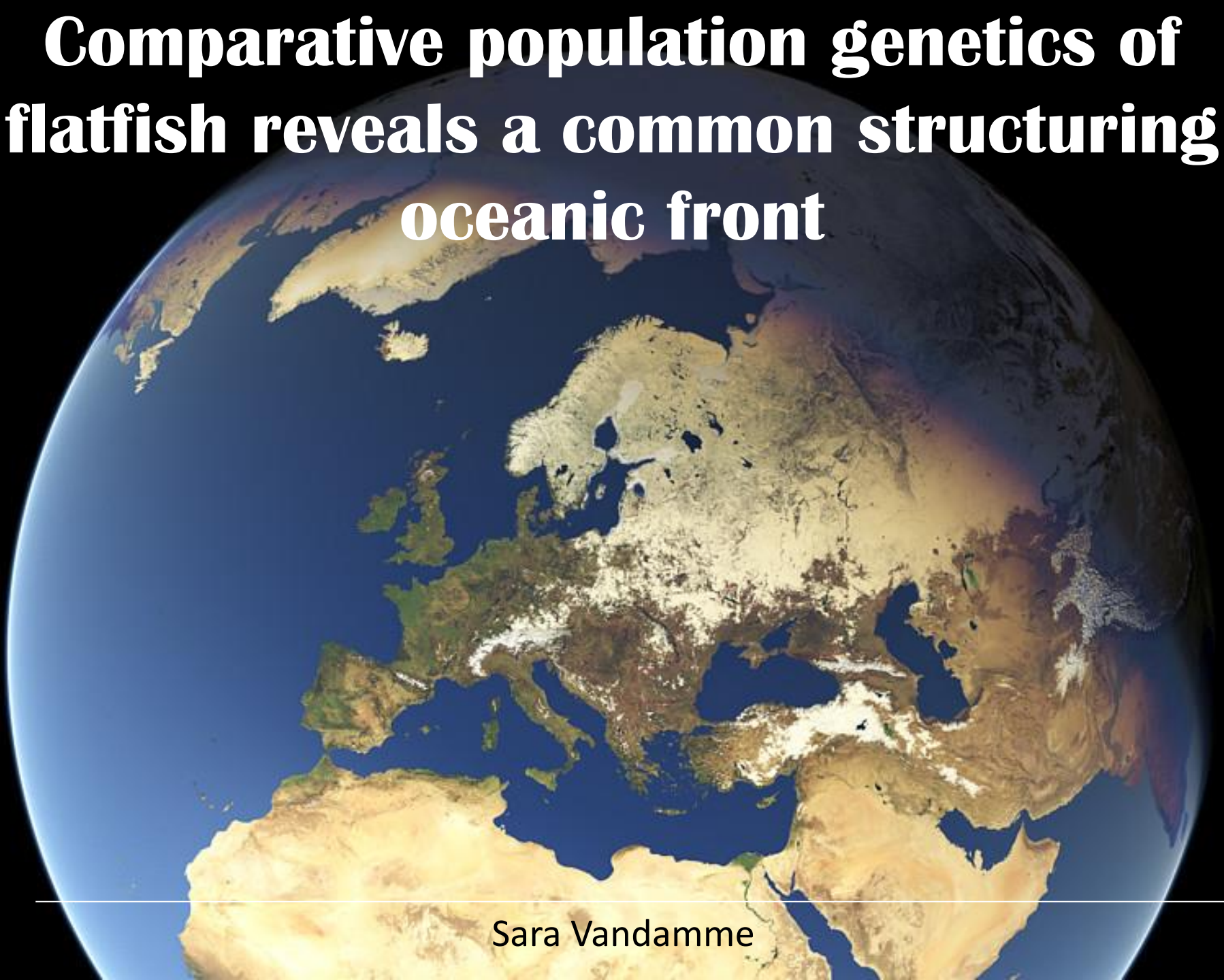
# Comparative population genetics of flatfish reveals a common structuring oceanic front



Sara Vandamme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# Study organisms

Soleidae: Sole

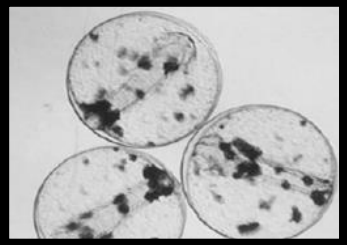
Scophtalmidae: Brill & Turbot

# Study organisms: Life history traits

| Species | Brill | Turbot | Sole | Plaice |
|---|---|---|---|---|
| Adult depth | 70-80m | 70-80m | < 50m | < 100m |
| Spawning location | offshore | offshore | inshore | offshore |
| Spawning time | Febr-Aug | May-July | March-May | Dec-Mar |
| Adult density at spawning site | 1/2x $10^6$ $m^2$ | 1/2x $10^6$ $m^2$ | 4/$10^4$ $m^2$ | 1/$10^4$ $m^2$ |
| Nursery location | Shallow coastal | | | |
| Pelagic duration | 2 months | > 2 months | 1 month | 3-4 months |

# Flatfish: Life cycle

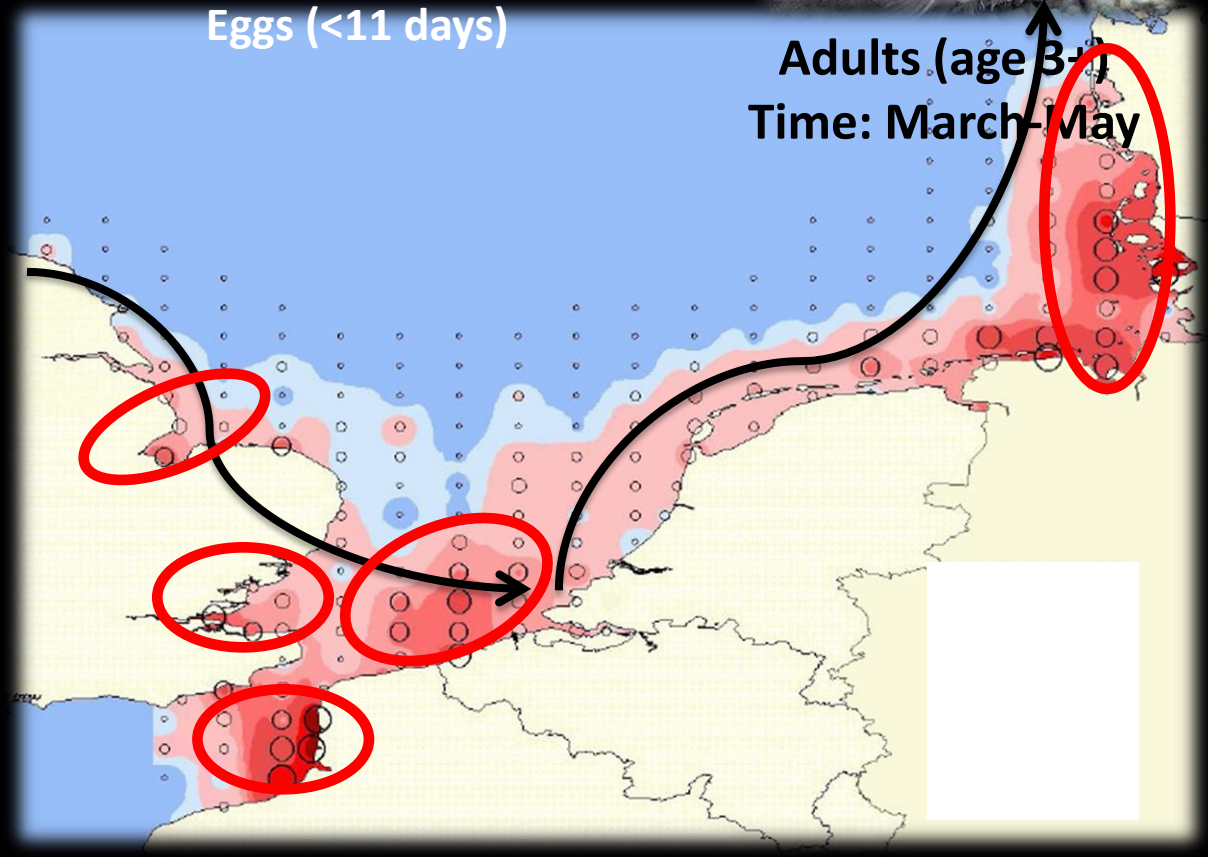
Larvae (> 4 weeks)



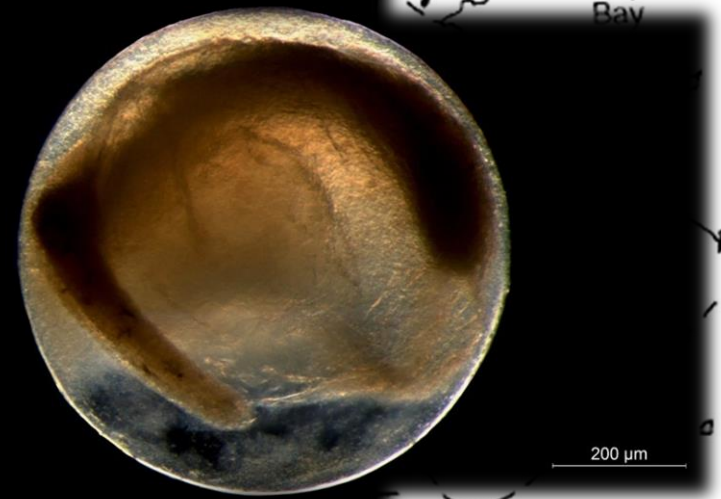
Eggs (<11 days)

Adults (age 3+)
Time: March-May

Postlarvae migrate



# Flatfish: Life cycle





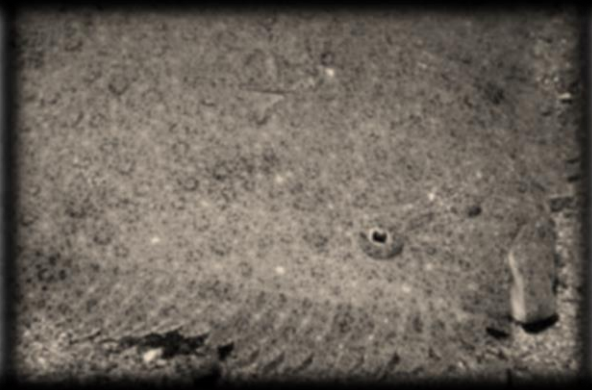

Rijnsdorp *et al.* 1992

# Connectivity

- Understand population dynamics
- Understand the population resiliency to exploitation
- Identify areas that need protection
- Design marine protected areas

⇒ Effective fisheries management

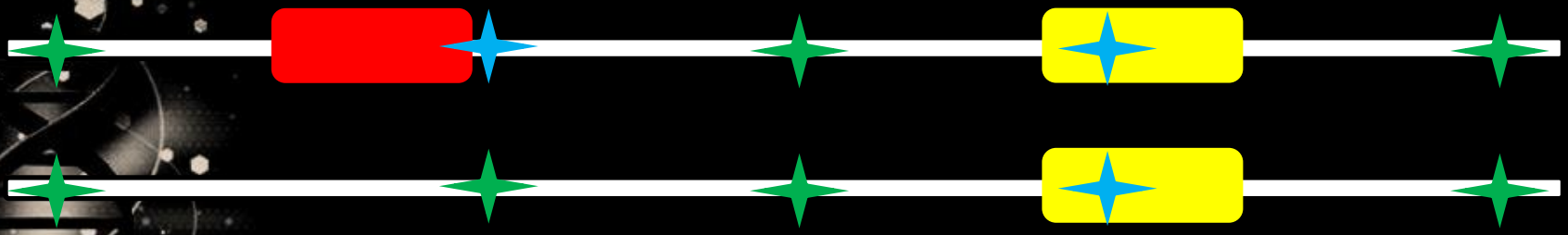
# Opportunity


- Co-distributed
- Turbot and brill are congeneric species → more similar ?
- Lower abundance → higher $F_{ST}$ ?
- Space & ENV effect ?
- One well studies species

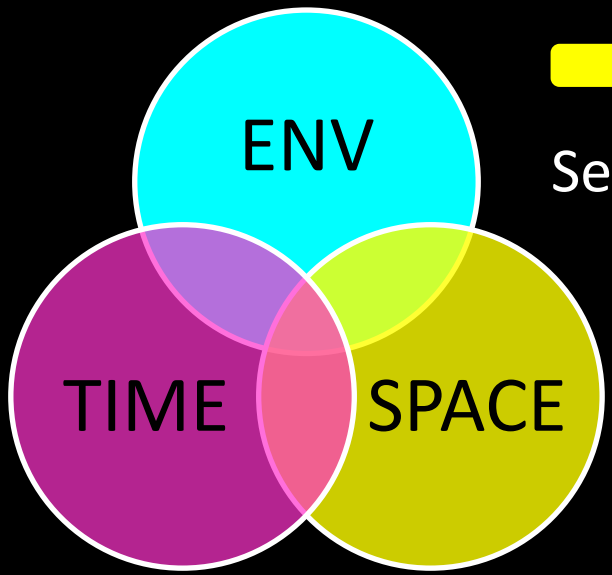
⇒ Seascape genetics and LHT explain connectivity ?

# Approach

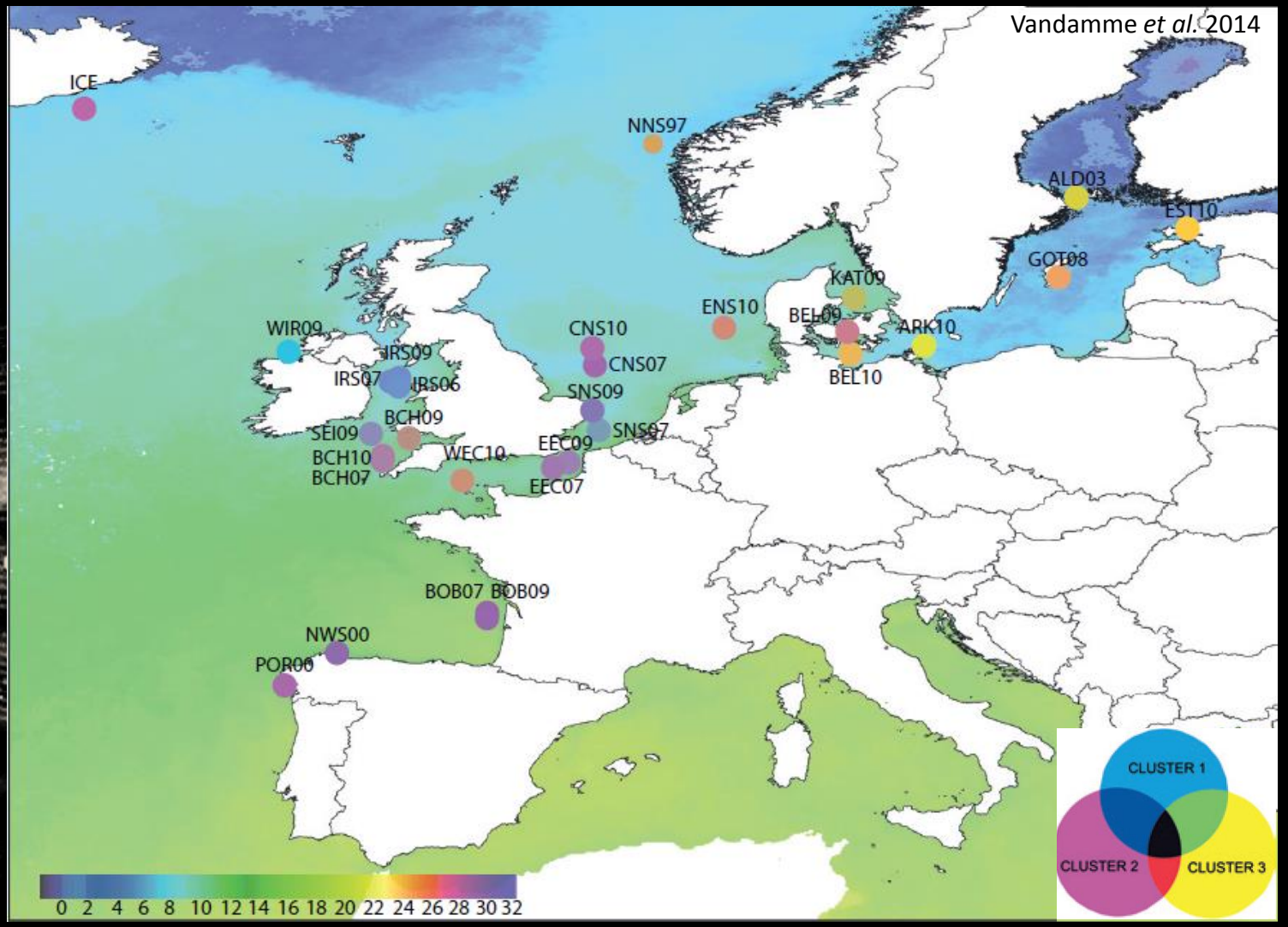


Genetic Marker
DNA strain
Gene

Seascape Genetics



# Genetic structure turbot



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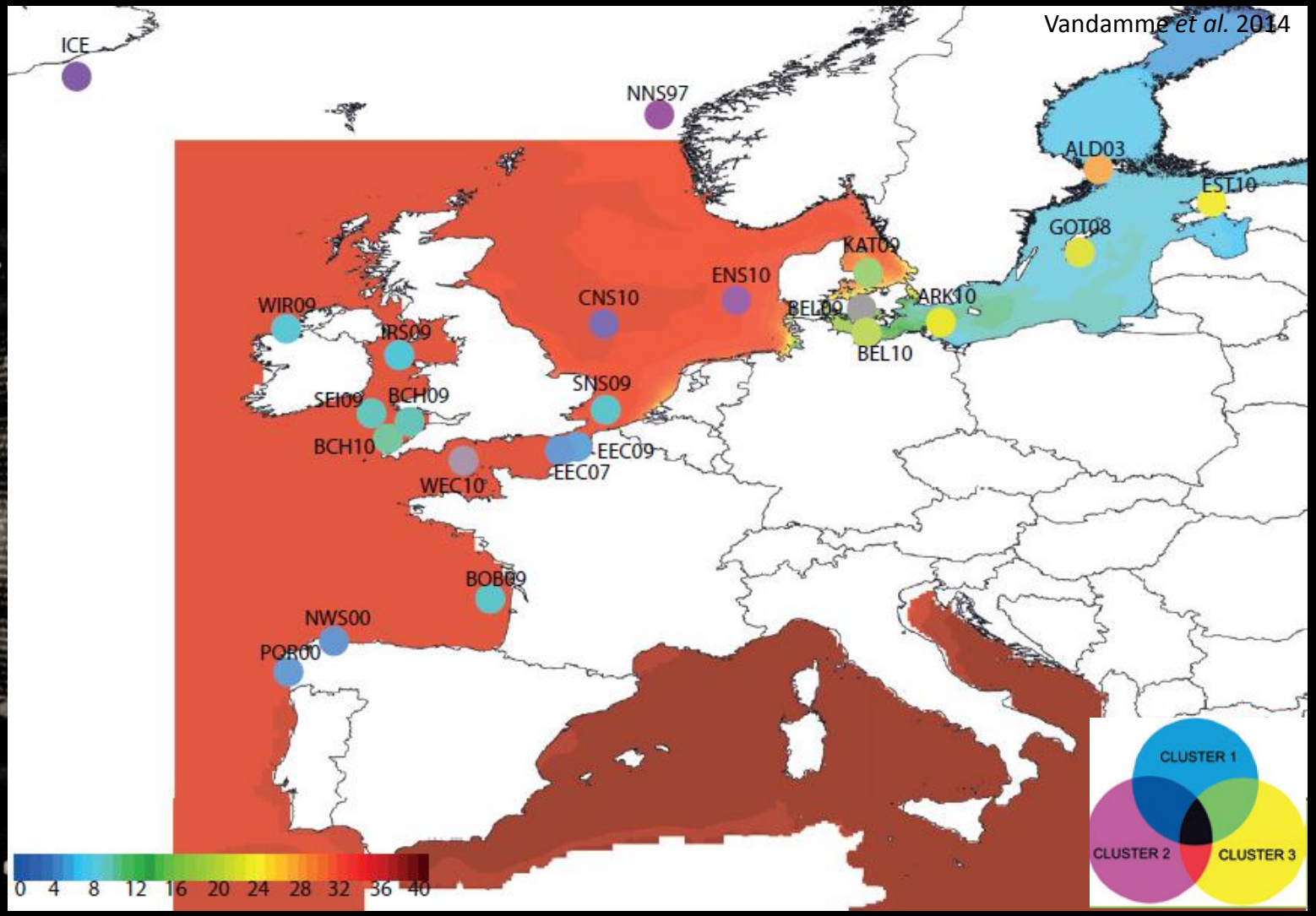
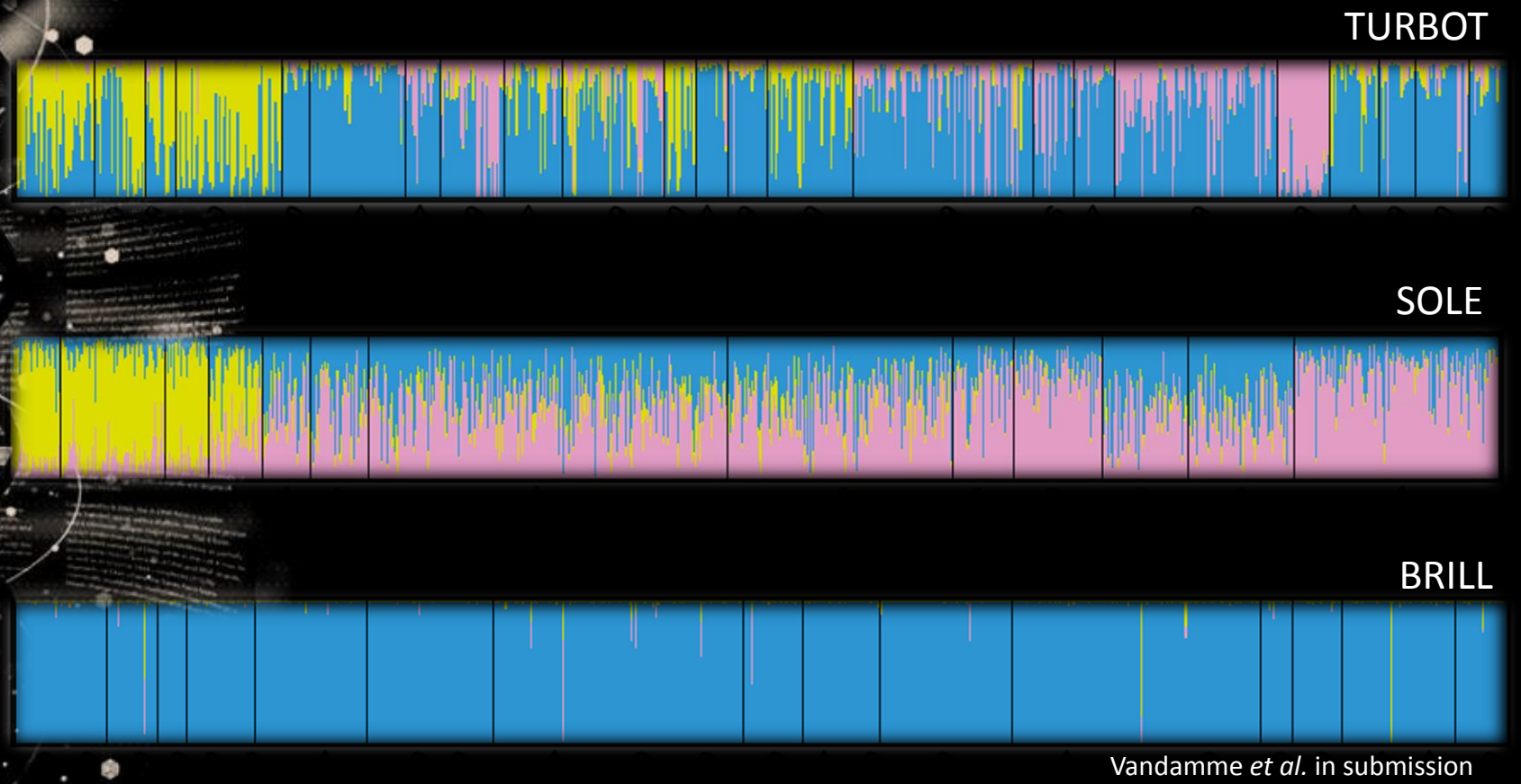


# Comparative genetic structure

Of course.. nothing is what it seems

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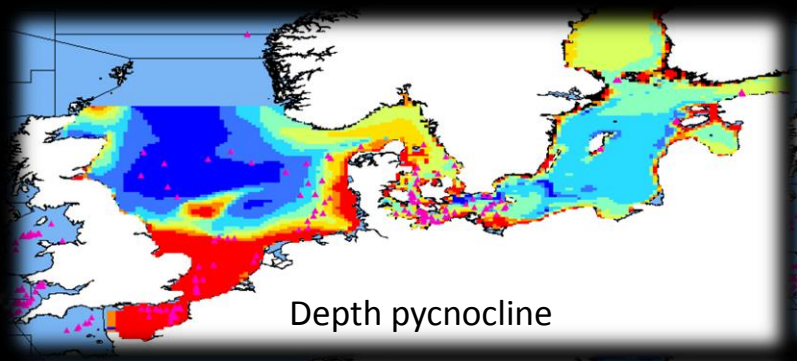
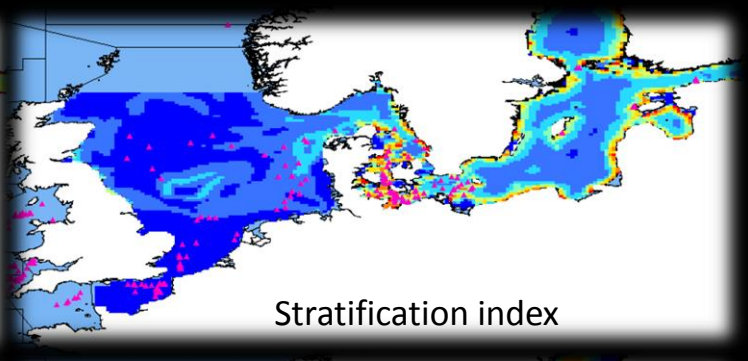
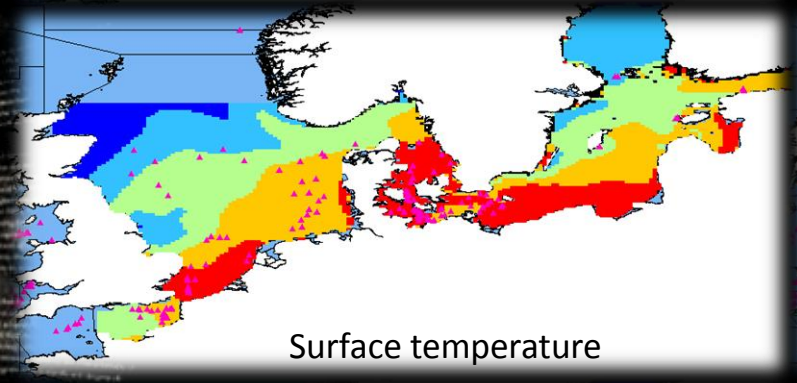
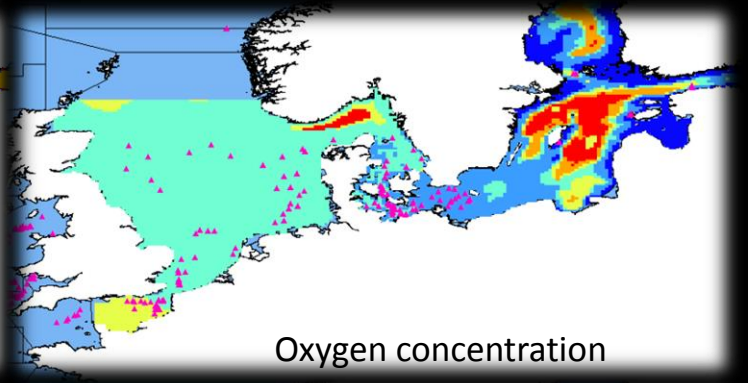
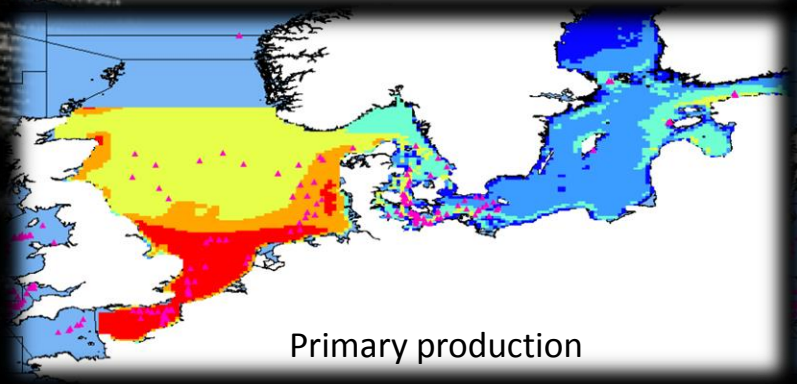
# Seascape genetics

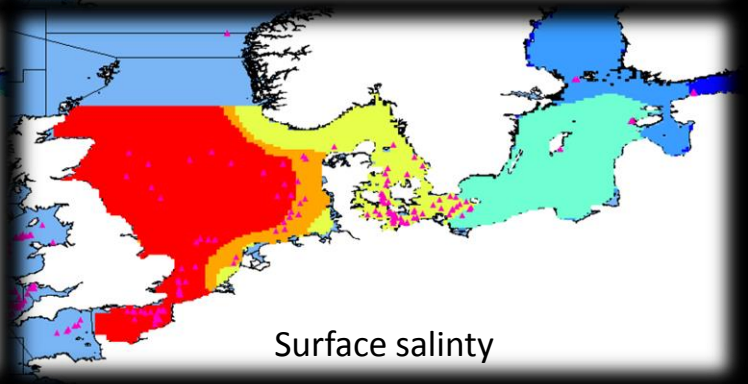

Depth pycnocline


Stratification index


Surface temperature


Oxygen concentration


Primary production


Surface salinty

# Seascape genetics

| | Turbot | Brill | Sole | Turbot adaptive | |
|---|---|---|---|---|---|
| | | | | Baltic Sea | North Sea |
| ENV | 0,004 | 0,002 | 0,002 | 0,095 | 0,023 |
| SPACE | 0,012 | 0,004 | 0,001 | 0,103 | 0,017 |
| TIME | 0,005 | 0,000 | 0,001 | 0,078 | 0,021 |
| E + S + T | 0,016 | 0,004 | 0,003 | 0,116 | 0,033 |

- Space & ENV largest effect in sole & brill
- Magnitude effect variables is different between species
- TIME only relevant in turbot

Vandamme *et al.* in submission

# Seascape genetics

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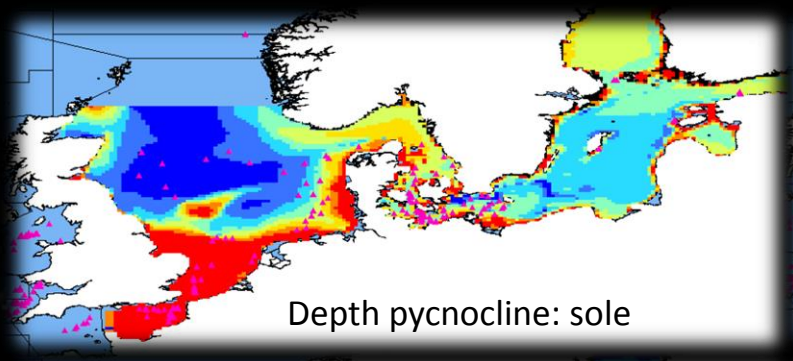
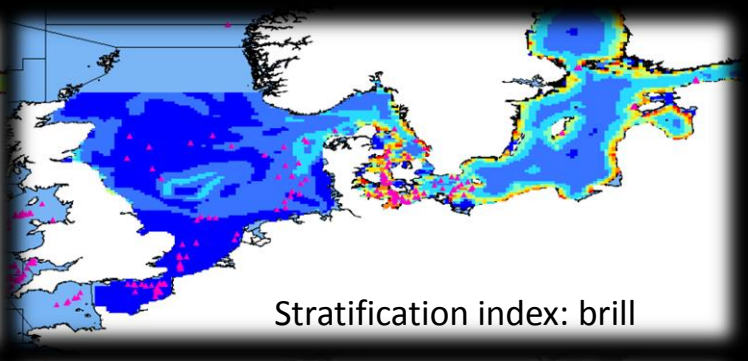
- Baltic Sea overall stronger effects
- Time largest effect in Baltic Sea
- Same magnitude for all 3 variables

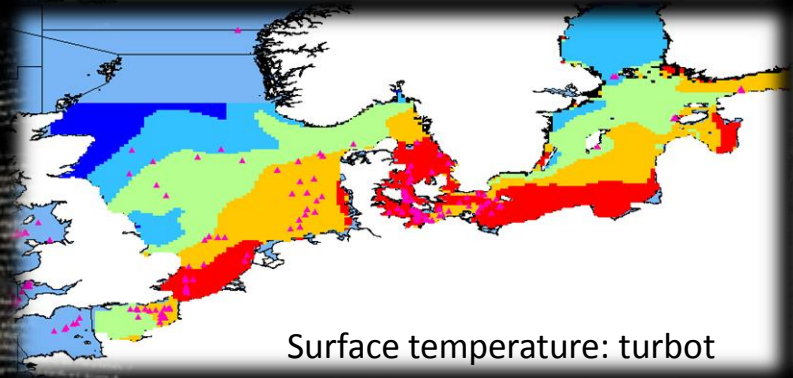
# Seascape genetics



Depth pycnocline: sole

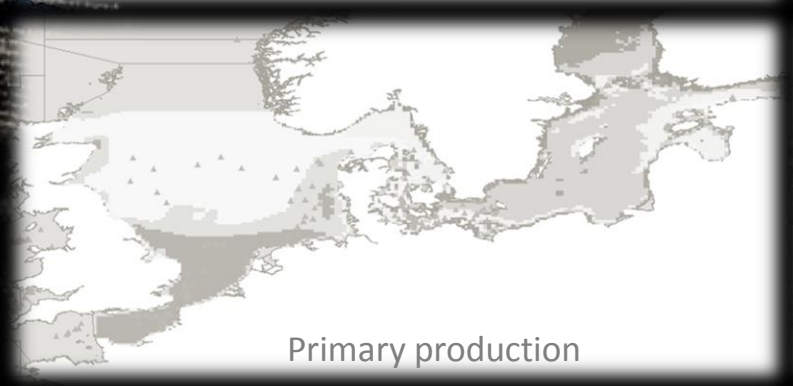


Stratification index: brill



Surface temperature: turbot

Oxygen concentration



Primary production

Surface salinty

# Summary

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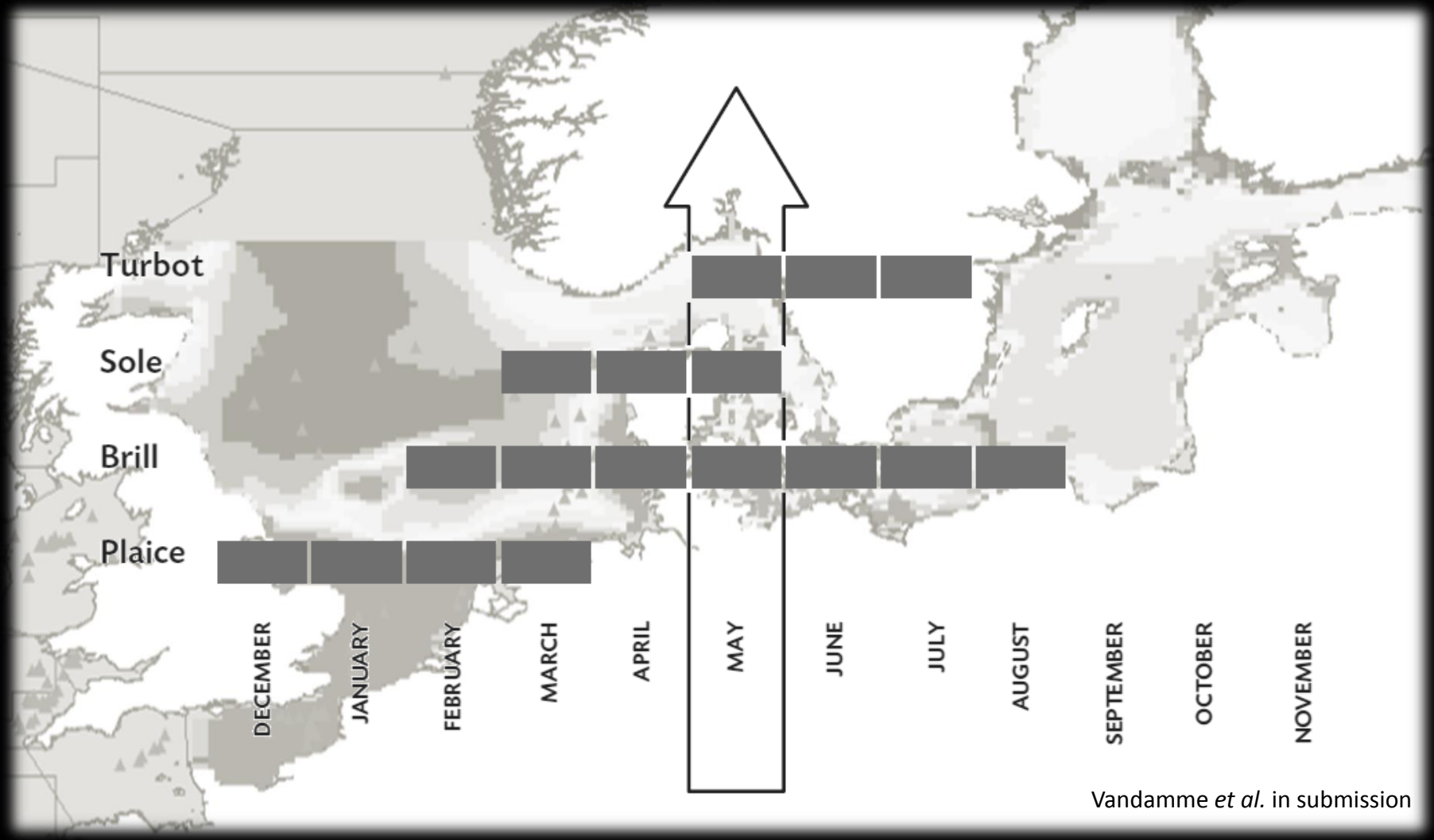


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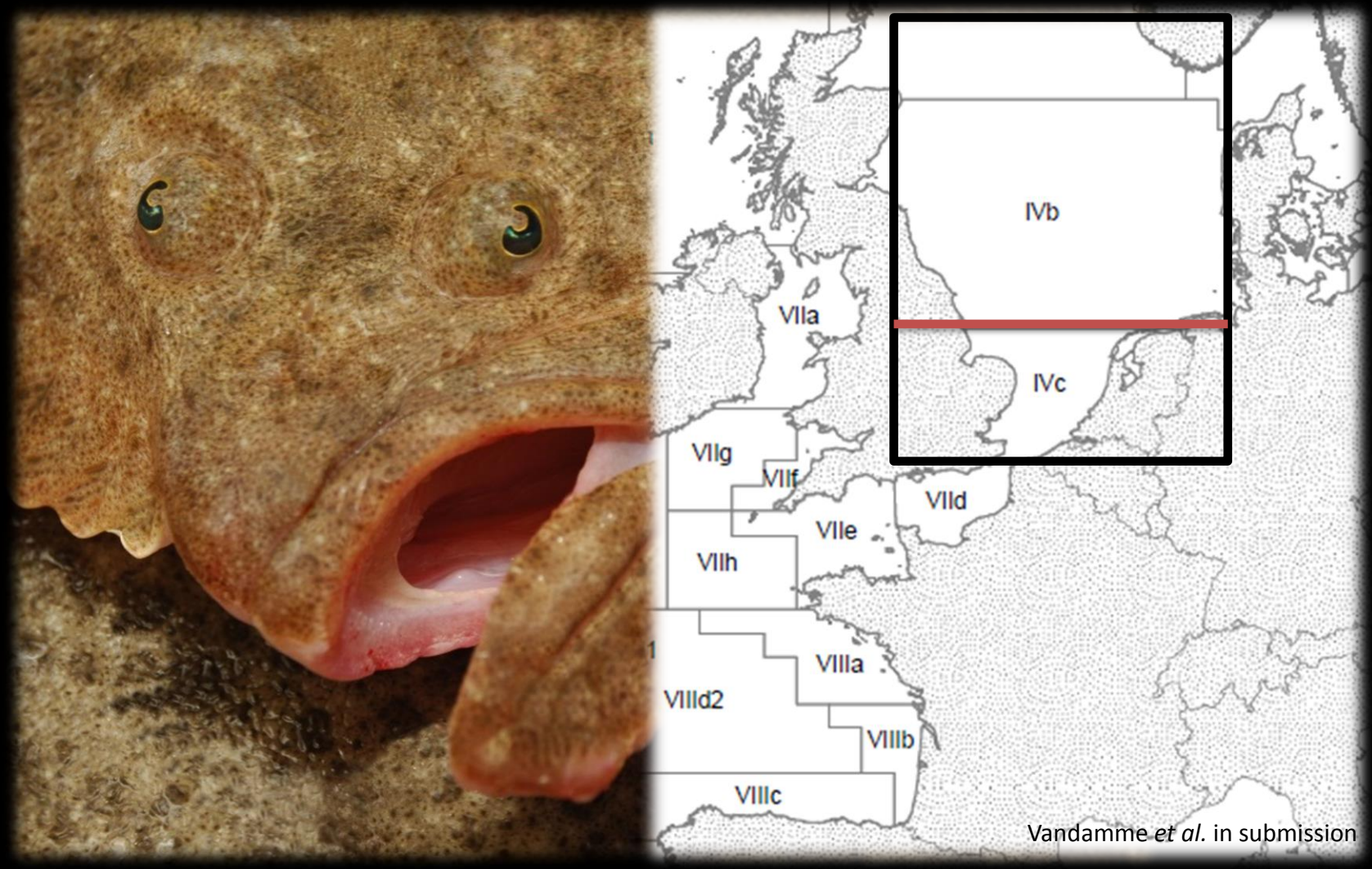
# Management implications

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# Management implications

- Turbot most sensitive:
  - Reduces age and size @maturity
  - Genetic diversity lowest
  - Northern spawning ground
  - Adaptation in Baltic Sea ?

- Other flatfish might benefit

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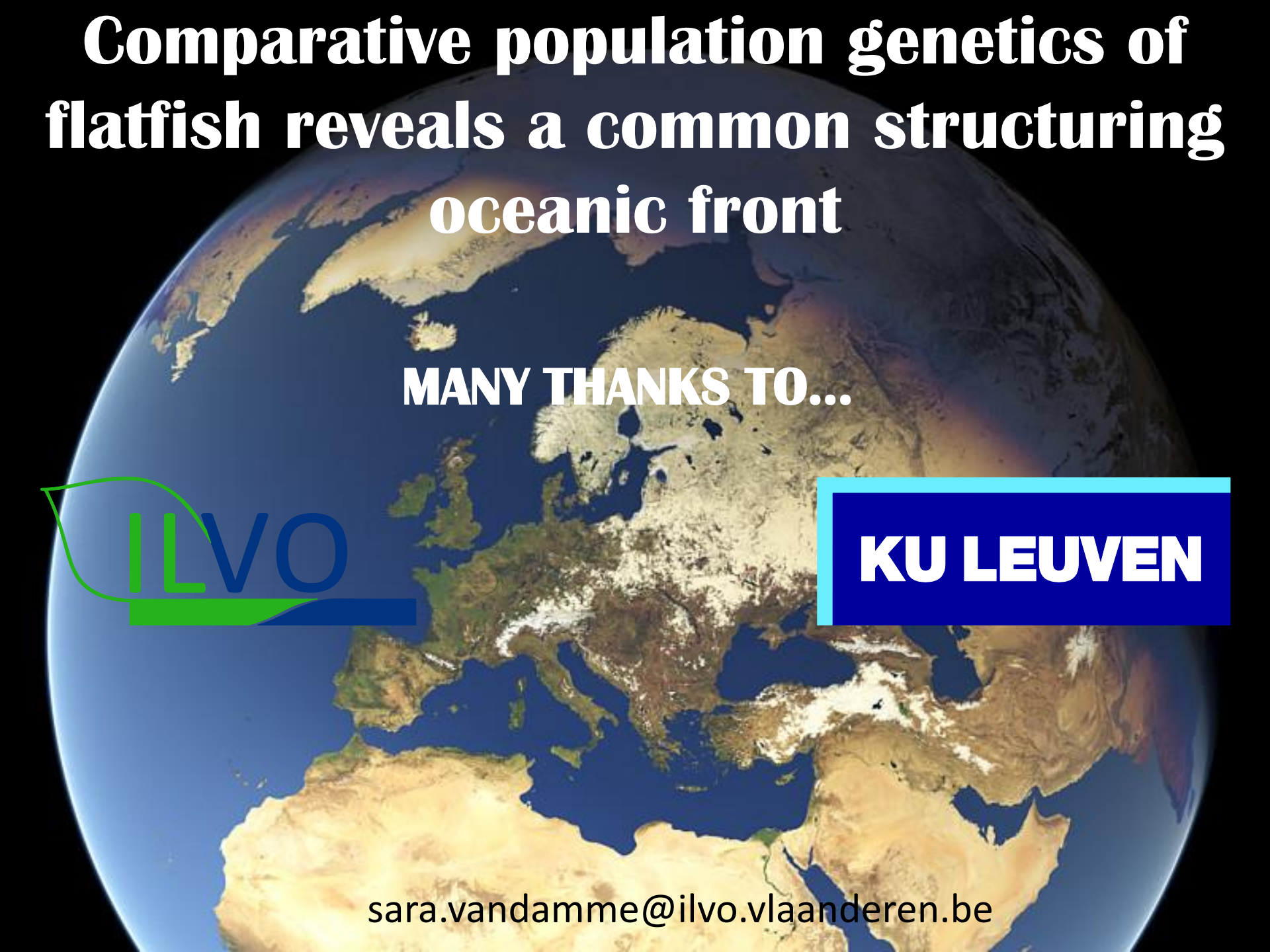

**MANY THANKS TO…**

ILVO

KU LEUVEN

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