ATLAS OF CURRENT AND FUTURE SPACE DISTRIBUTION OF THE MAIN MARINE SPECIES EXPLOITED IN THE MEDITERRANEAN

CLIM-ECO² Project

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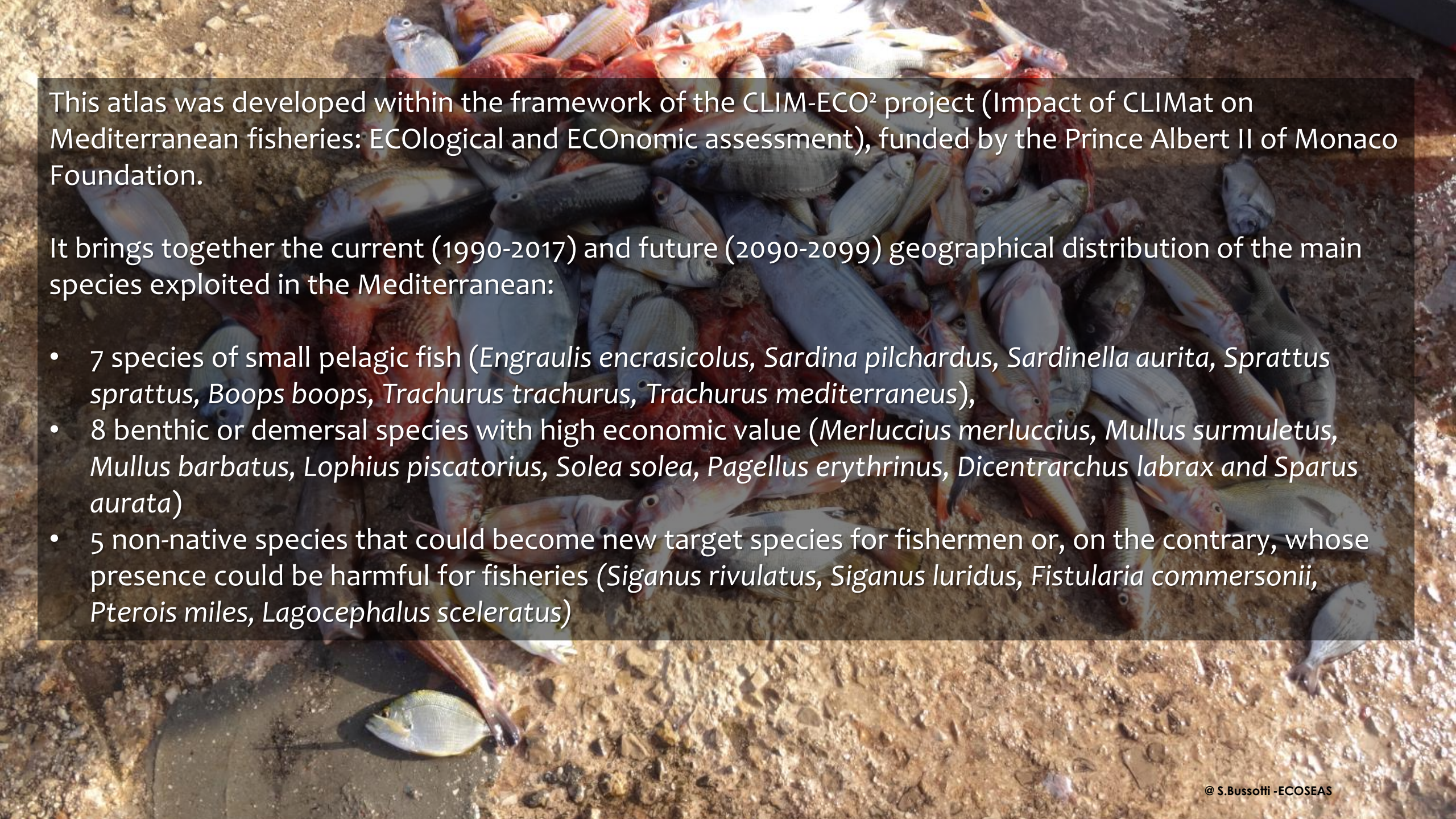
UMR 7035 ECOSEAS



This atlas was developed within the framework of the CLIM-ECO² project (Impact of CLIMat on Mediterranean fisheries: ECOlogical and ECOnomic assessment), funded by the Prince Albert II of Monaco Foundation.

It brings together the current (1990-2017) and future (2090-2099) geographical distribution of the main species exploited in the Mediterranean:

- 7 species of small pelagic fish (*Engraulis encrasicolus, Sardina pilchardus, Sardinella aurita, Sprattus sprattus, Boops boops, Trachurus trachurus, Trachurus mediterraneus*),
- 8 benthic or demersal species with high economic value (*Merluccius merluccius, Mullus surmuletus, Mullus barbatus, Lophius piscatorius, Solea solea, Pagellus erythrinus, Dicentrarchus labrax and Sparus aurata*)
- 5 non-native species that could become new target species for fishermen or, on the contrary, whose presence could be harmful for fisheries *(Siganus rivulatus, Siganus luridus, Fistularia commersonii, Pterois miles, Lagocephalus sceleratus)*

Acronyms used :

SST	**Sea Surface Temperature**
SBT	**Sea Bottom Temperature**

For more details on the methodology used and the other RCP scenarios, refer to the following articles :

- Schickele, A., Leroy, B., Beaugrand, G., Goberville, E., Hattab, T., Francour, P., Raybaud, V. 2020. Modelling European small pelagic fish distribution: Methodological insights. Ecological Modelling, 416, 108902. https://www.sciencedirect.com/science/article/abs/pii/S0304380019304107

- Schickele, A., Goberville, E., Leroy, B., Beaugrand, G., Hattab, T., Francour, P., Raybaud, V. 2020. European small pelagic fish distribution under global change scenarios. Fish and Fisheries, in press https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12515

Engraulis encrasicolus

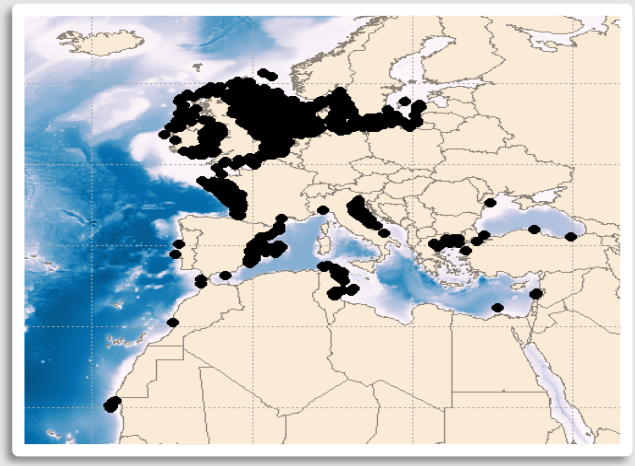
Anchois européen

European anchovy

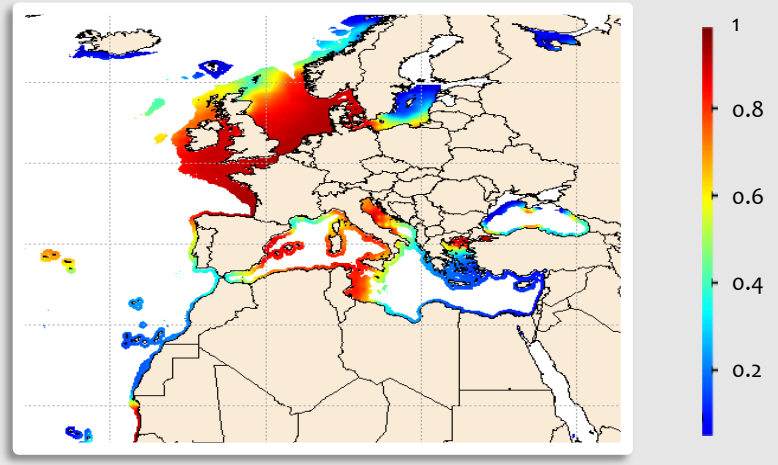
- Number of attendance data: 13,869
- Environmental parameters used: SST mean, SST variance, Salinity
- Boyce index : 0,88

CURRENT PERIOD

Distribution Observed

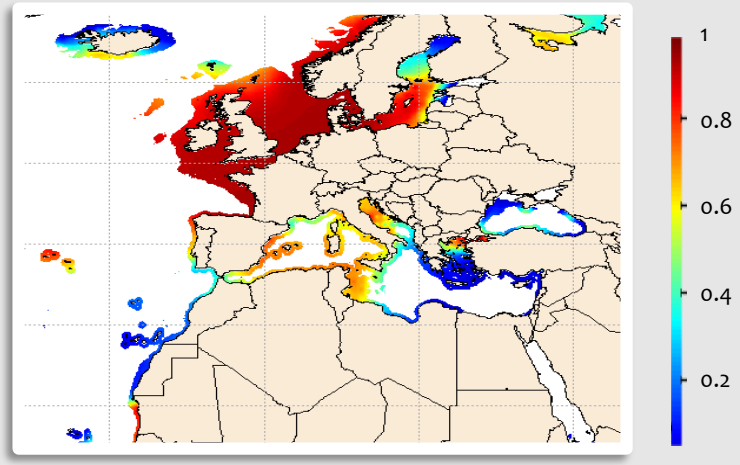


Modeling the probability of presence

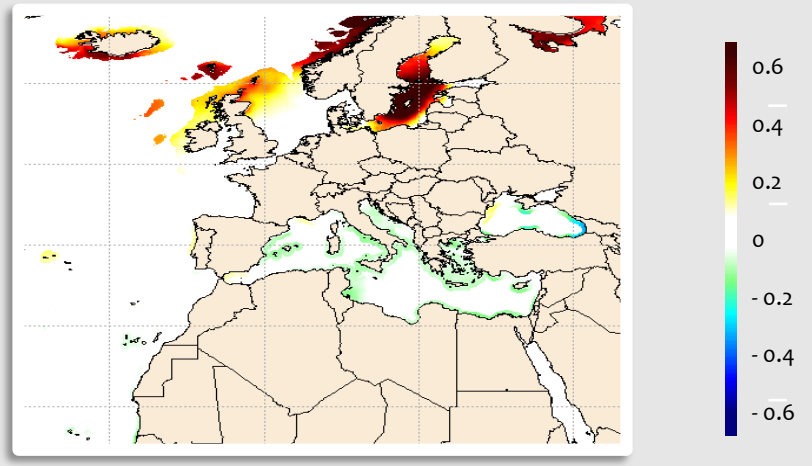


FUTURE PROJECTIONS (SCENARIO RCP8.5)

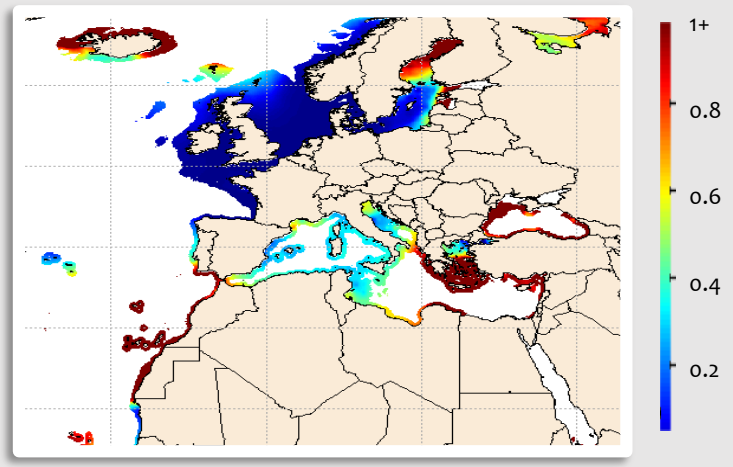
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Sardina pilchardus

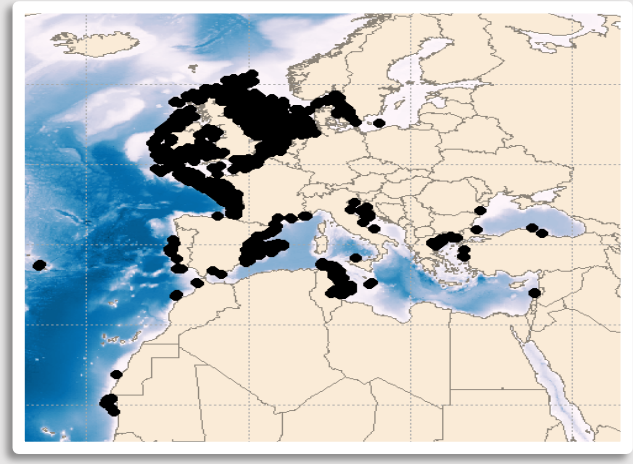
Sardine européenne

European pilchard

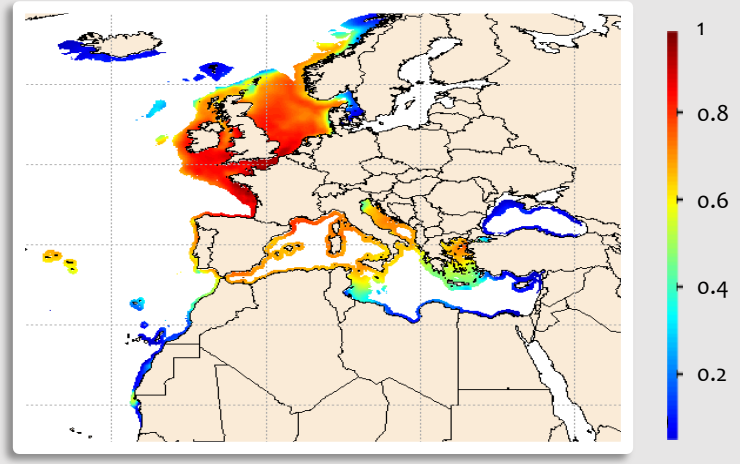
- Number of attendance data: 11,888
- Environmental parameters used: SST mean, SST range, Salinity
- Boyce index : 0,75

CURRENT PERIOD

Distribution Observed



Modeling the probability of presence



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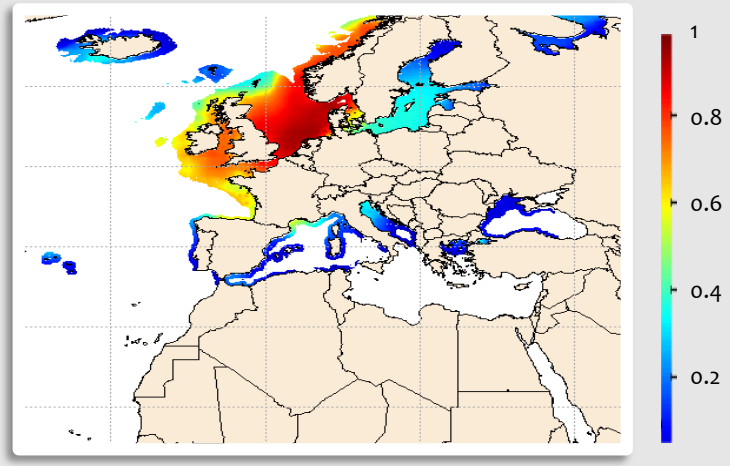
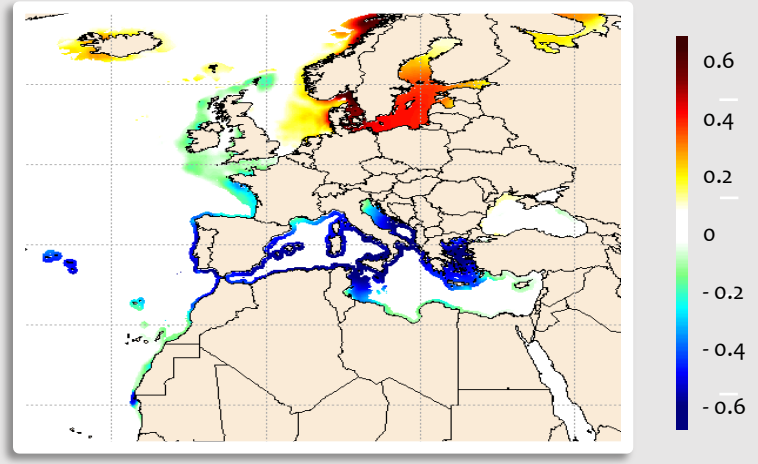
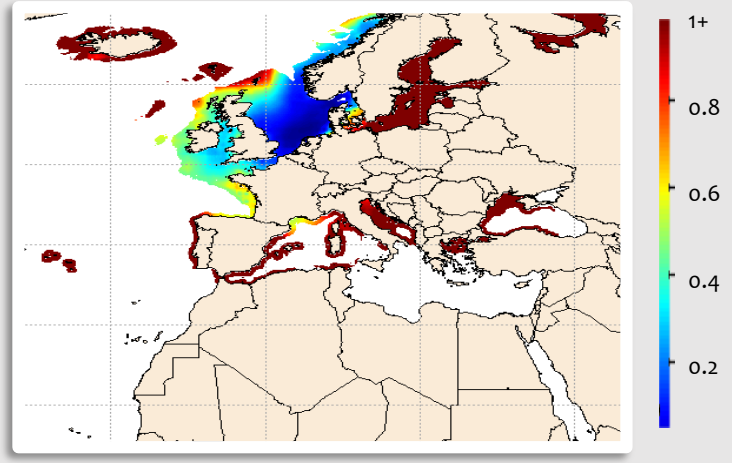
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Sardinella aurita

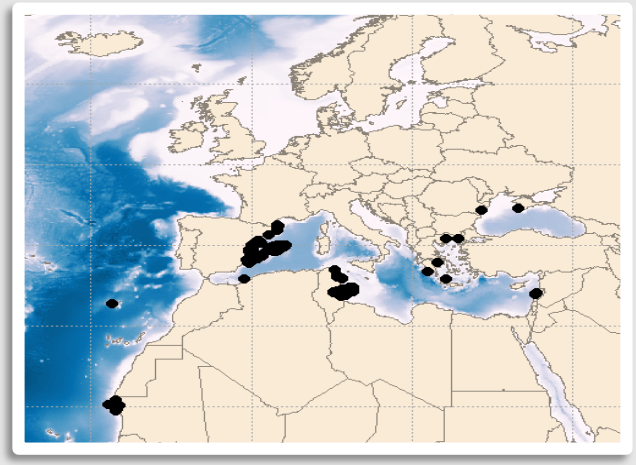
Sardinelle ronde

Round sardinella

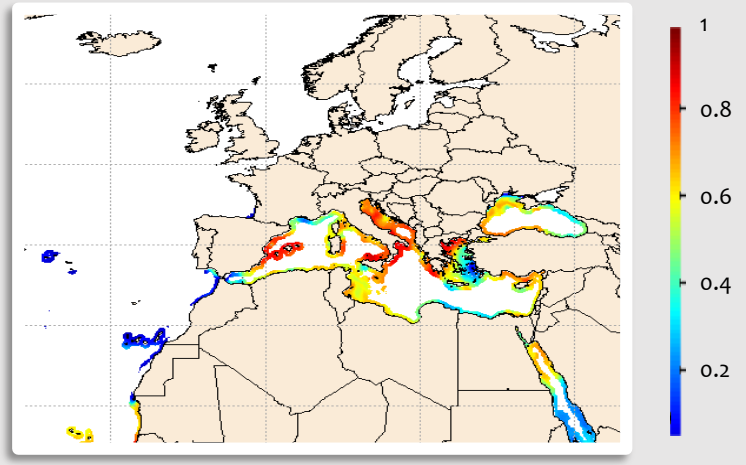
- Number of attendance data: 20 201
- Environmental parameters used: Average SST, SST range, Primary production
- Boyce index : 0,88

CURRENT PERIOD

Distribution Observed

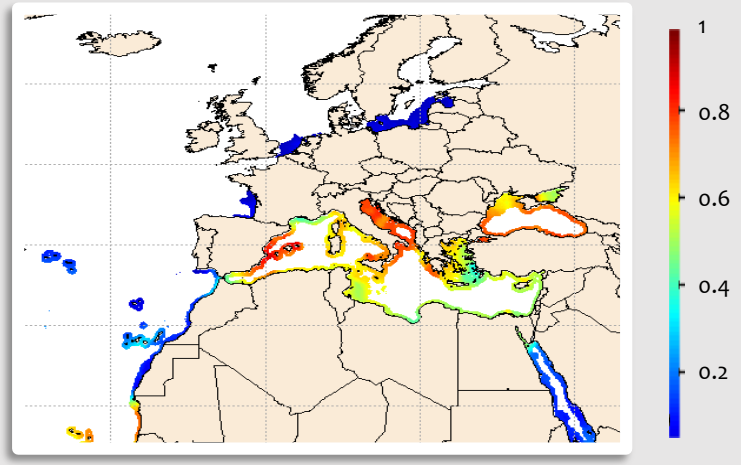


Modeling the probability of presence

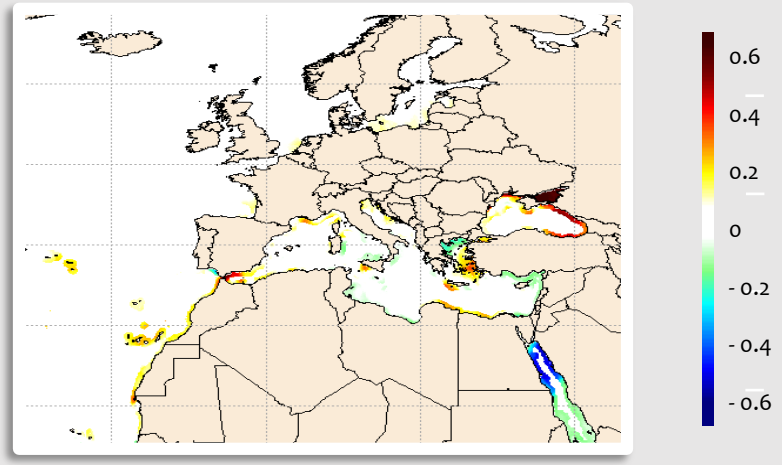


FUTURE PROJECTIONS (SCENARIO RCP8.5)

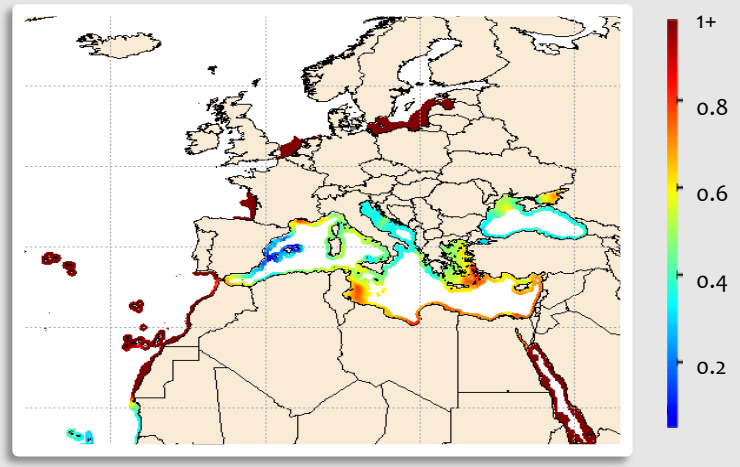
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Sprattus sprattus

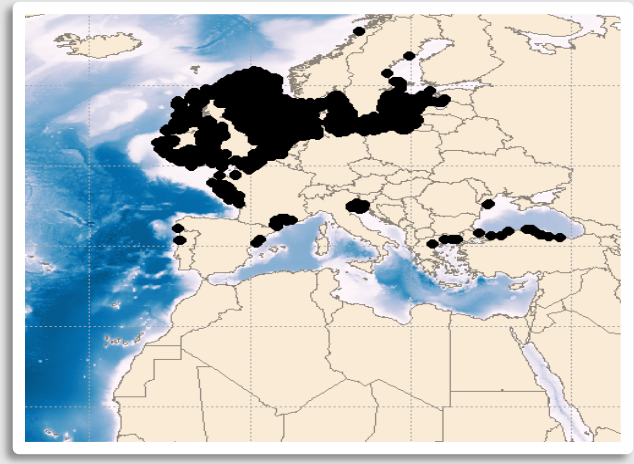
Sprat européen

European sprat

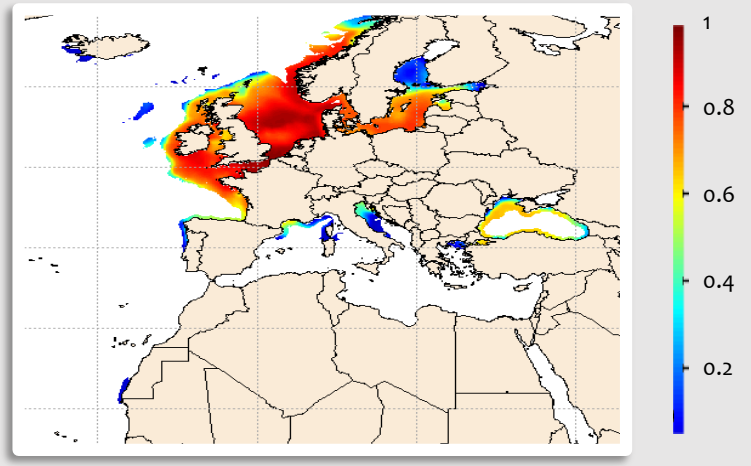
- Number of attendance data: 235,062
- Environmental parameters used: Average SST, SST range, Primary production
- Boyce index : 0,92

CURRENT PERIOD

Distribution Observed

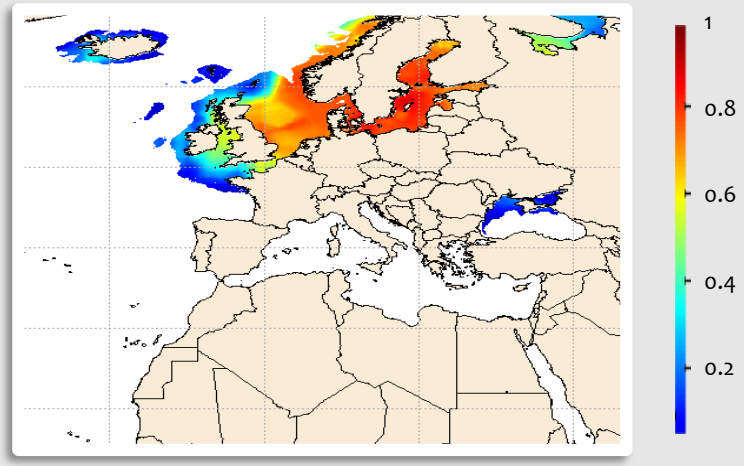


Modeling the probability of presence

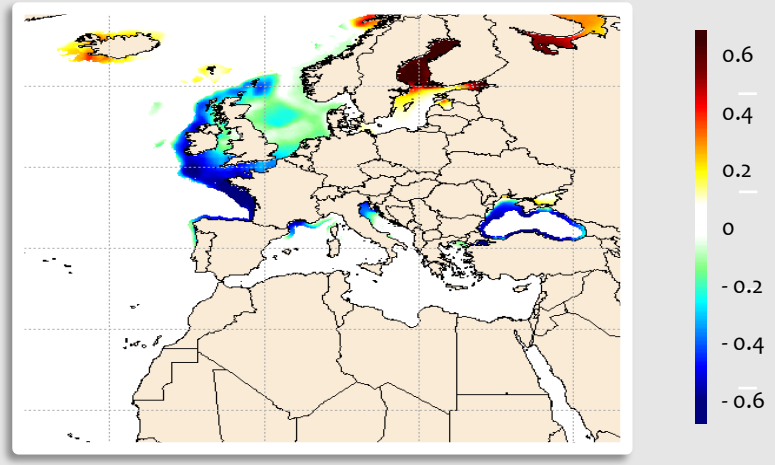


FUTURE PROJECTIONS (SCENARIO RCP8.5)

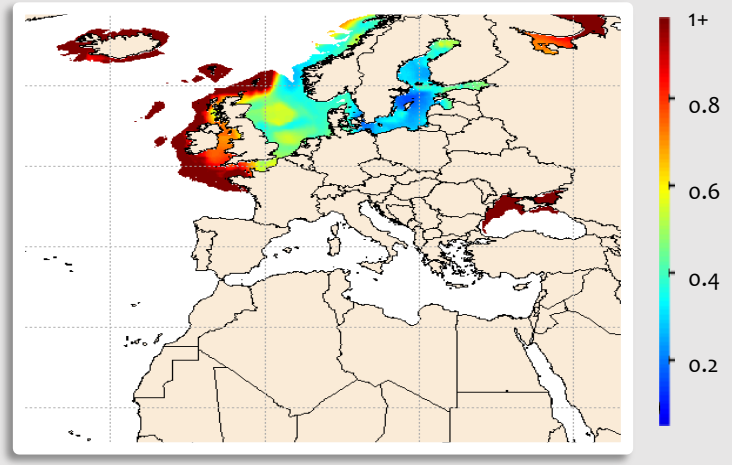
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Boops boops

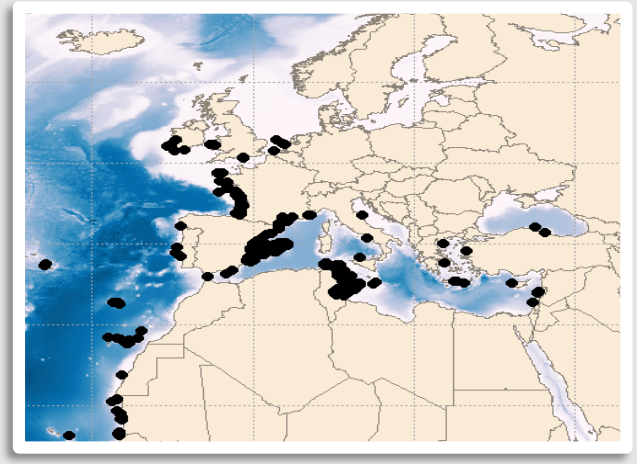
Bogue

Bogue

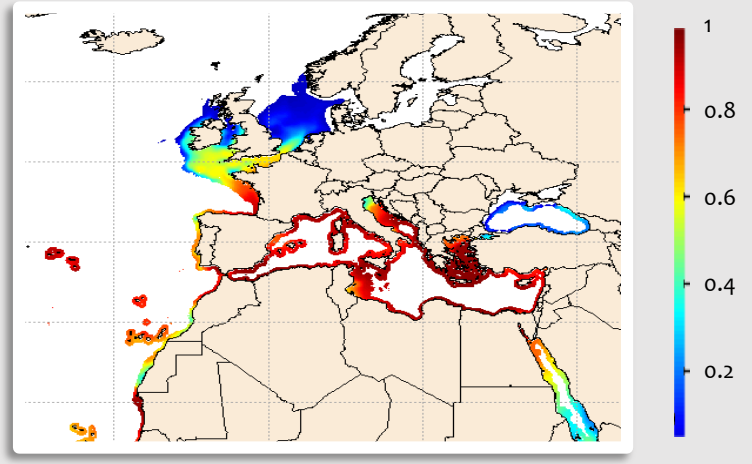
- Number of attendance data: 6,949
- Environmental parameters used: SST mean, SST range
- Boyce index : 0,65

CURRENT PERIOD

Distribution Observed

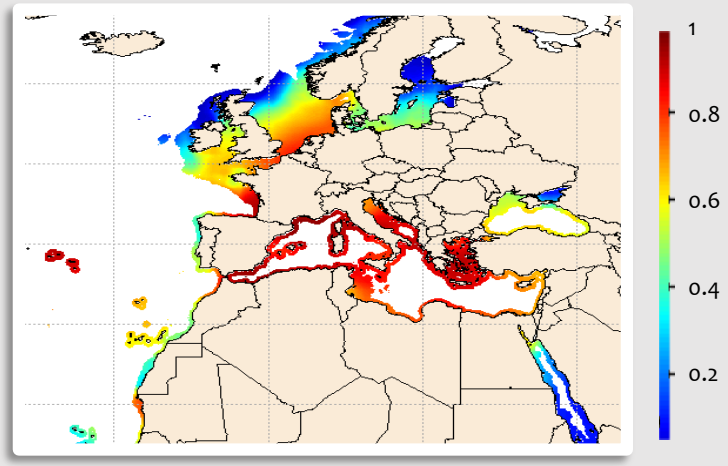


Modeling the probability of presence

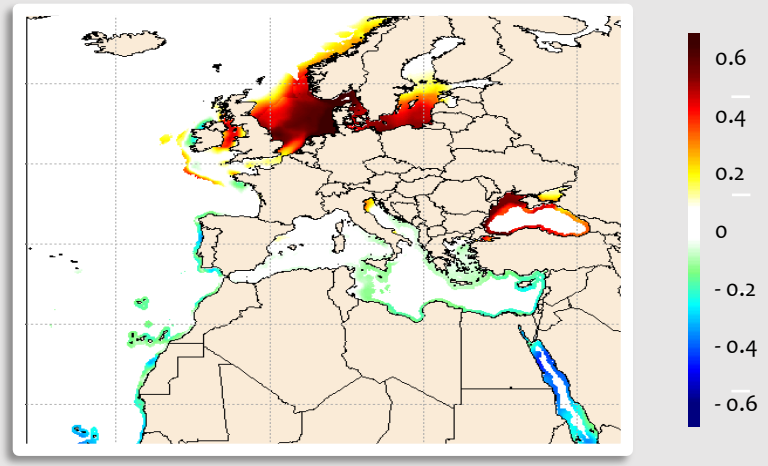


FUTURE PROJECTIONS (SCENARIO RCP8.5)

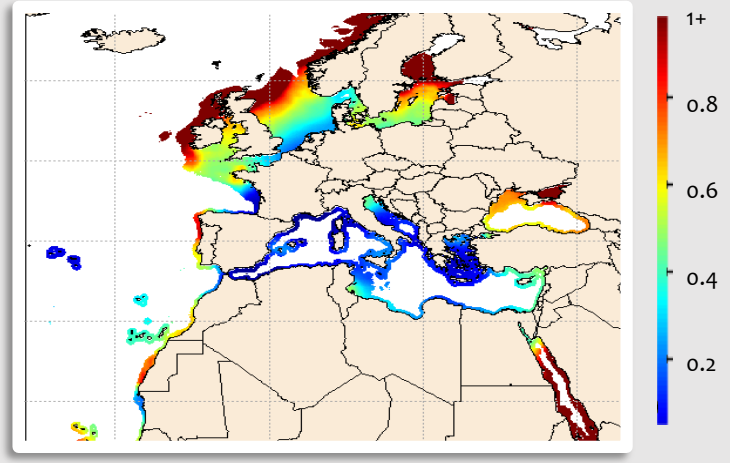
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Trachurus trachurus

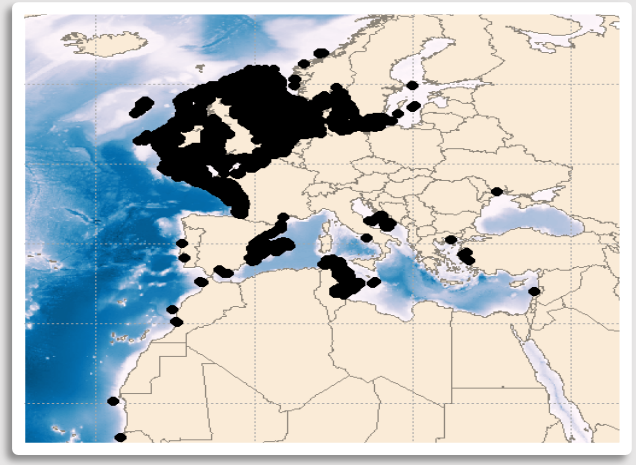
Chinchard atlantique

Atlantic horsemackerel

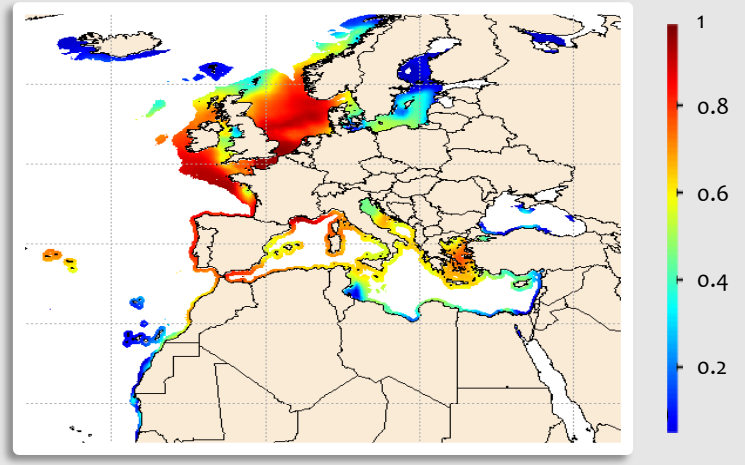
- Number of attendance data: 113,716
- Environmental parameters used: SST mean, SST variance, Primary production
- Boyce index : 0,95

CURRENT PERIOD

Distribution Observed

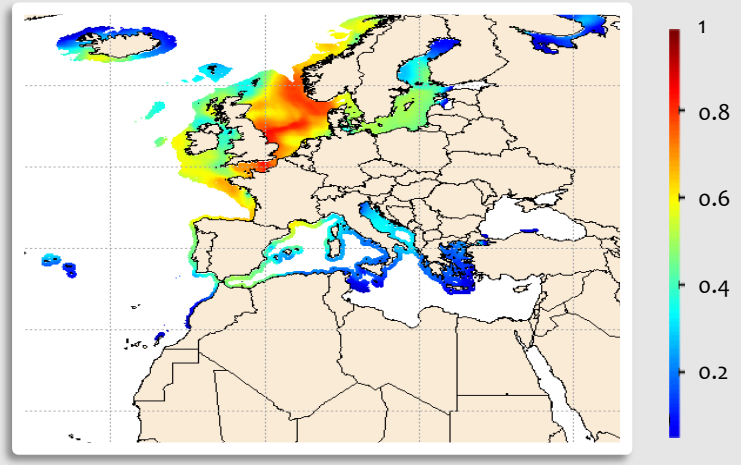


Modeling the probability of presence

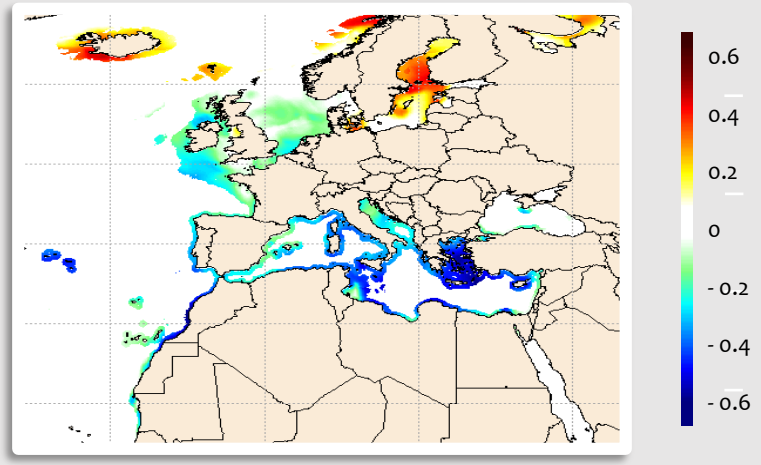


FUTURE PROJECTIONS (SCENARIO RCP8.5)

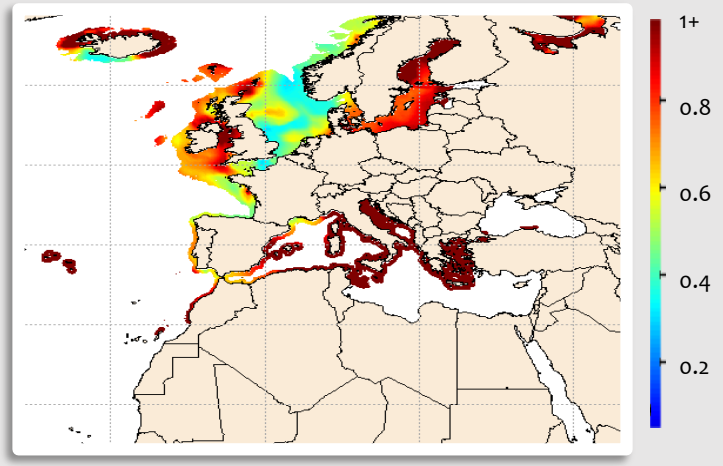
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Trachurus mediterraneus

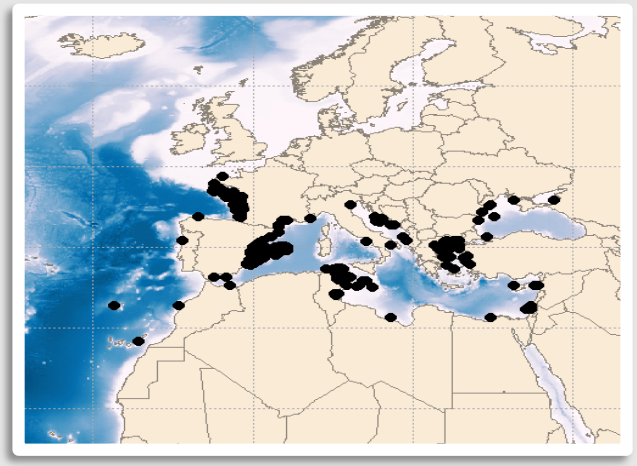
Chinchard méditerranéen

Mediterranean horsemackerel

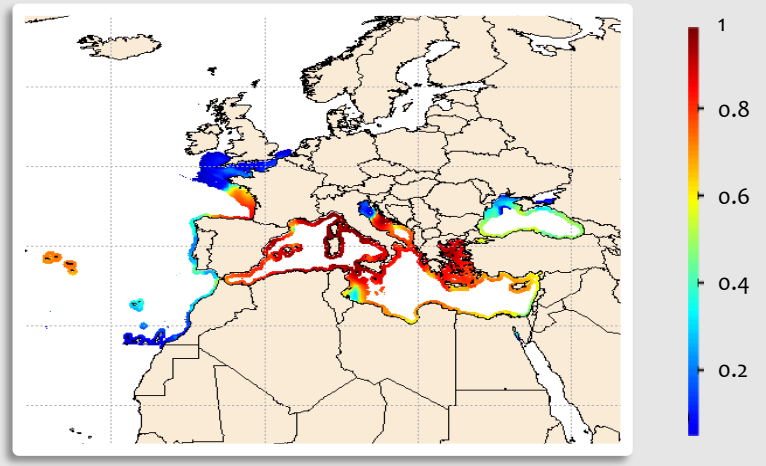
- Number of attendance data: 2,358
- Environmental parameters used: SST mean, SST variance, Primary production
- Boyce index : 0,71

CURRENT PERIOD

Distribution Observed

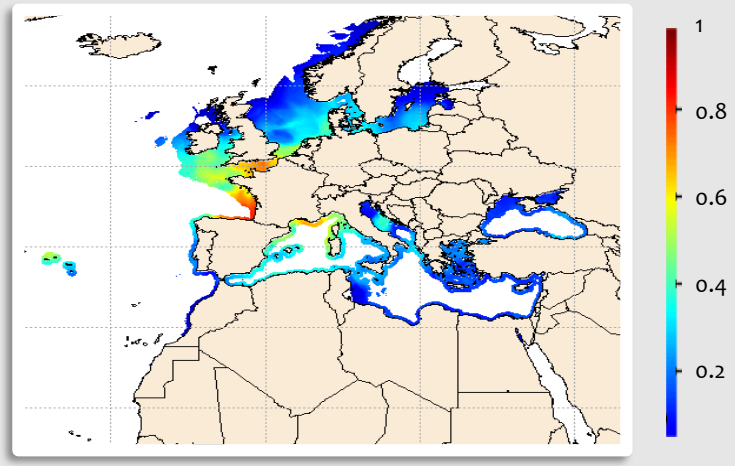


Modeling the probability of presence

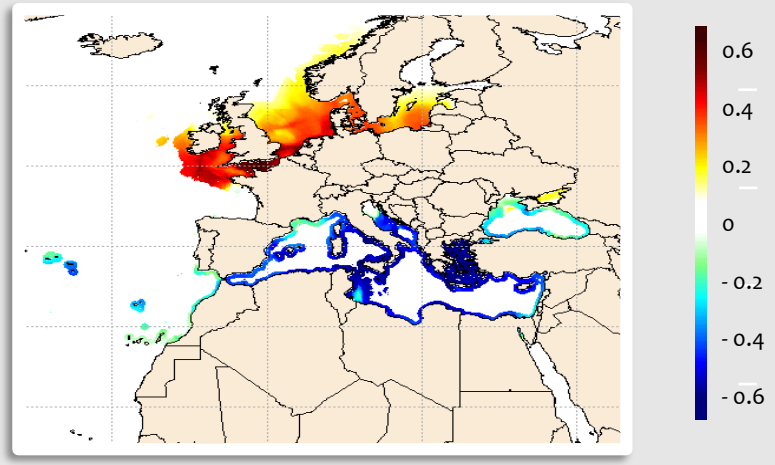


FUTURE PROJECTIONS (SCENARIO RCP8.5)

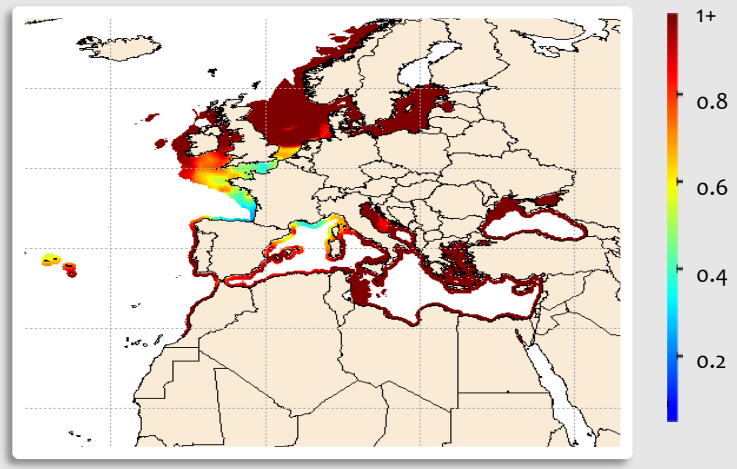
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Merluccius merluccius

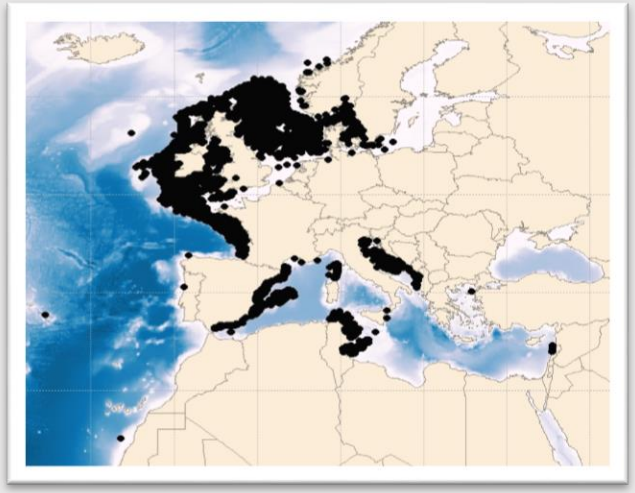
Merlu

European hake

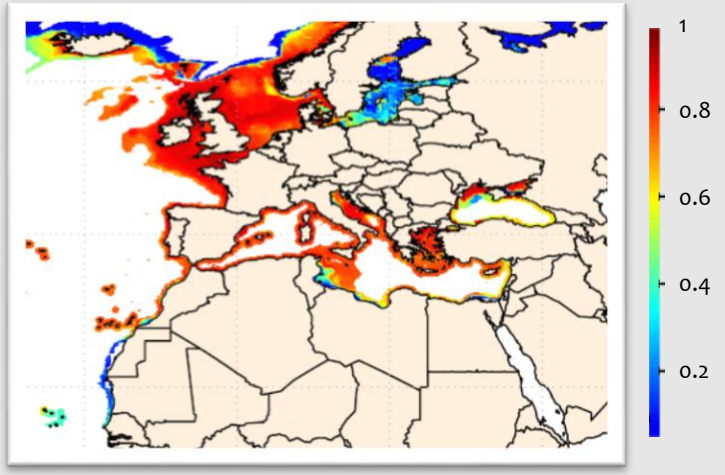
- Number of attendance data: 12423
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,835

CURRENT PERIOD

Distribution Observed

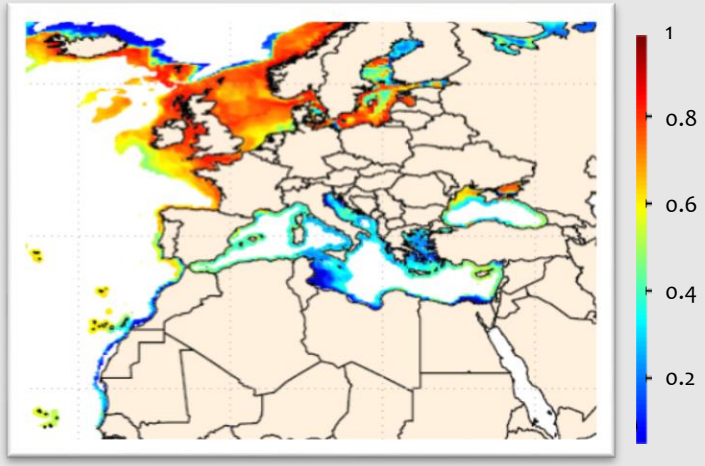


Modeling the probability of presence

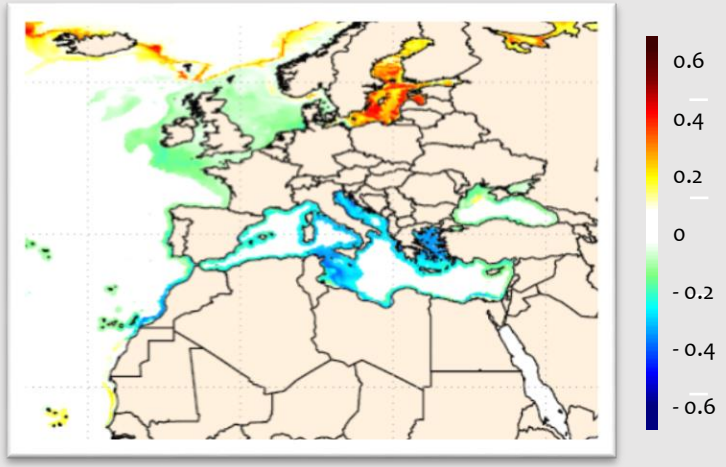


FUTURE PROJECTIONS (SCENARIO RCP8.5)

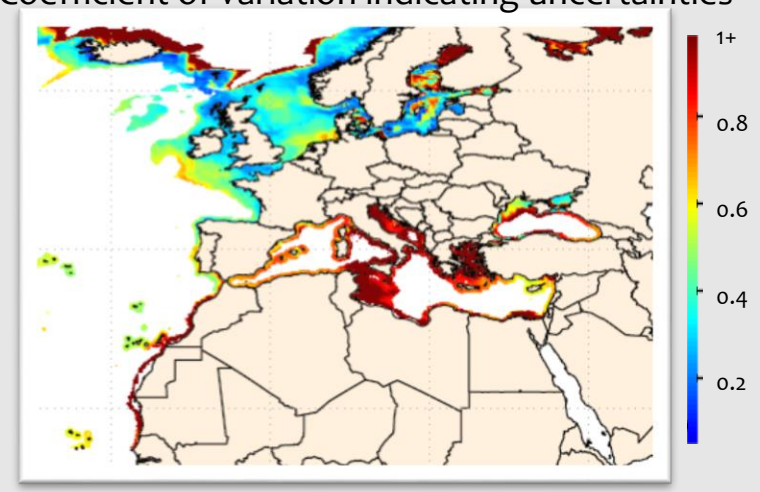
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Mullus surmuletus

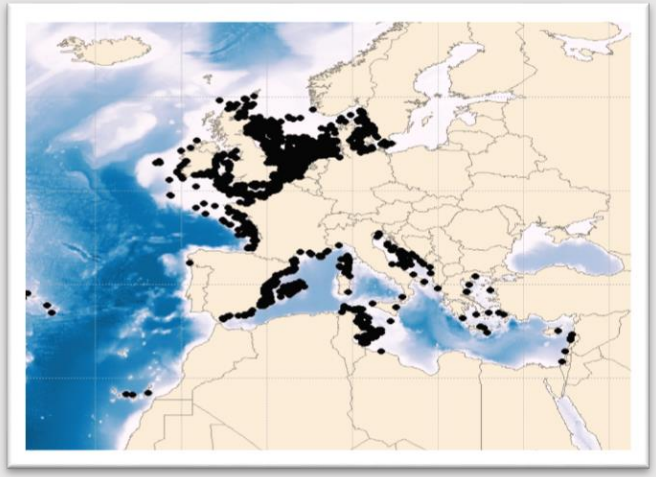
Rouget de roche

Surmullet

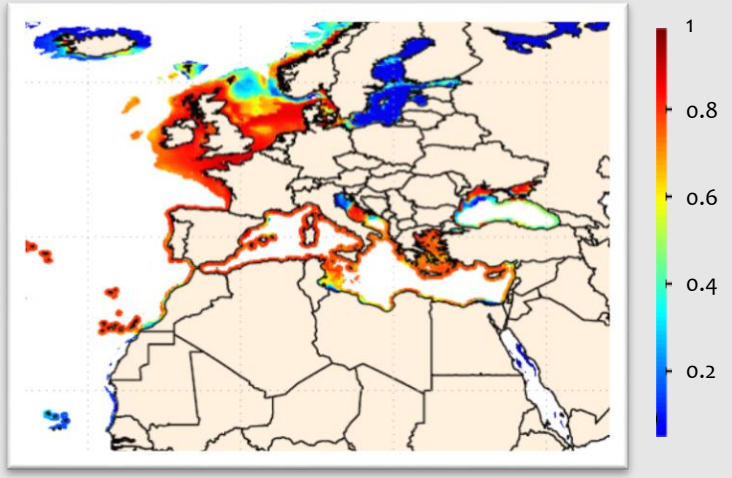
- Number of attendance data: 7672
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,868

CURRENT PERIOD

Distribution Observed

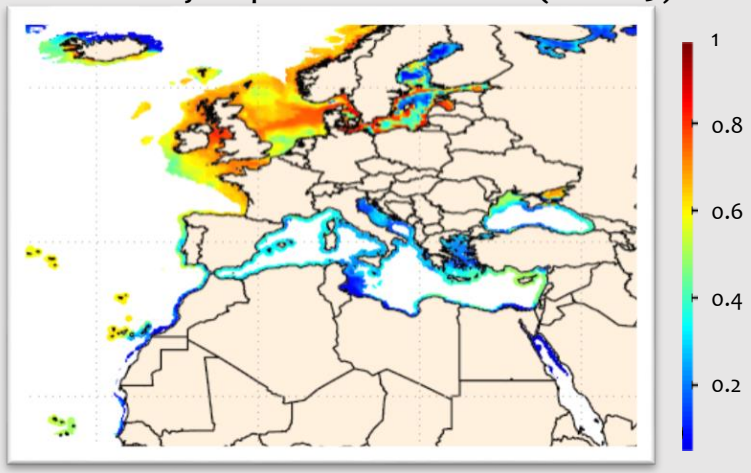


Modeling the probability of presence

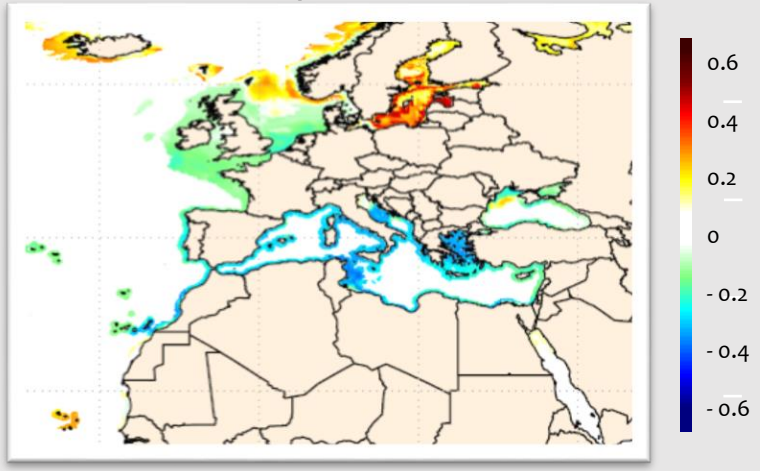


FUTURE PROJECTIONS (SCENARIO RCP8.5)

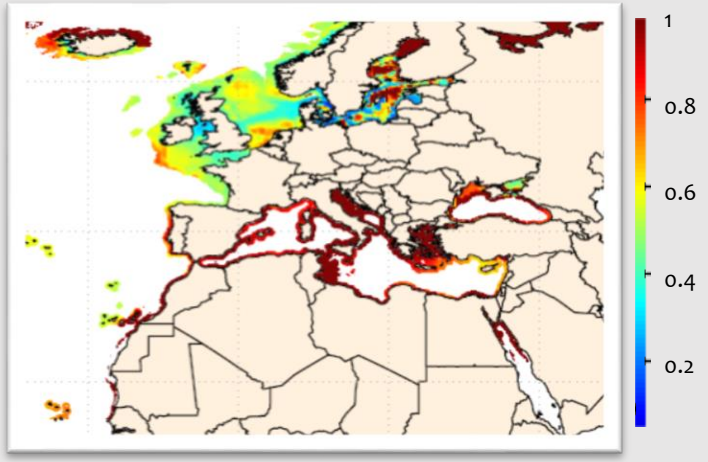
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Mullus barbatus

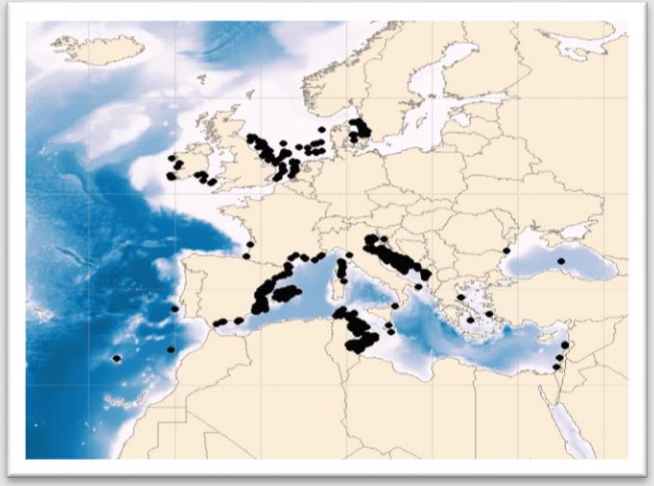
Rouget de vase

Red mullet

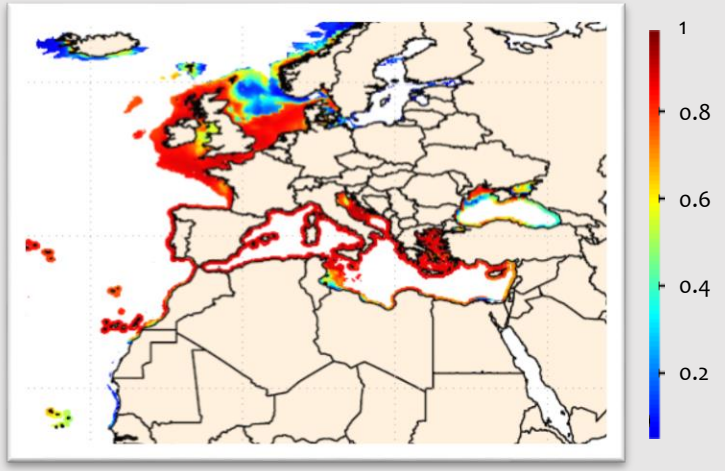
- Number of attendance data: 2627
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,856

CURRENT PERIOD

Distribution Observed

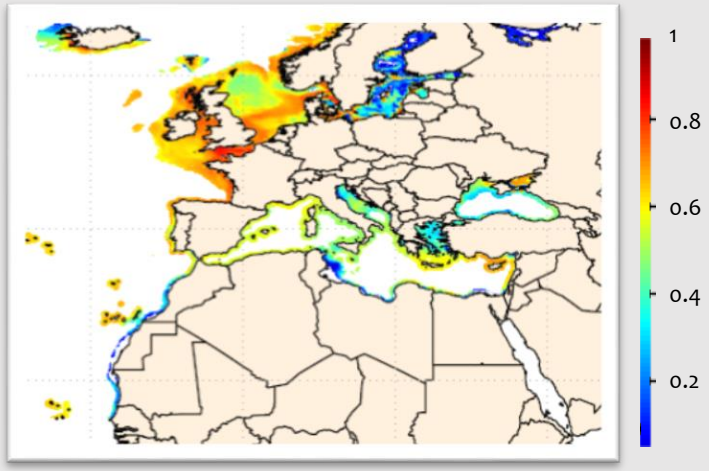


Modeling the probability of presence

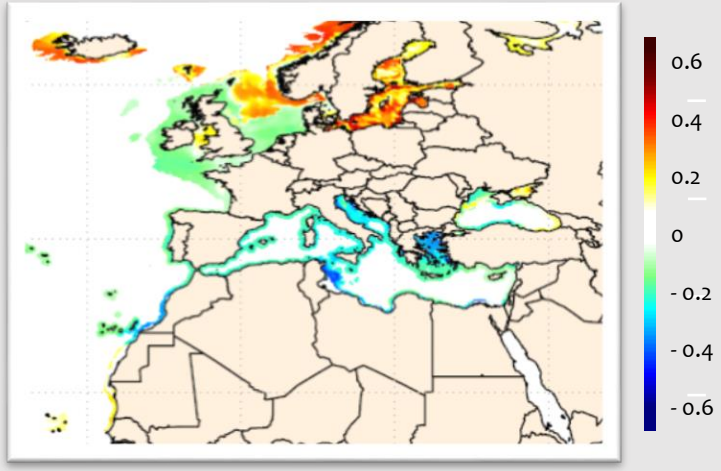


FUTURE PROJECTIONS (SCENARIO RCP8.5)

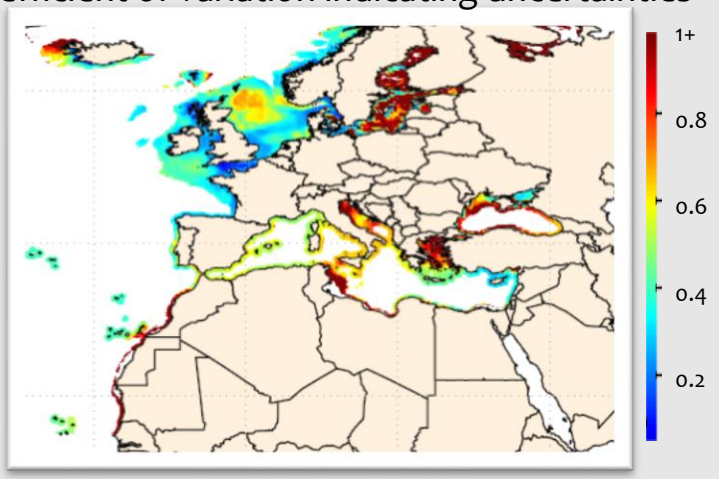
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Lophius spp.

L. piscatorius + L. budegassa

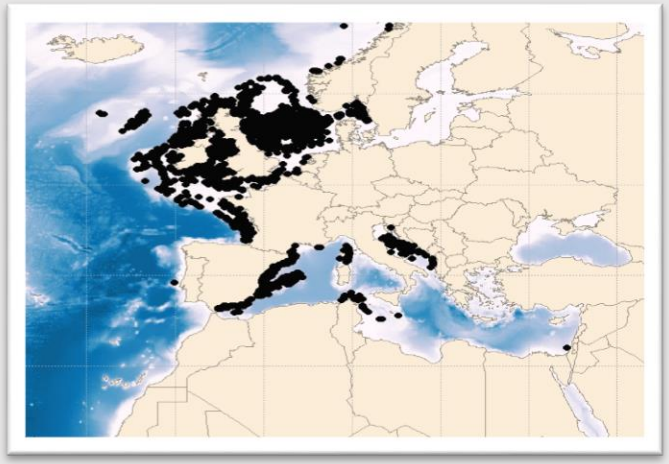
Baudroie

Anglerfish

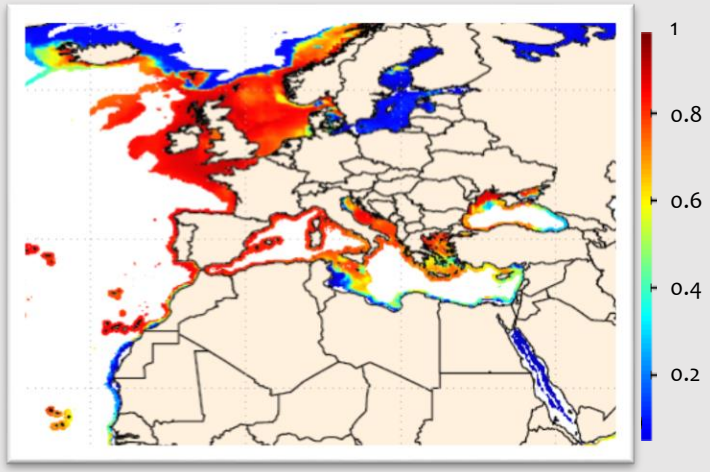
- Number of attendance data: 11859
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,816

CURRENT PERIOD

Distribution Observed

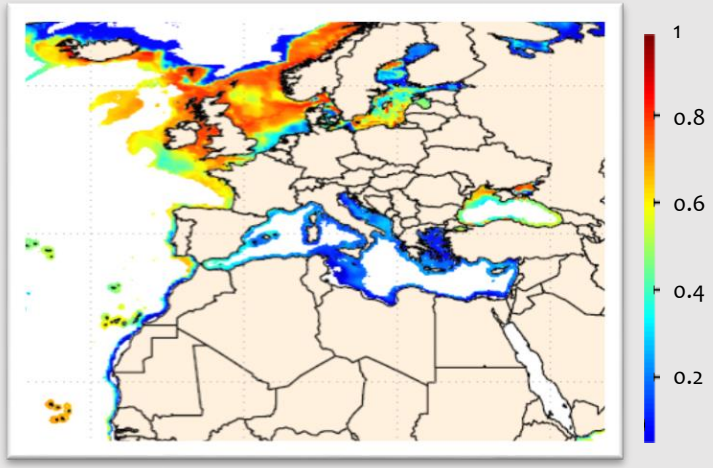


Modeling the probability of presence

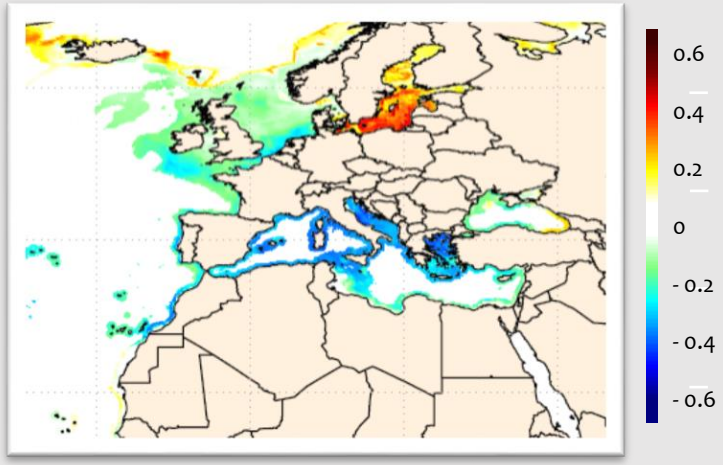


FUTURE PROJECTIONS (SCENARIO RCP8.5)

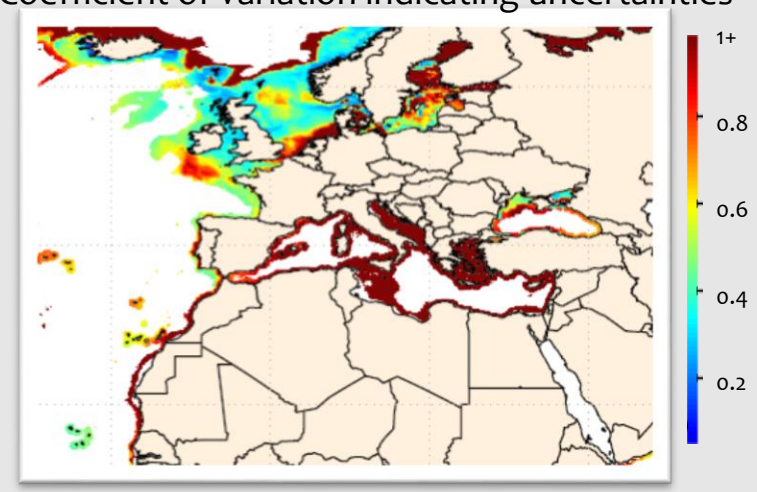
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Solea solea

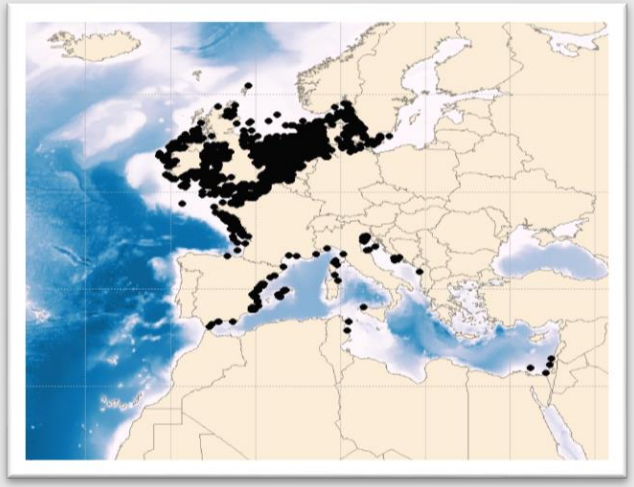
Sole commune

Common sole

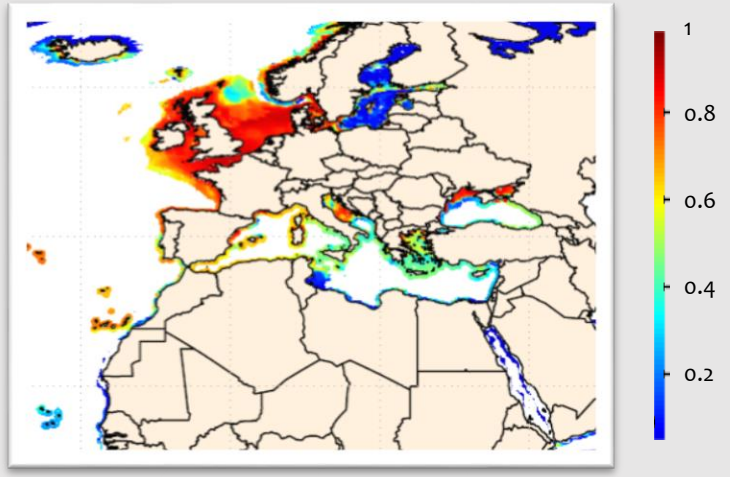
- Number of attendance data: 15827
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,835

CURRENT PERIOD

Distribution Observed

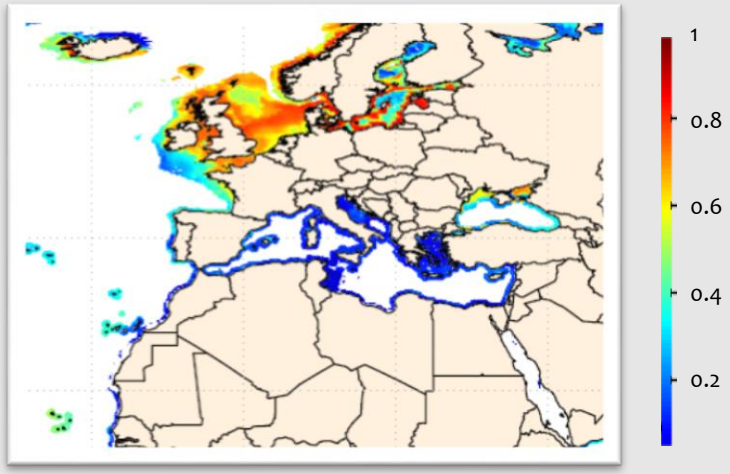


Modeling the probability of presence

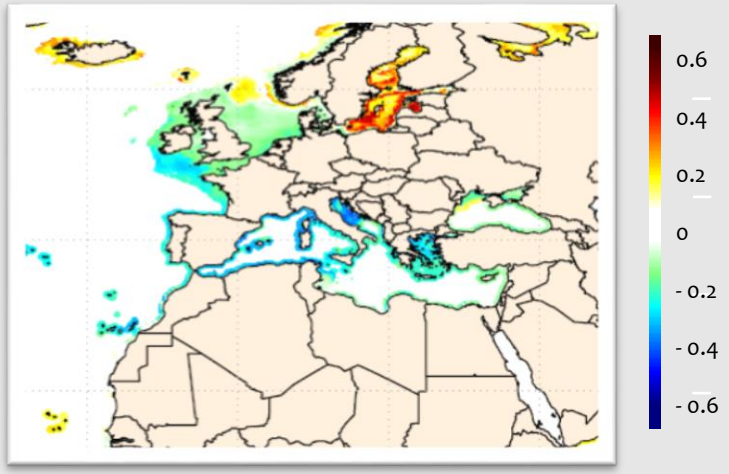


FUTURE PROJECTIONS (SCENARIO RCP8.5)

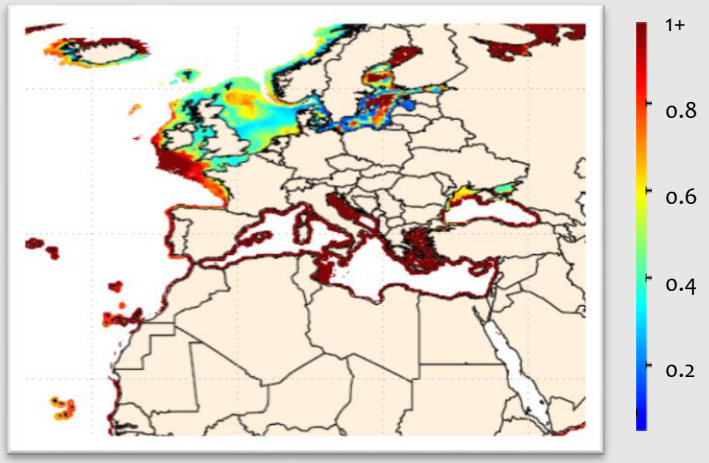
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Pagellus erythrinus

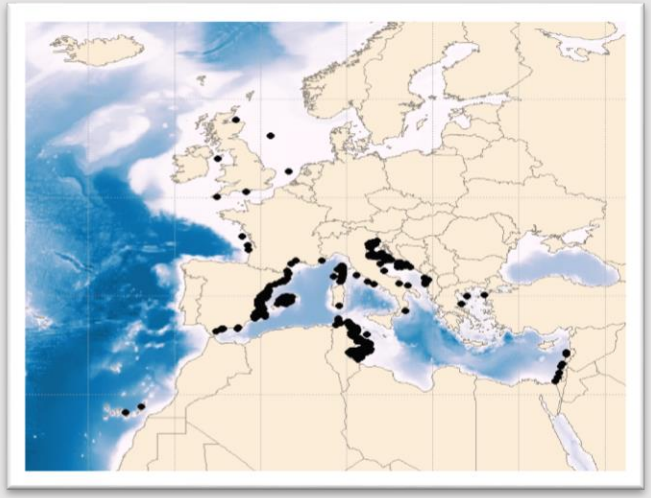
Pageot commun

Common pandora

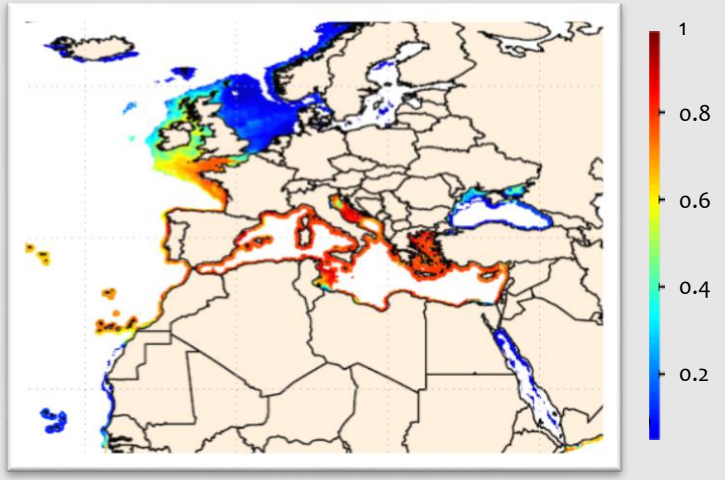
- Number of attendance data: 2229
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,827

CURRENT PERIOD

Distribution Observed

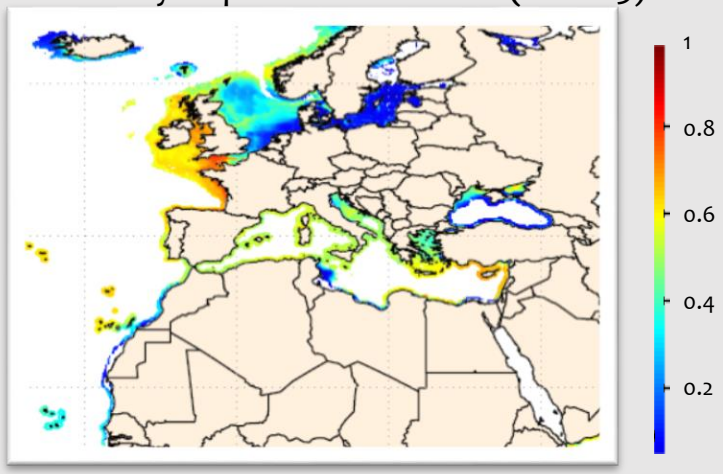


Modeling the probability of presence

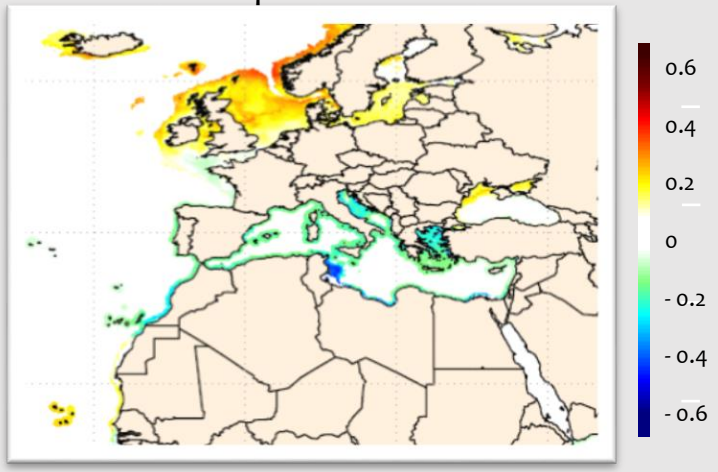


FUTURE PROJECTIONS (SCENARIO RCP8.5)

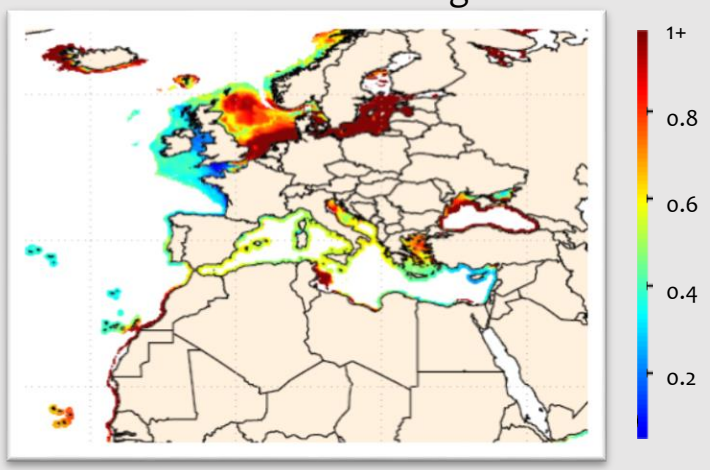
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Dicentrarchus labrax

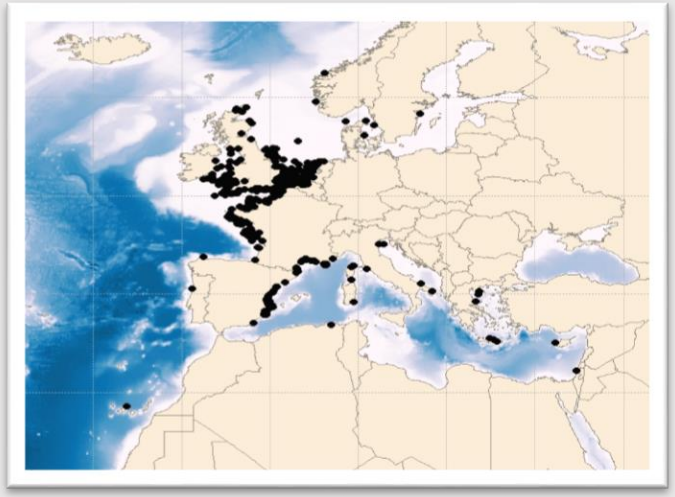
Loup (ou bar)

European seabass

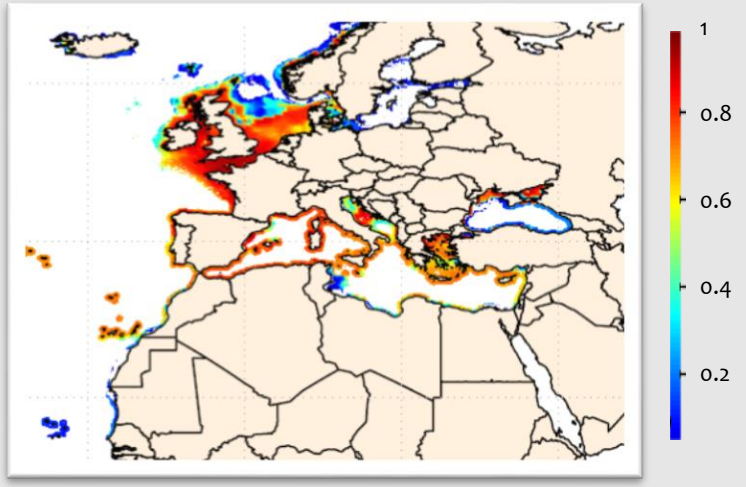
- Number of attendance data: 2541
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,822

CURRENT PERIOD

Distribution Observed

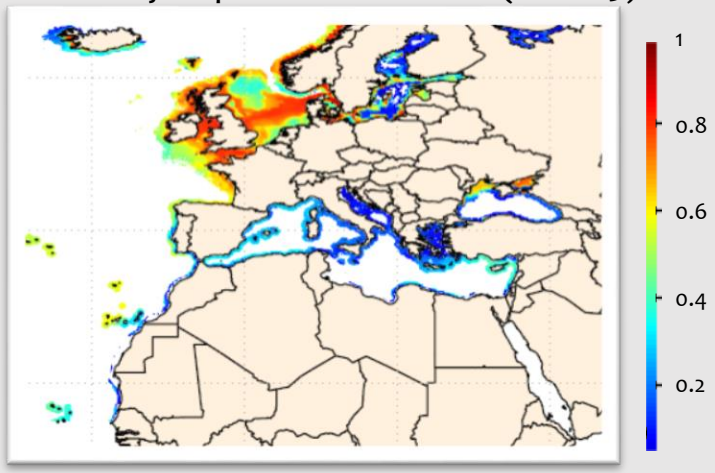


Modeling the probability of presence

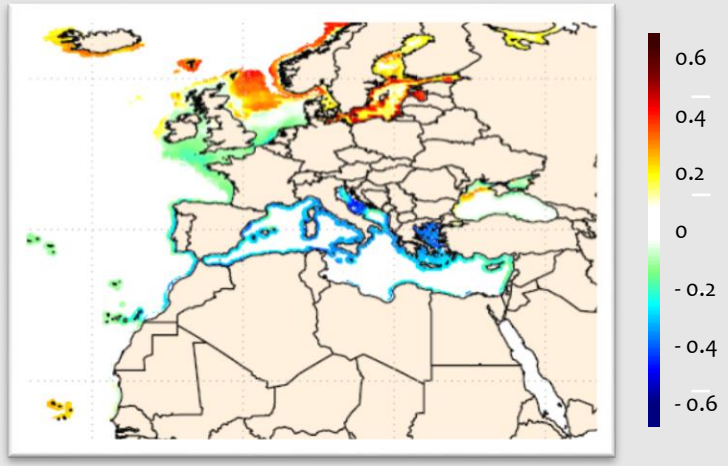


FUTURE PROJECTIONS (SCENARIO RCP8.5)

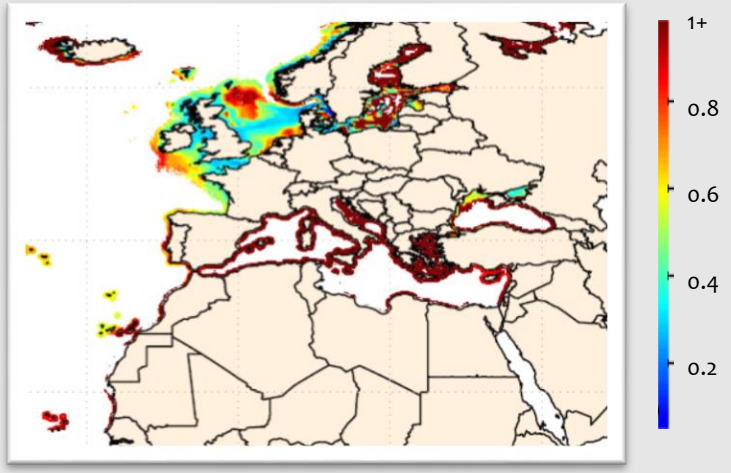
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Sparus aurata

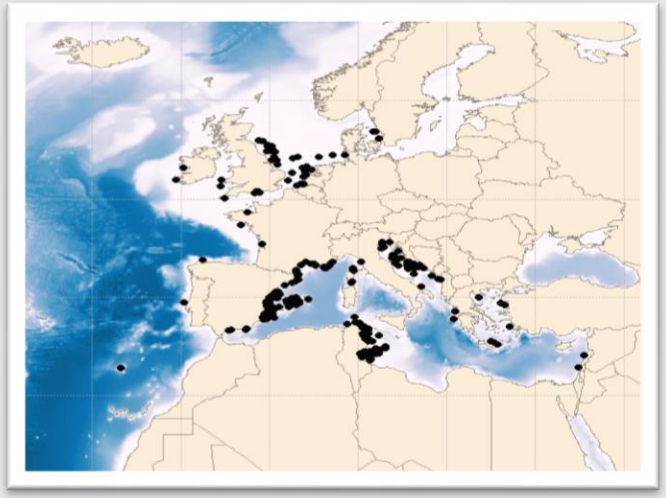
Dorade royale

Gilthead seabream

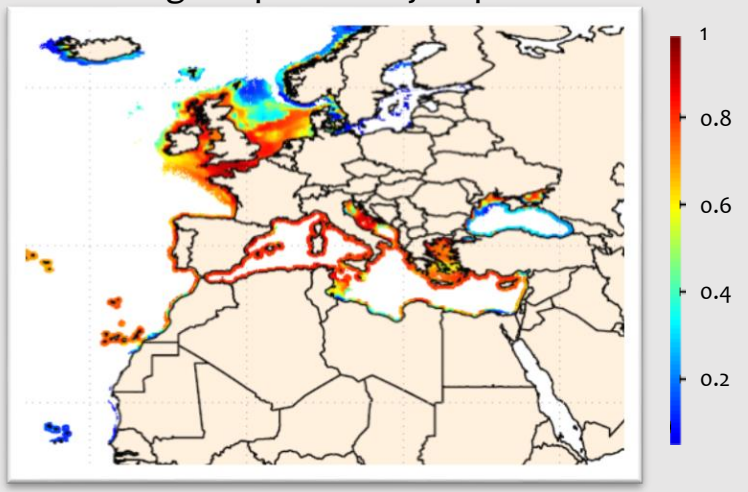
- Number of attendance data: 1212
- Environmental parameters used: Average SBT, SBT range, Primary production
- Boyce index : 0,823

CURRENT PERIOD

Distribution Observed

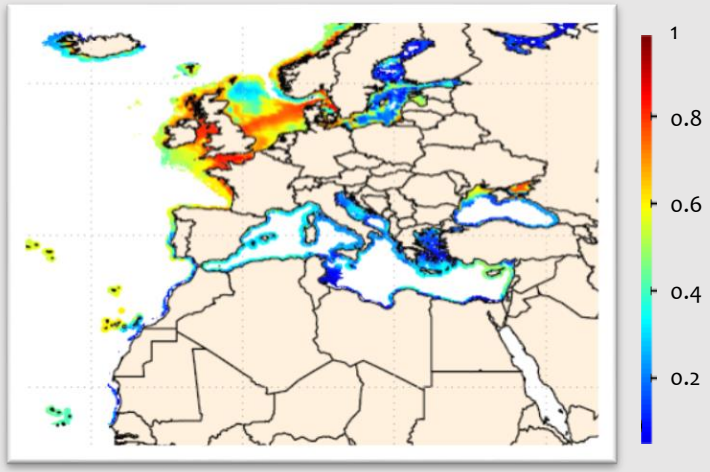


Modeling the probability of presence

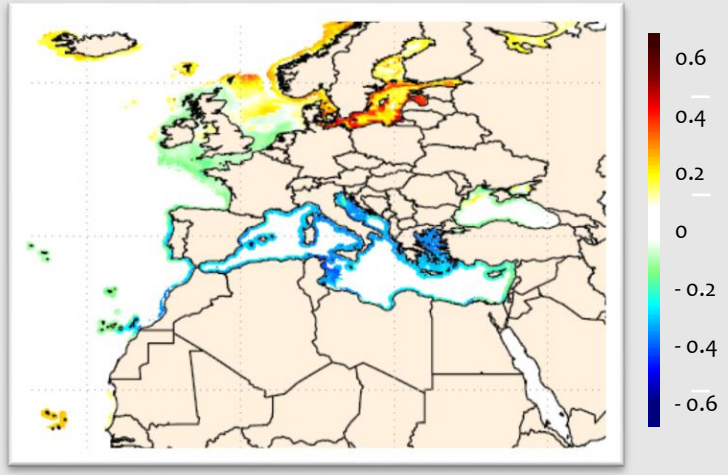


FUTURE PROJECTIONS (SCENARIO RCP8.5)

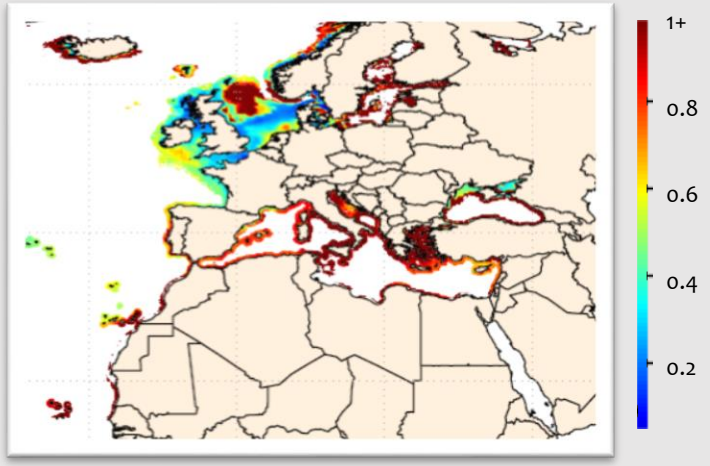
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Siganus rivulatus

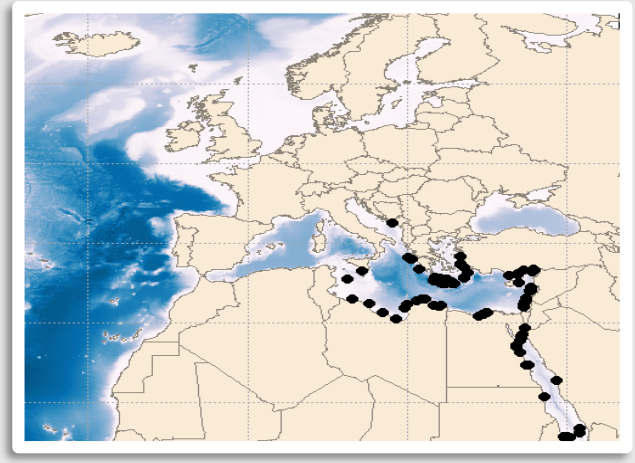
Poisson-lapin à ventre strié

Marbled spinefoot

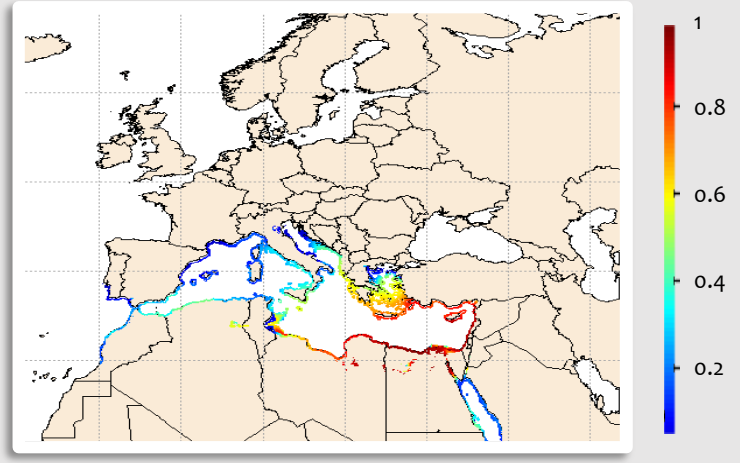
- Number of attendance data: 320
- Environmental parameters used: Average SBT, SBT range, Salinity
- Boyce index : 0,71

CURRENT PERIOD

Distribution Observed

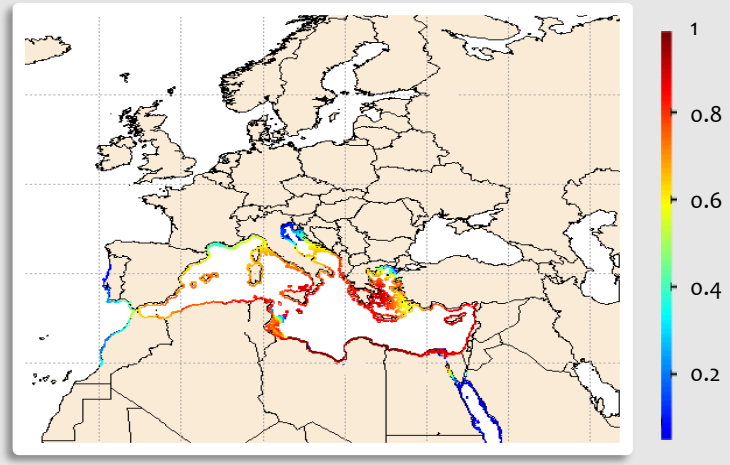


Modeling the probability of presence

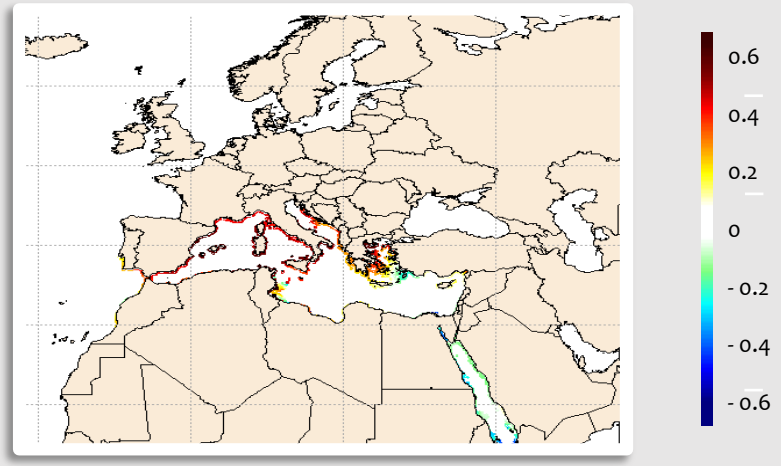


FUTURE PROJECTIONS (SCENARIO RCP8.5)

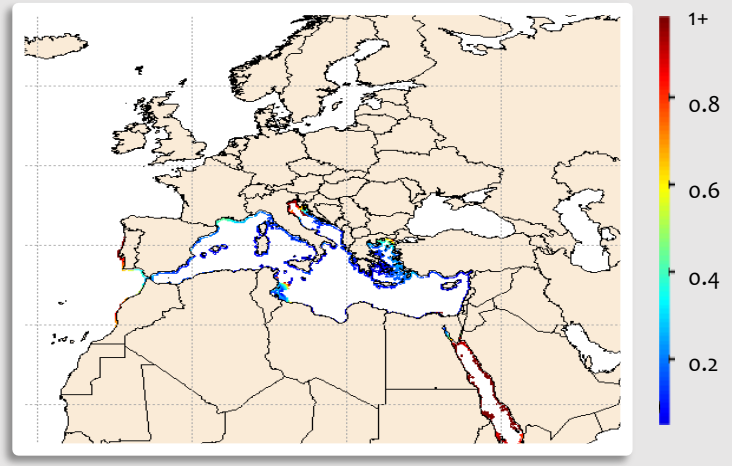
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Siganus luridus

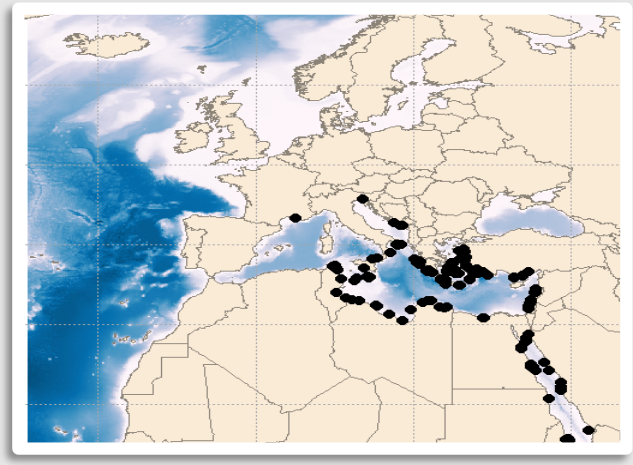
Poisson-lapin à queue tronquée

Dusky spinefoot

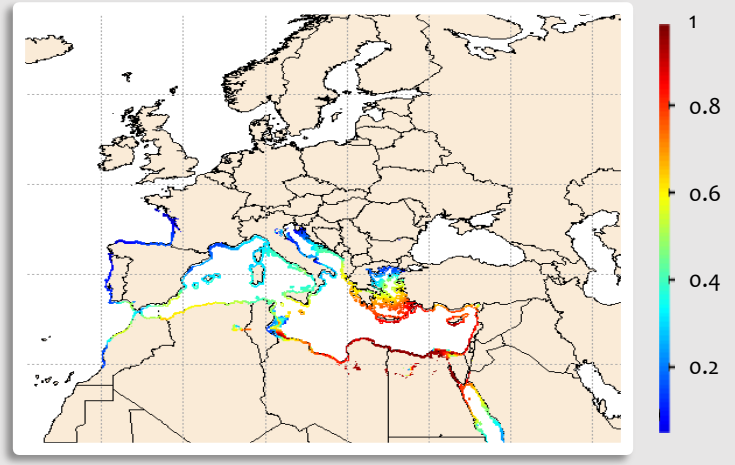
- Number of attendance data: 488
- Environmental parameters used: Average SBT, SBT range
- Boyce index : 0,80

CURRENT PERIOD

Distribution Observed

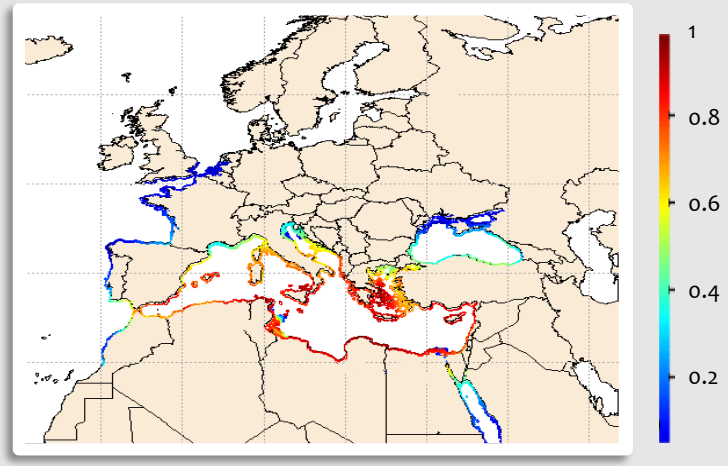


Modeling the probability of presence

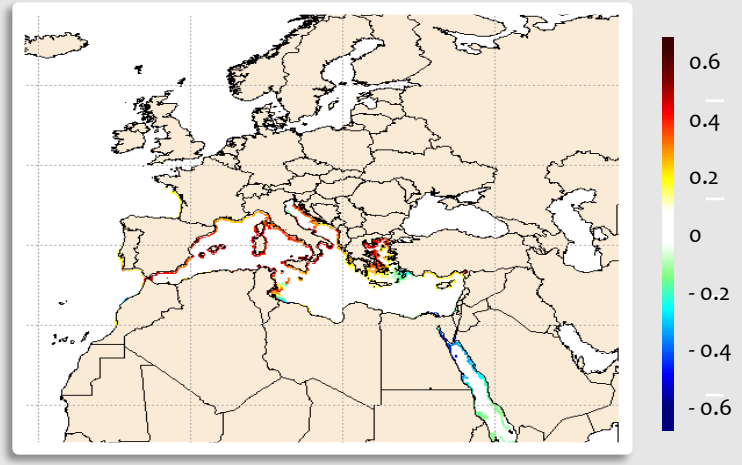


FUTURE PROJECTIONS (SCENARIO RCP8.5)

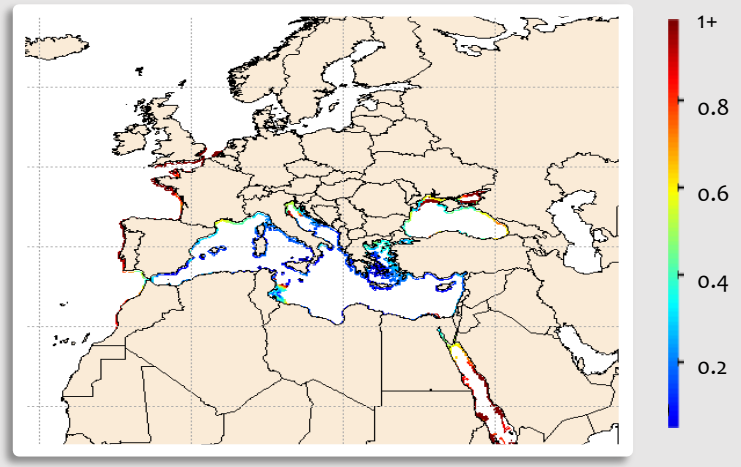
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Fistularia commersonii

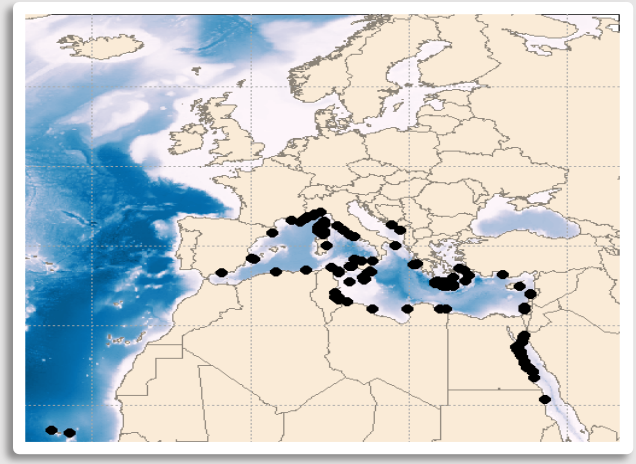
Poisson flûte

Bluespotted cornetfish

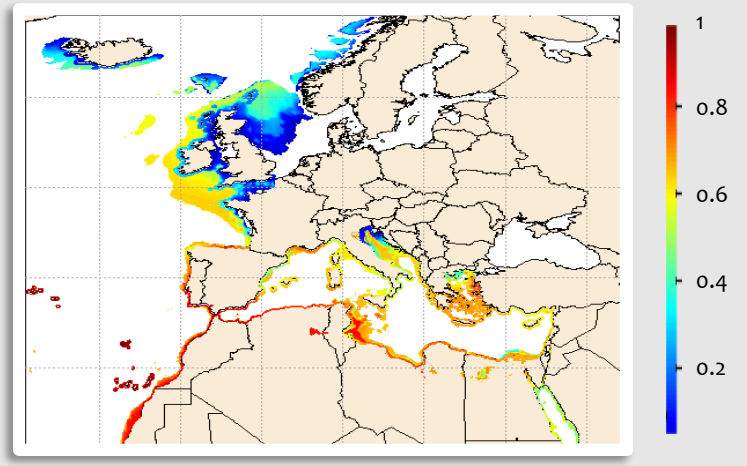
- Number of attendance data: 5,839
- Environmental parameters used: Mean SBT, Variance SBT, Salinity
- Boyce index : 0,77

CURRENT PERIOD

Distribution Observed

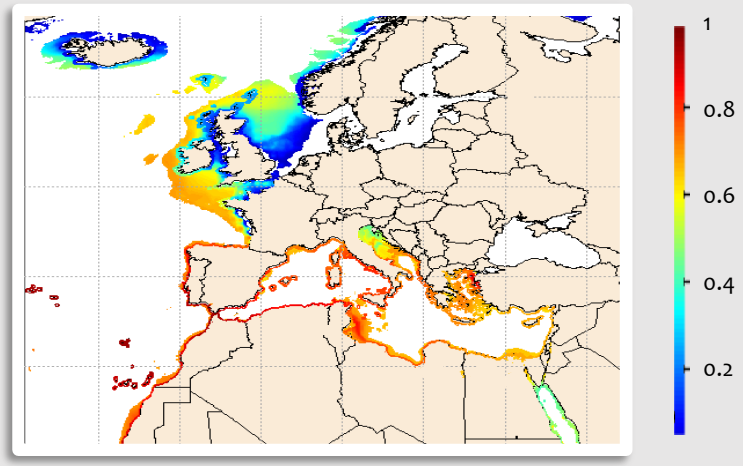


Modeling the probability of presence

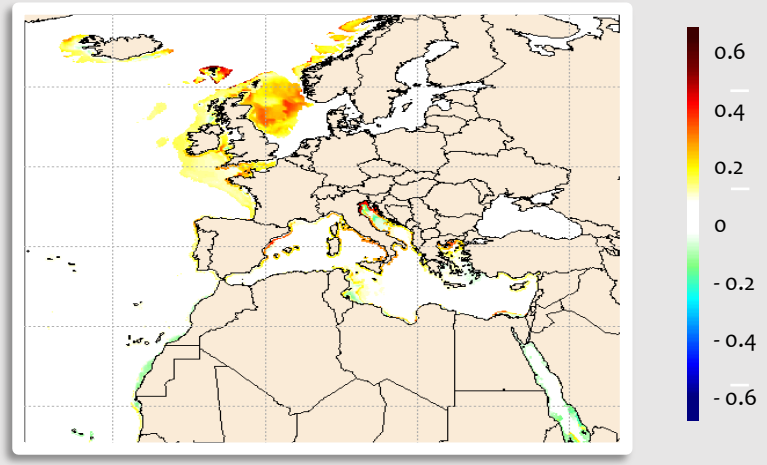


FUTURE PROJECTIONS (SCENARIO RCP8.5)

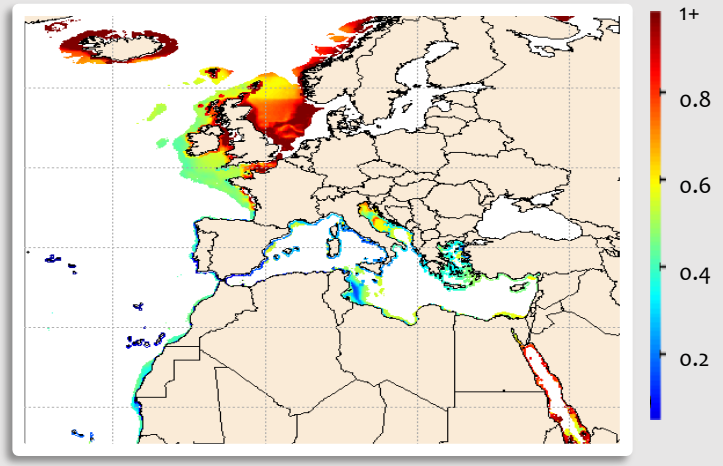
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Pterois miles

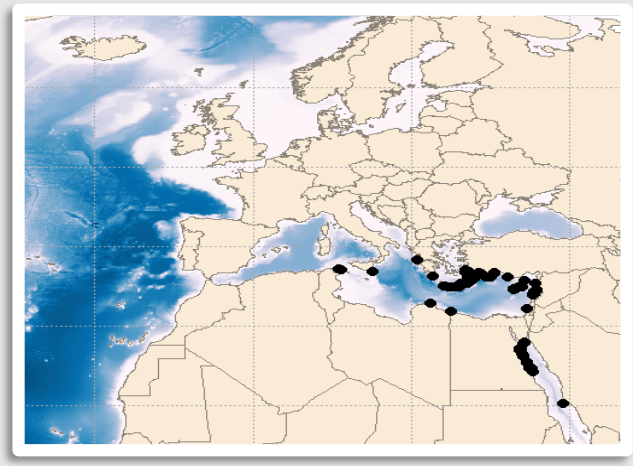
Poisson Lion

Common Lionfish

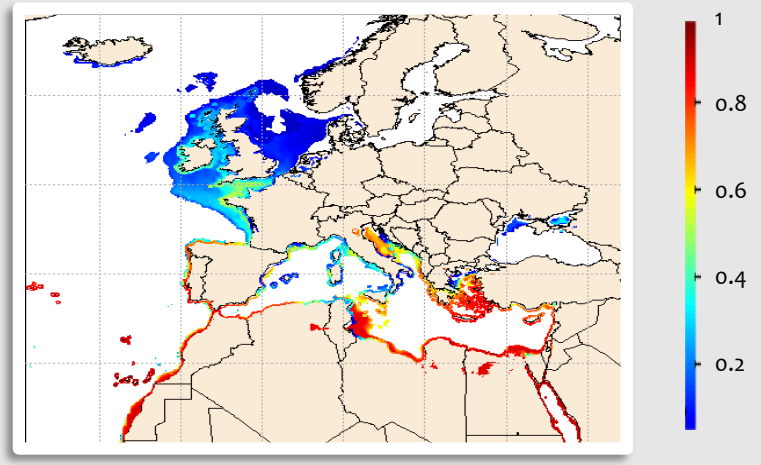
- Number of attendance data: 1,476
- Environmental parameters used: Average SBT, SBT range
- Boyce index : 0,74

CURRENT PERIOD

Distribution Observed

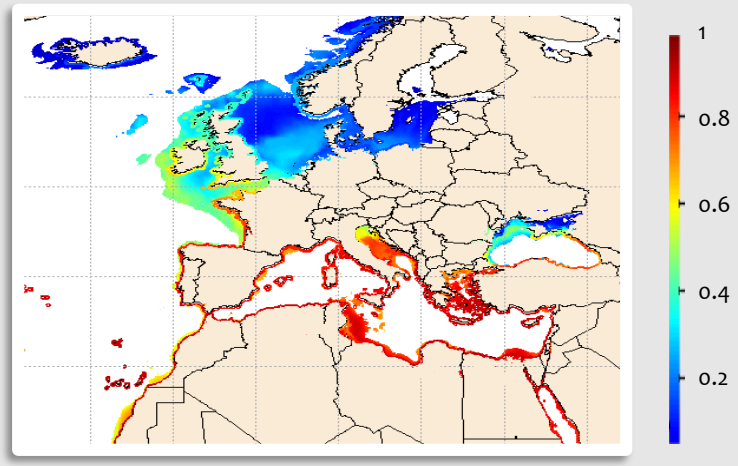


Modeling the probability of presence

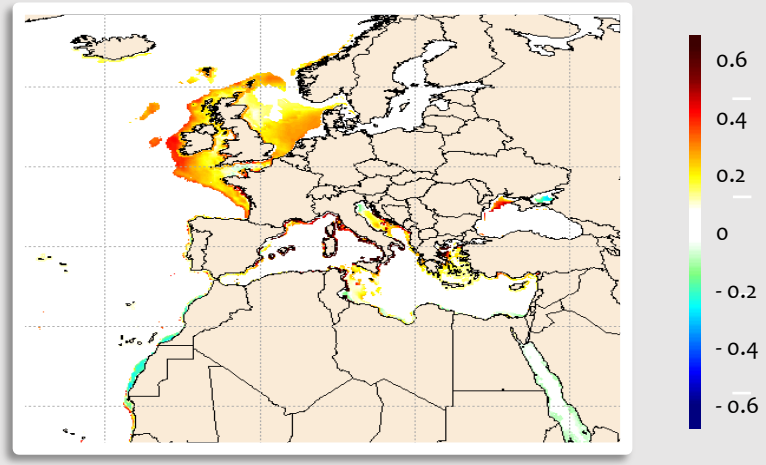


FUTURE PROJECTIONS (SCENARIO RCP8.5)

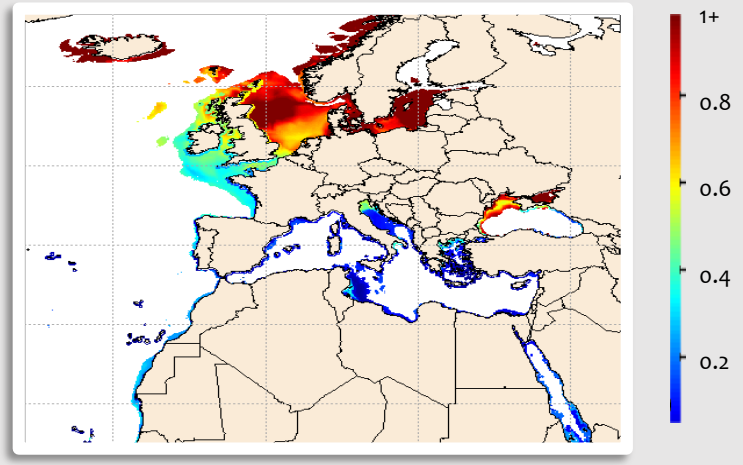
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



Lagocephalus sceleratus

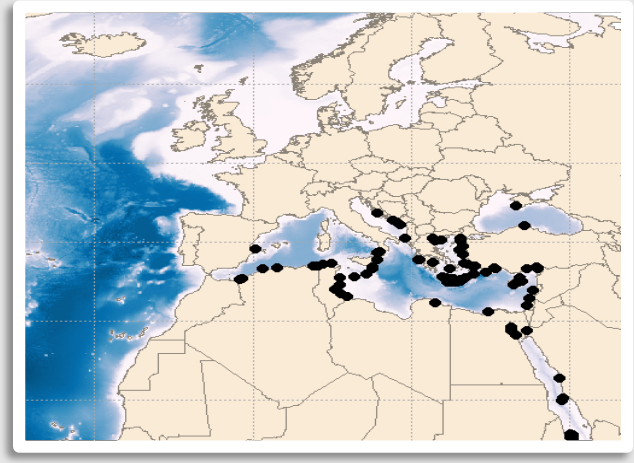
Poisson-ballon à bande argentée

Silver-cheeked toadfish

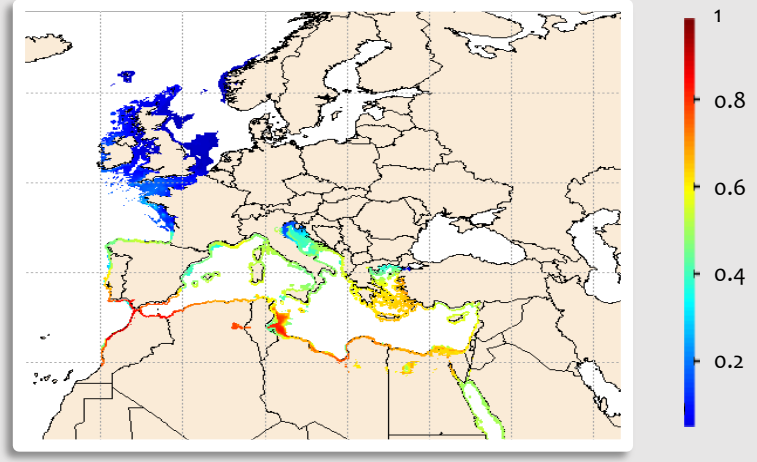
- Number of attendance data: 4,966
- Environmental parameters used:Mean SBT, Variance SBT, Salinity
- Boyce index : 0,92

CURRENT PERIOD

Distribution Observed

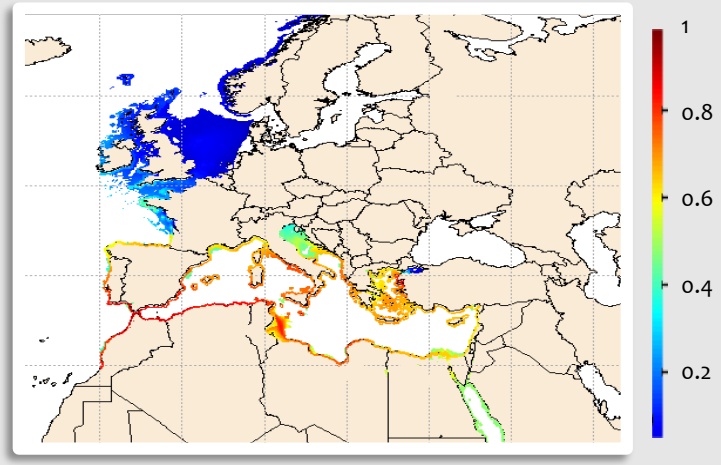


Modeling the probability of presence

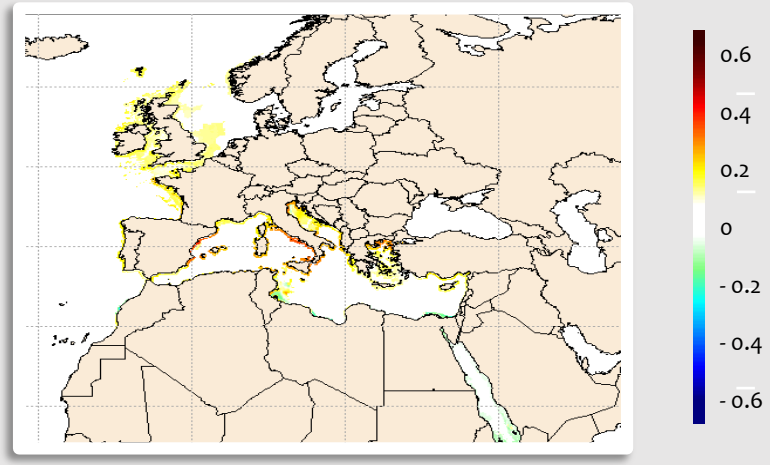


FUTURE PROJECTIONS (SCENARIO RCP8.5)

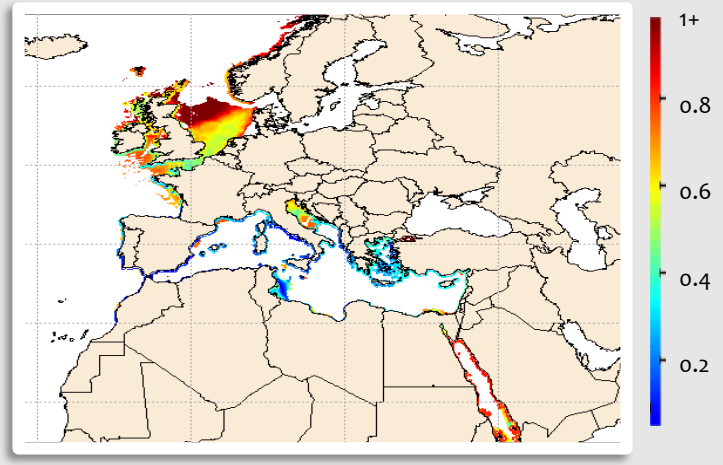
Probability of presence for 2100 (RCP8.5)



Relative evolution compared to the current period



Coefficient of variation indicating uncertainties



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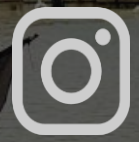
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