

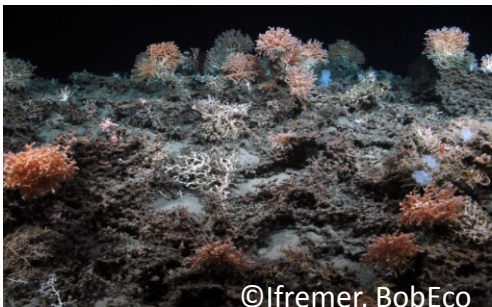


atlas

UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS



Realized dispersal through population genetics:
contrasted patterns in the two reef builders *L.
pertusa* and *M. occulata*



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Boavida J., Becheler R., Liautard-Haag, C., Arnaud-Haond, S.

3rd annual meeting

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Sampling
>200 samples
High latitudes
Mid Atl Ridge
Mediterranean
ITS, 7 and 6 msats
RAD-seq (12 samples)

Iceland

Rockall bank

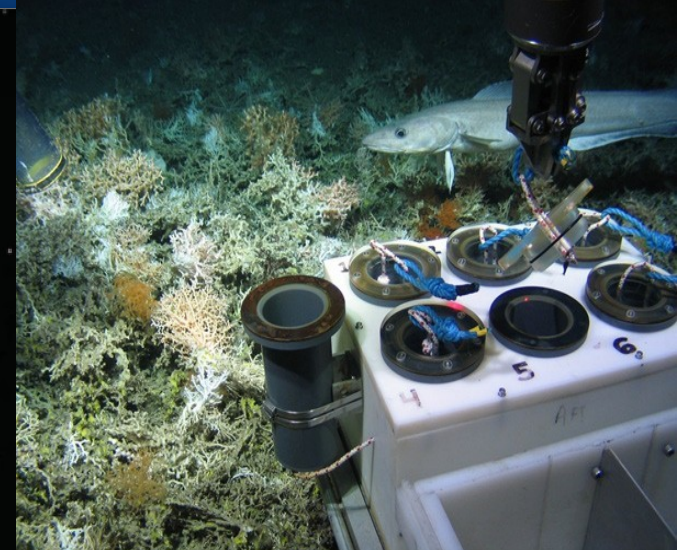
Bay of Biscay

Mid Atl Ridge

Bay of Cadiz

W Med

Ionian Sea



- * Cold-water corals
- * 40 to >1000m depth 4-14°C
- * Reefs km wide, 100s m high
- * All oceans except polar
- * ***Lophelia pertusa*** - PLD up to 7 weeks
- * ***Madrepora oculata*** - PLD unknown
- * Likely broadcast spawners



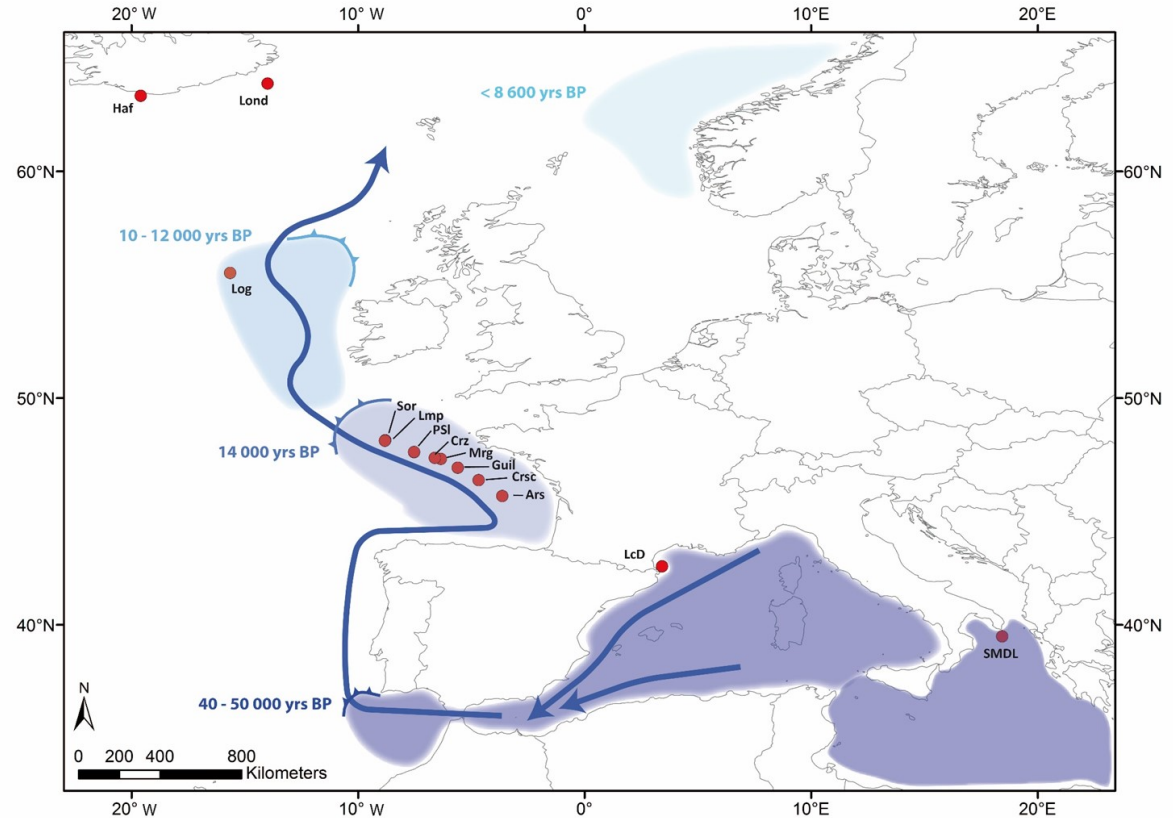
Ifremer

What genetics tells about now, and what about yesterday?



Which conclusion does this bring for present connectivity

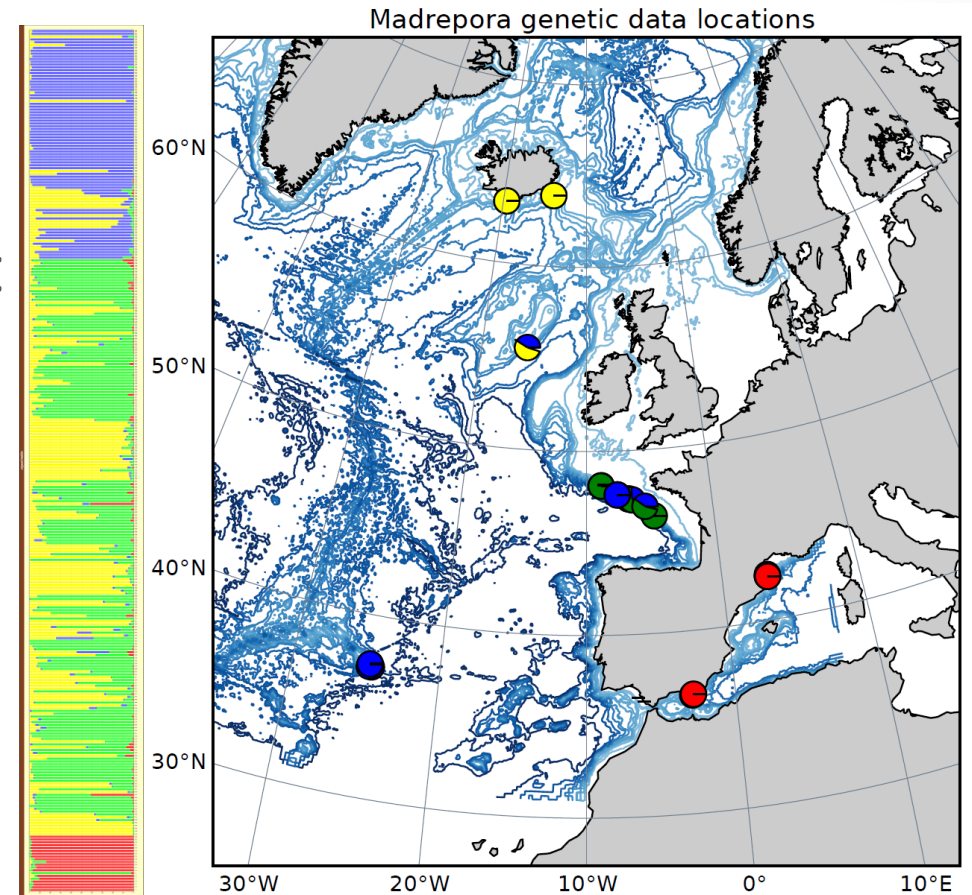
- No connection between Med and Atl (with all caution due to extremely partial sampling)
- Warning against possible conclusion about homogeneity in the Atlantic showing present day connectivity



Madrepora oculata

- Hints of partial reproductive isolation among some genetic background present in sympatry with no admixture
- Remains of biogeographic history; vicariance and initiation of allopatric speciation during the last glaciation?
- Position of refugees?

Question: possibility to reconstruct past currents/connectivity and past habitat suitability?

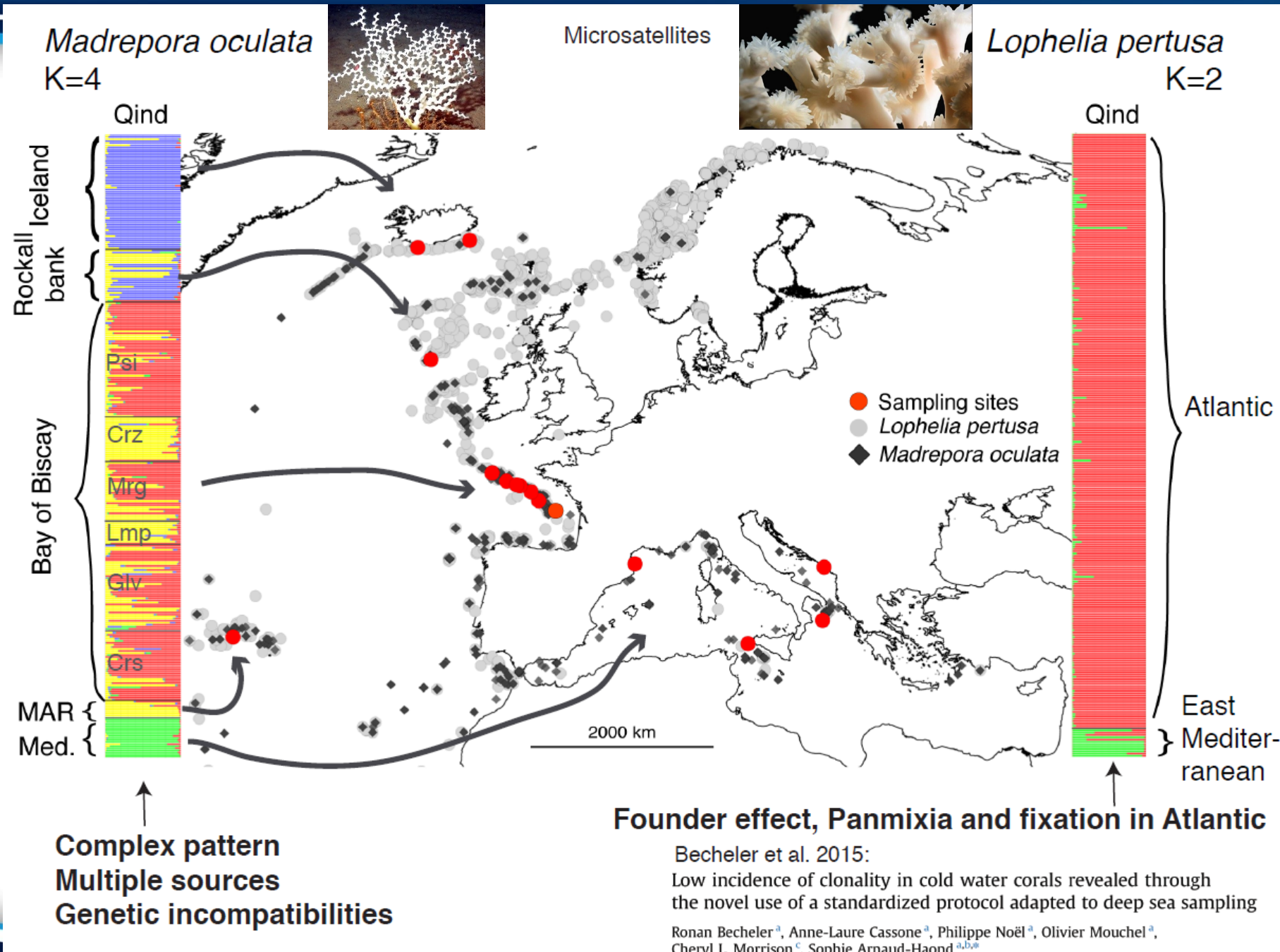


A plot by Alan Fox (trying to understand the link with hydrodynamics) –blue and yellow inversed between barplots and map



Why is information on habitat preferences AND Life History Traits essential?

Differences in habitat suitability, glacial refuge, or dispersal capabilities?



Lophelia pertusa

Ice sheets retreat - large areas habitat become available, expected rapid colonisation

Dispersal may have allowed *L. ophelia*'s dominant haplotype to rapidly become distributed (High latitudes to Mediterranean)

Meistertzheim et al. 2016:

Patterns of bacteria-host associations suggest different ecological strategies between two reef building cold-water coral species

Anne.-Leila Meistertzheim^{a,b}, Franck Lartaud^{a,*}, Sophie Arnaud-Haond^{c,d}, Dimitri Kalenitchenko^a, Manon Bessalam^a, Nadine Le Bris^a, Pierre E. Galand^a

To do:

*** Currently processing 100s samples including transition zone, new samples

*** Bayesian approaches test evolutionary scenarios

*** Long-term: expand range molecular tools

Whole genome seq, functional areas of the genome

Madrepora oculata

**Distinct coexisting genetic backgrounds
Limited introgression?**

Secondary contact of lineages from multiple refugia

Partial incompatibility among well differentiated genomic backgrounds

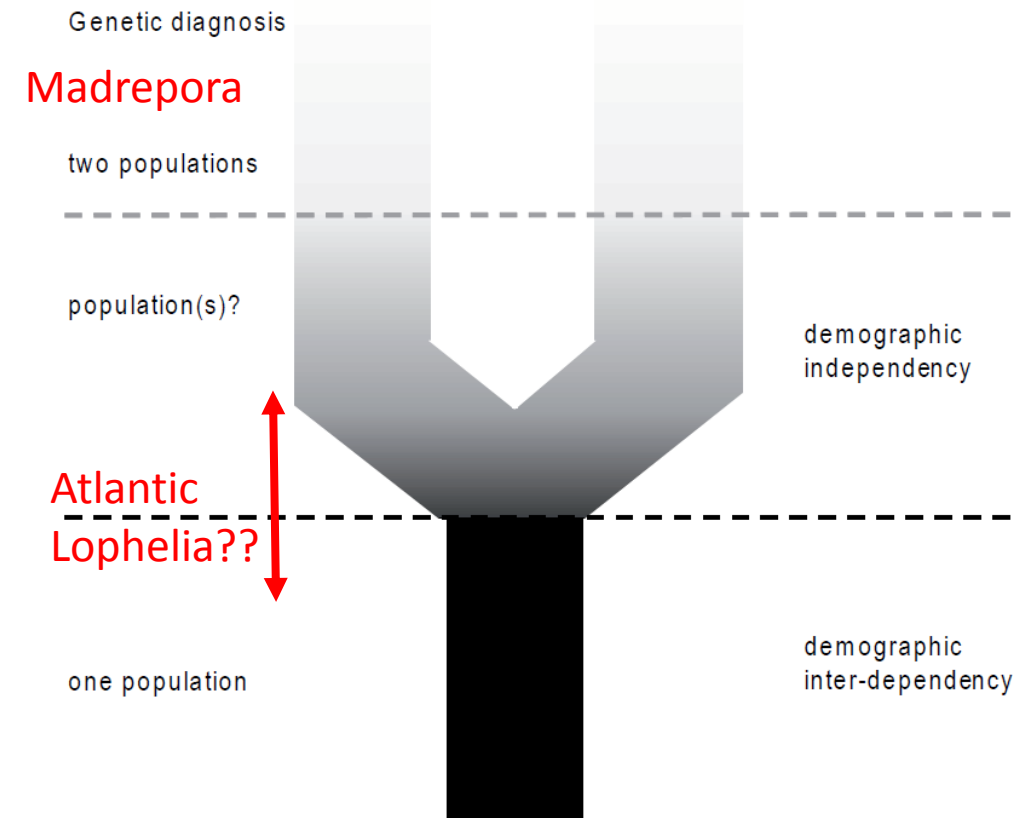
Poorer disperser (?)

Dispersal variation at dif spatial temporal scales?

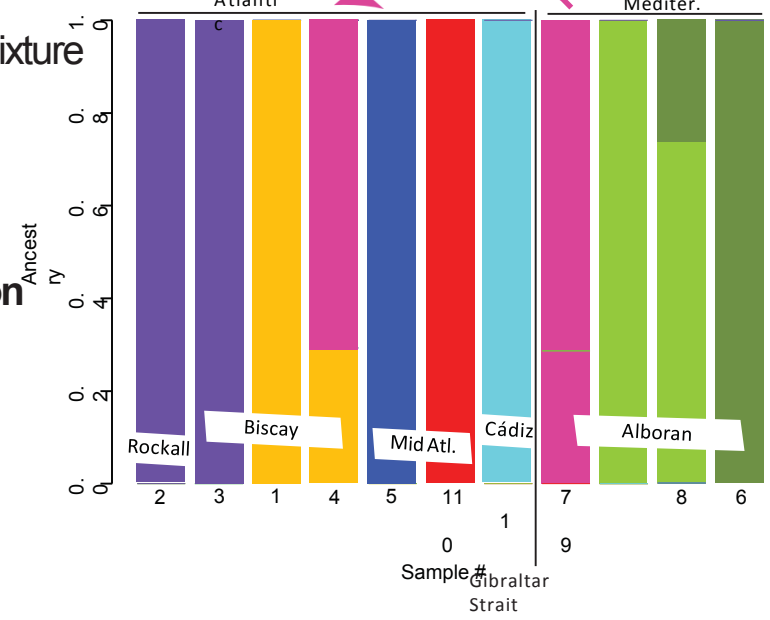
Thank you!

Present and Past connectivity, demographic versus genetics

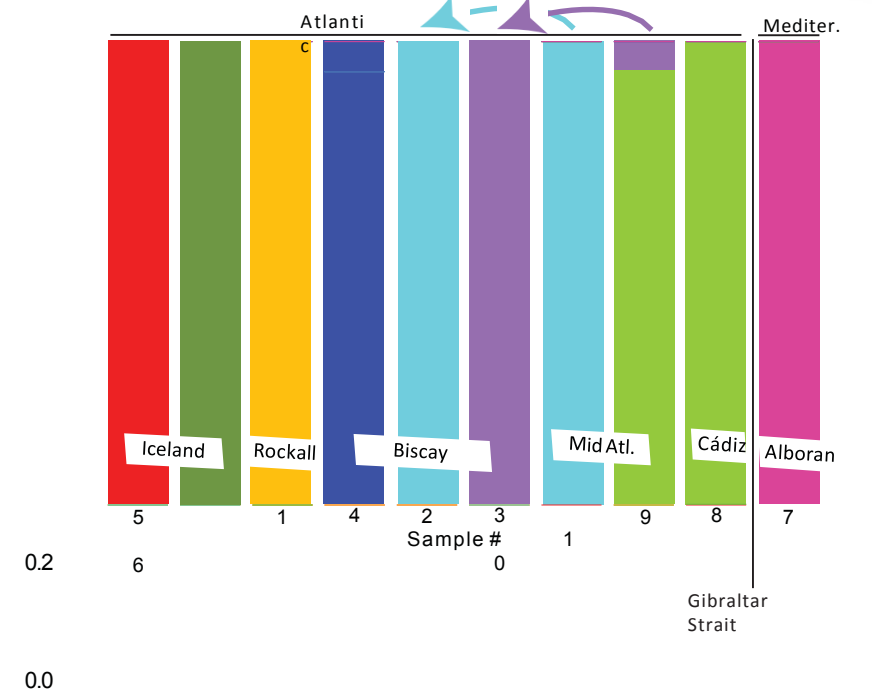
- The grey zone, a time lag between demographic independency and its genetic signature
- A pitfall with classical markers
- A possible advantage with NGS based genome scans analyzed in a Bayesian framework: ability to reconstruct both past and present connectivity patterns?



M. oculata



L. pertusa



RAD-seq (*PstI*), Admixture K=8 (?), very low admixture

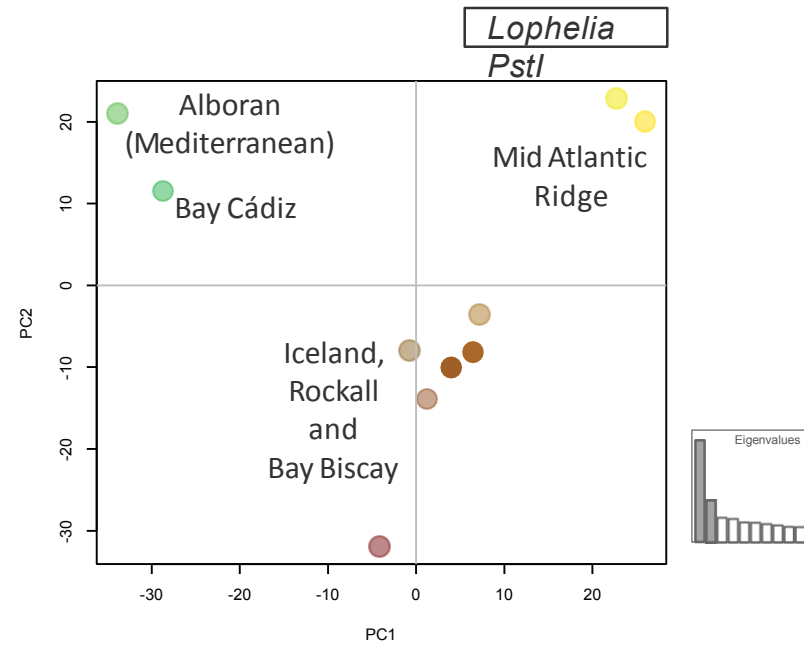
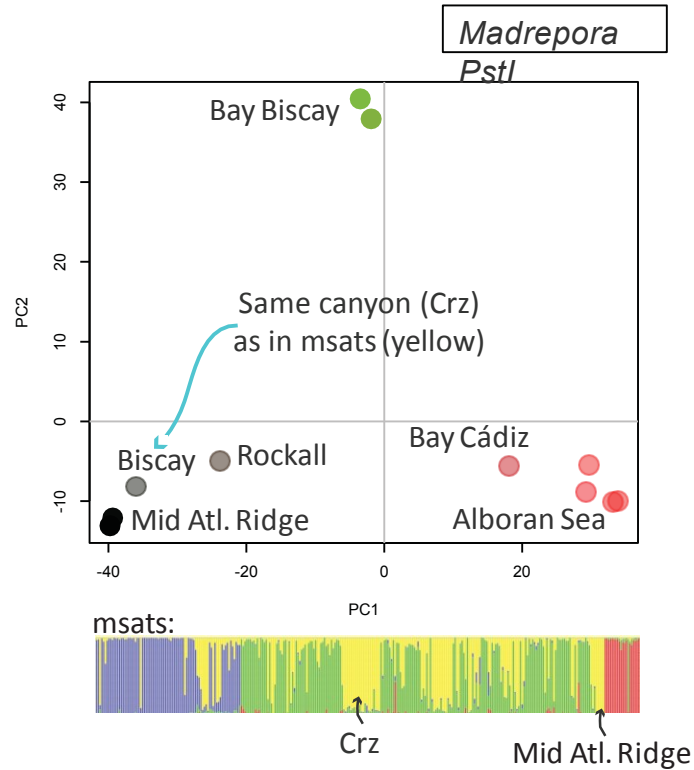
Bay of Biscay and High latitudes :
several putative ancestral populations
could have represented

multiple sources for post-glacial recolonization

- Mediterranean
- Bay of Biscay
- of Cadiz
- Mid Atlantic

Genetic incompatibilities
Temporally variable recruitment pulses?

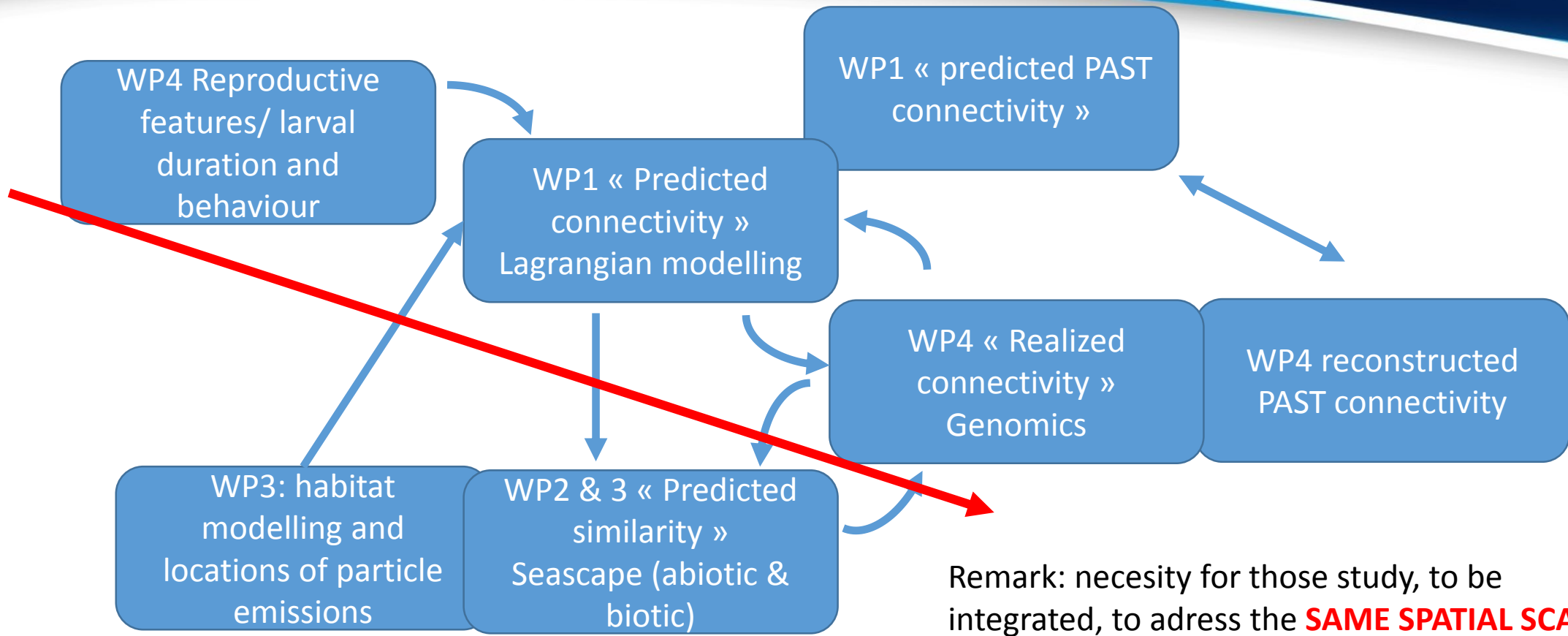
Restriction-site Associated DNA sequencing RAD-seq



(both PCAs similar with other enzyme)

Two enzymes, 10-16 samples
Illumina HiSeq 2 lanes, 101 bp
Stacks *de novo* loci assembly
Parameter optimization
No. heterozyg loci shared across samples

Mo ~ 1.7k - 26k SNPs
Lp ~ 2.5k - 32k SNPs
Along NE Atlantic similar patterns
Adding sites → more evident structure



Remark: necessity for those study, to be integrated, to adress the **SAME SPATIAL SCALE AND TIME WINDOW**

Question: How to adjust the scale of those different frameworks?

Thank You!



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