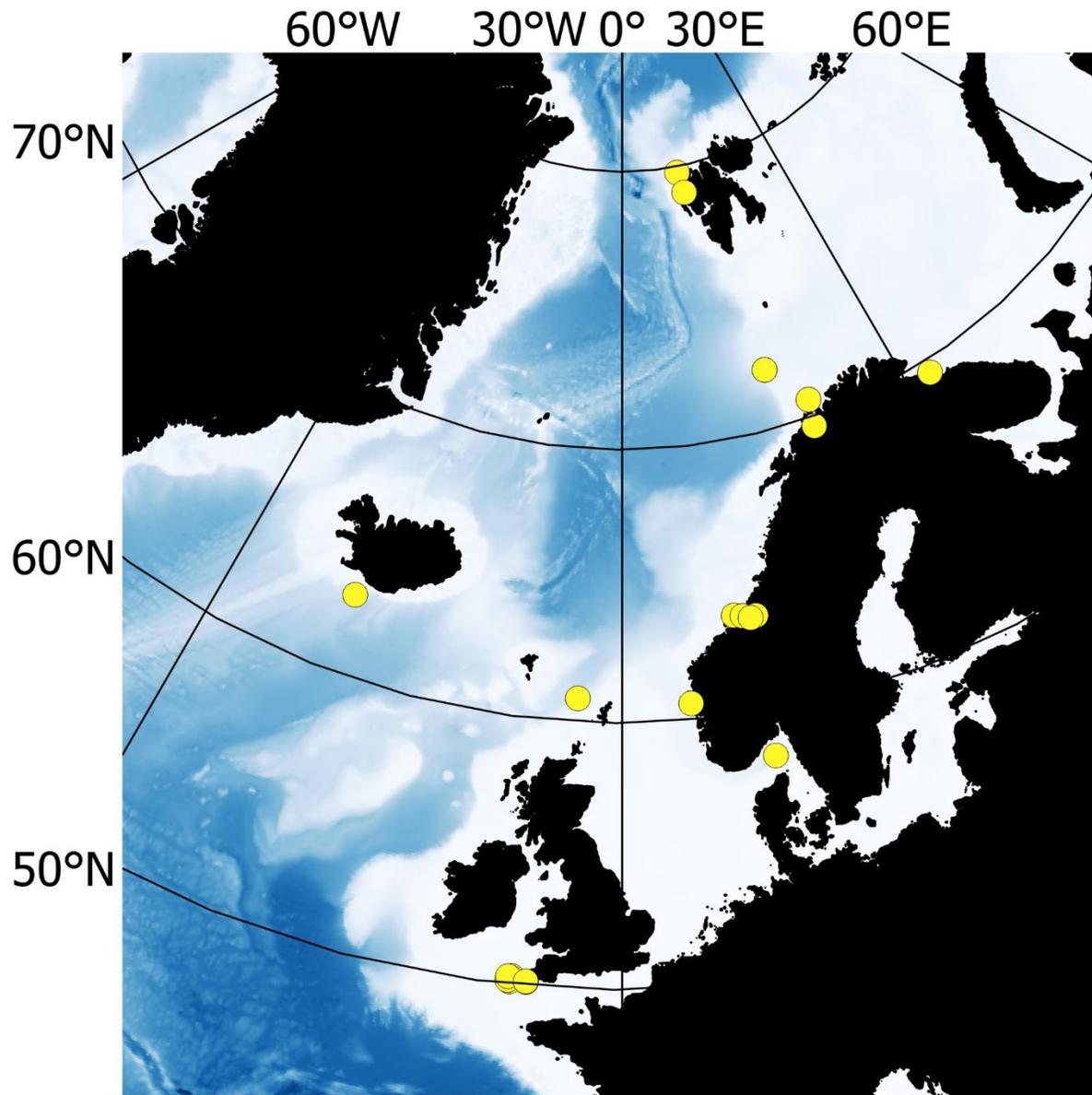
# New occurrence data collection

OBIS and GBIF databases

340 records



43 records

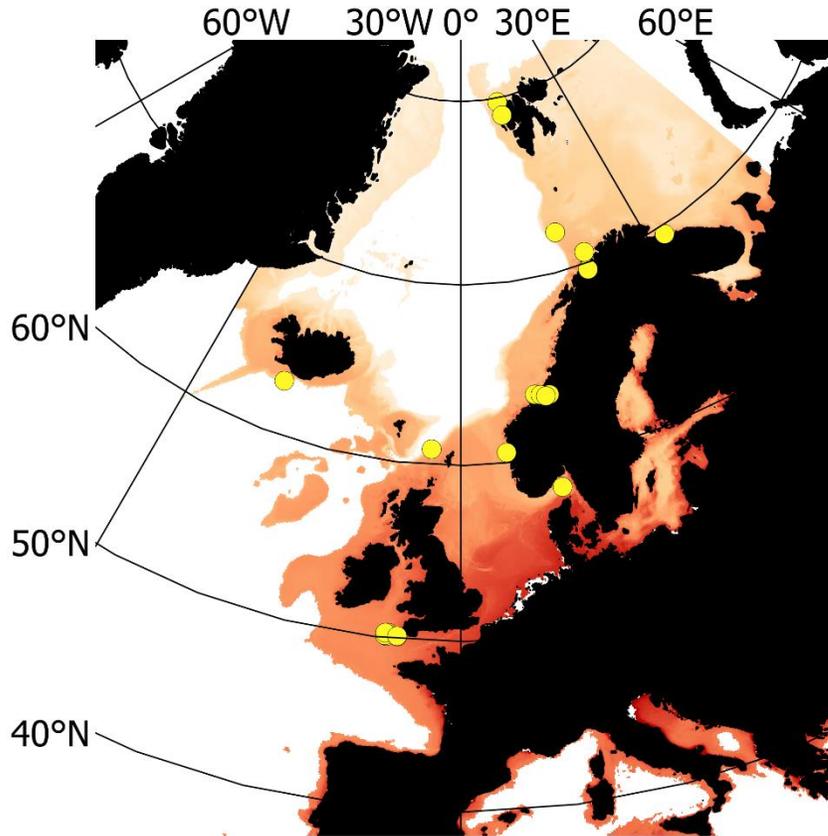


*Lacydonia* sp. &  
*Lacydonia eliasoni*  
occurrence data  
selected to model

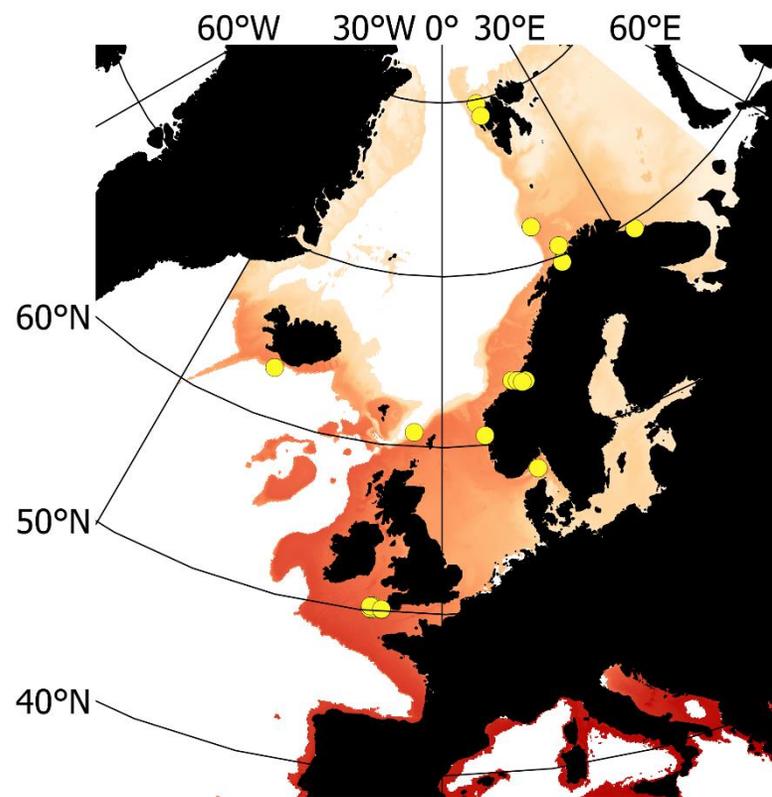
20 records:

- 3 my own
- 5 literature
- 12 OBIS & GBIF

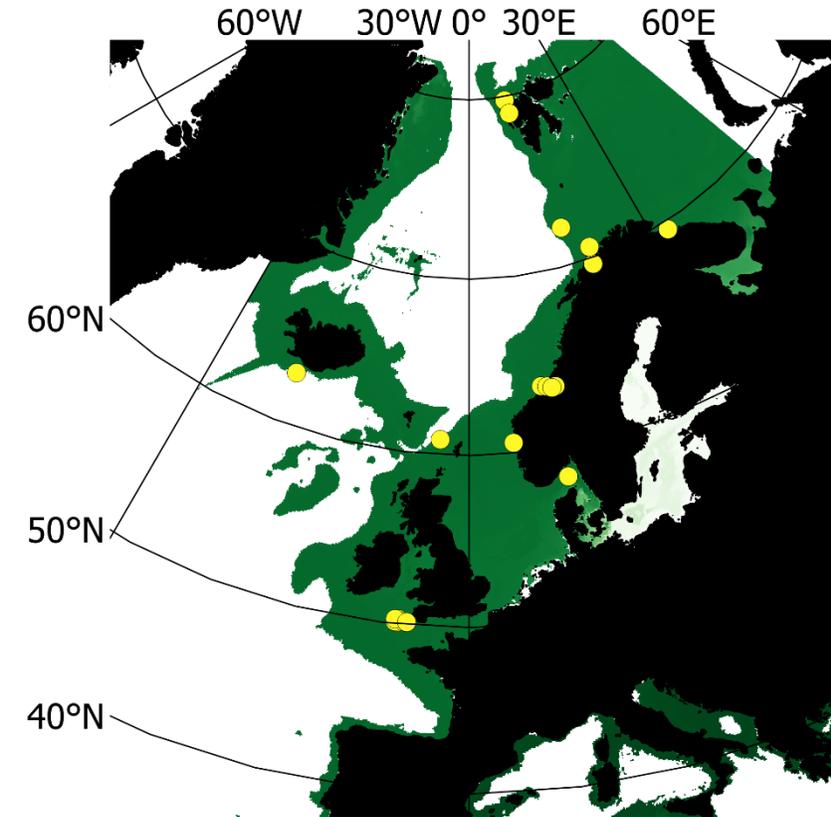
# Bottom environmental data from Bio-Oracle



Temp max.

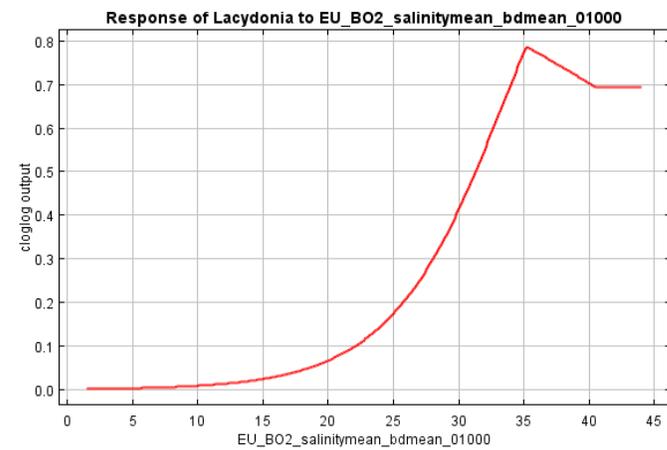
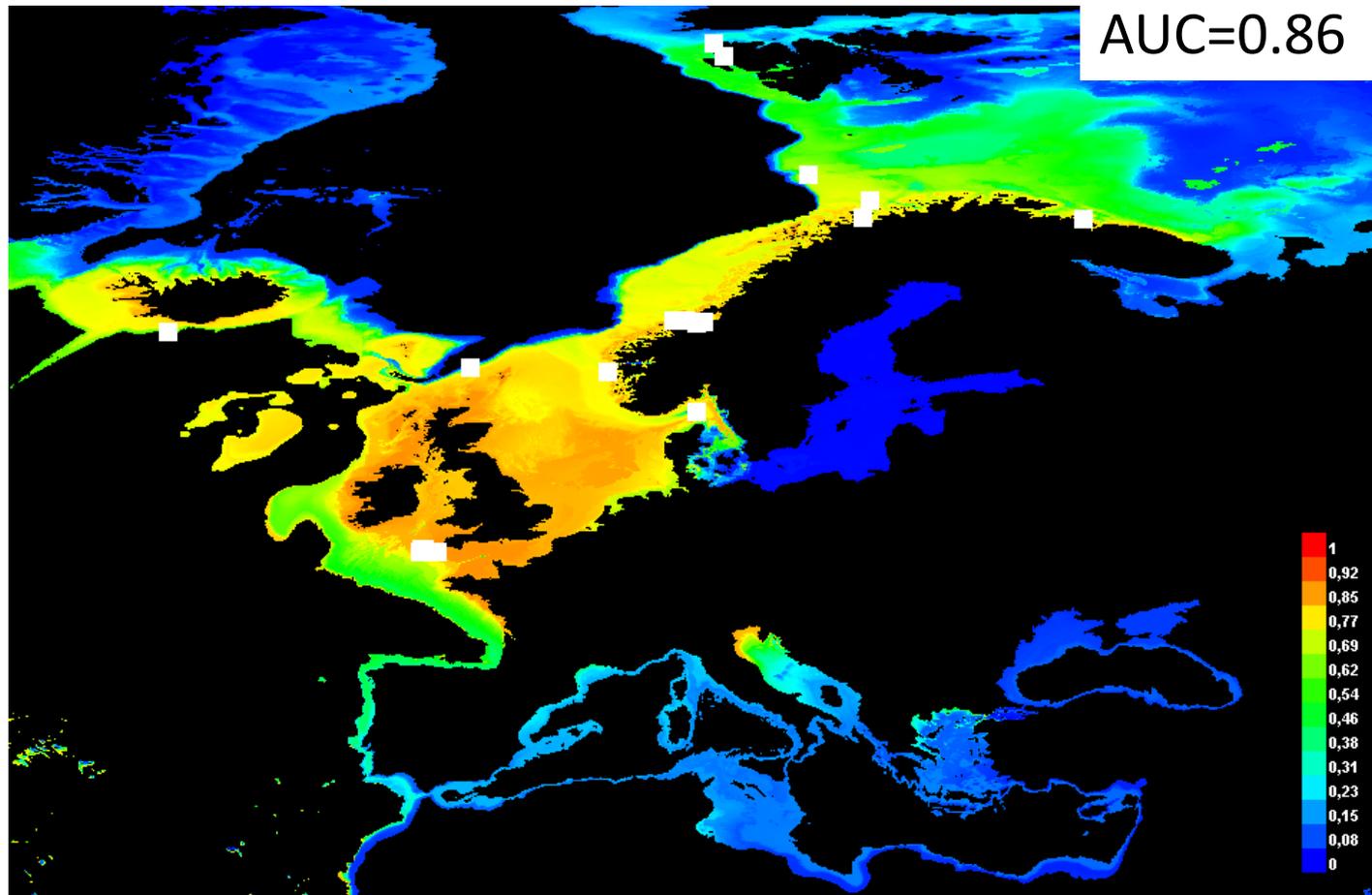


Temp min.

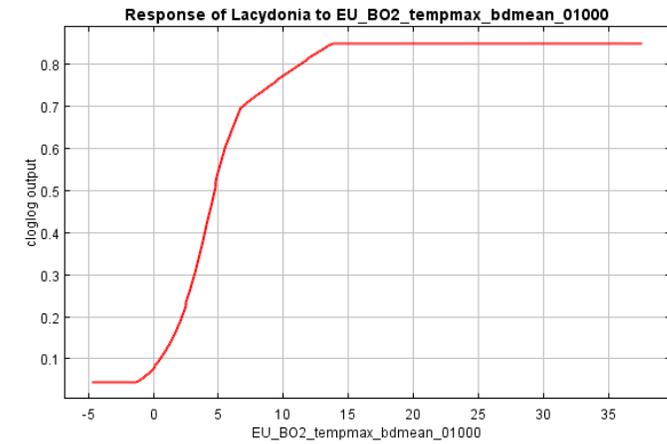


Salinity mean

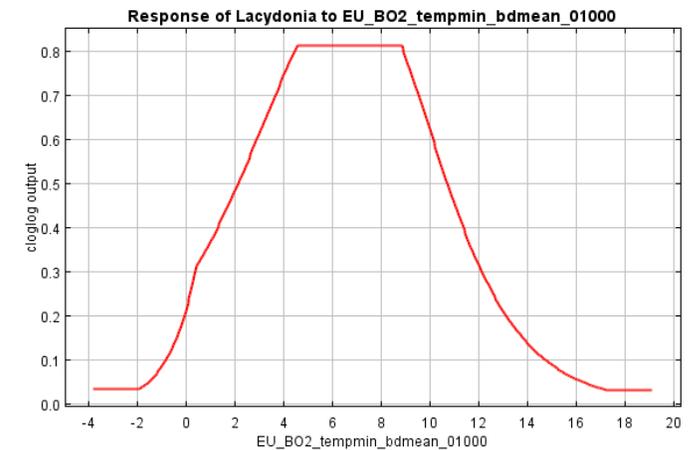
Depth range 0-1000m



Salinity  
mean

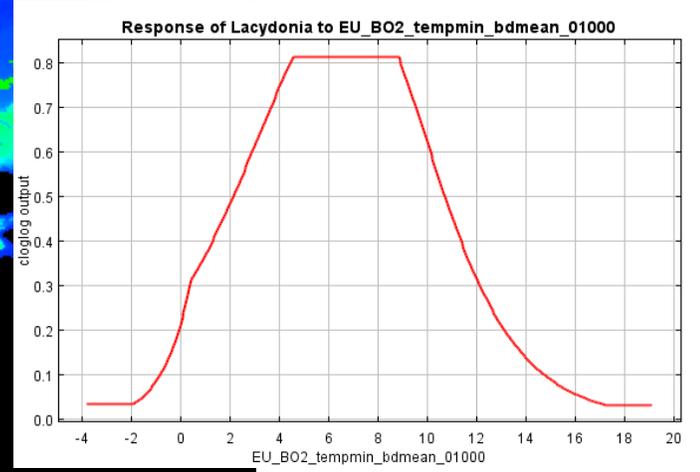
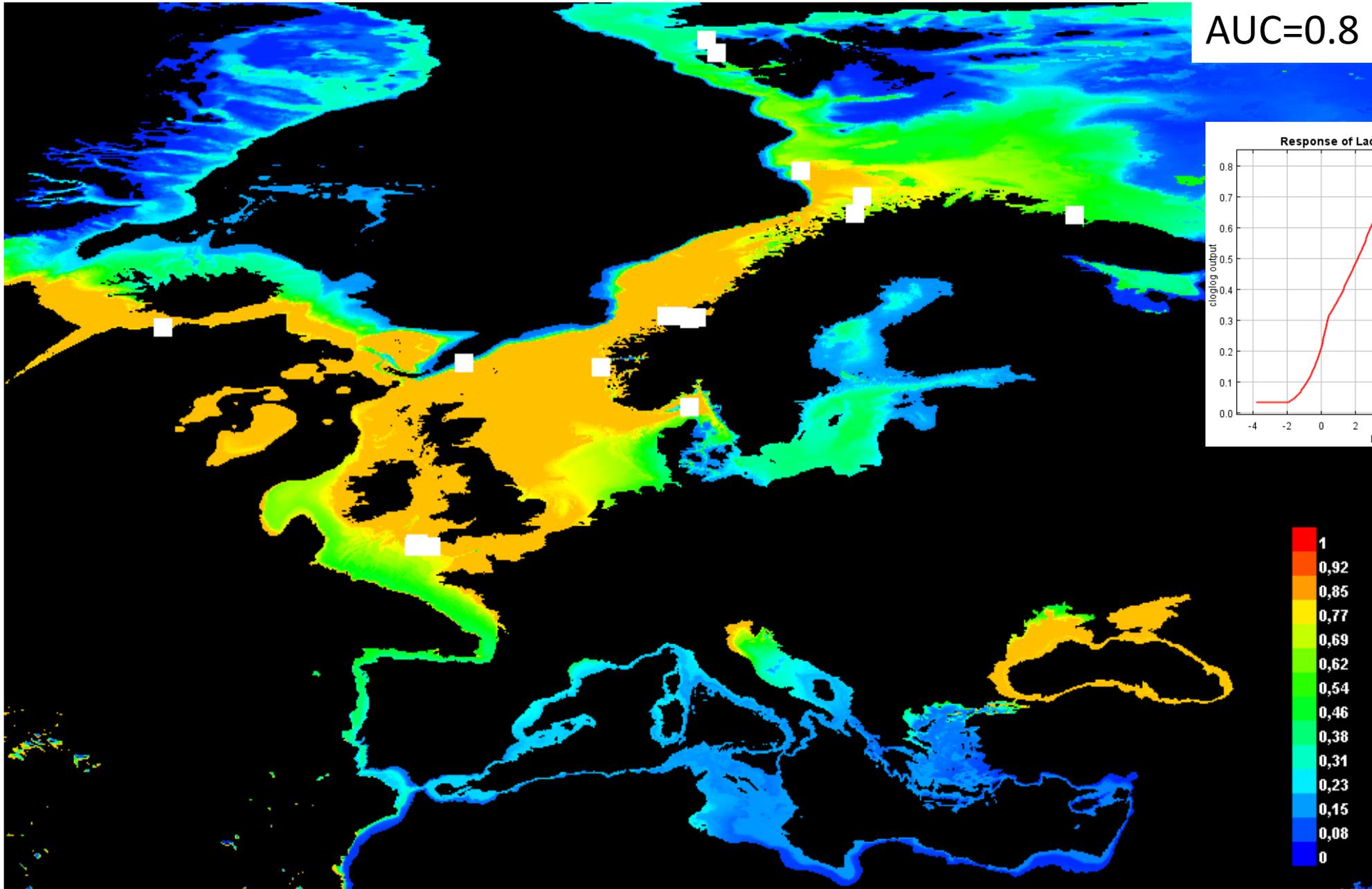


Temp  
max



Temp  
min

Variable	% contrib	Perm importance
Temp min	73	38.6
Temp max	15.3	24.7
Salinity mean	11.7	36.7



# Data platforms

## Biological data

- IOBIS - <http://iobis.org/>
  - <http://iobis.org/mapper2/>
  - R *robis* package
- OBIS – Arctic - <https://www.caff.is/>
- GBIF | Global Biodiversity Information Facility - <https://www.gbif.org/>
  - R *rgibif* package

## Environmental data

- Bio-Oracle <http://bio-oracle.org> (present and future)
  - R *smpredictors* package
- MARSPEC <http://marspec.org/> (present and paleo)
- WorldClim – <http://www.worldclim.org> (present)
  - R *dismo* package