

Suivi des ENI dans les ports



Thomas Burel, Michel Le Duff, Annaëlle Anquet, Anaëlle Bizien, Mathieu Helias, Lucas Pinsivy, Vincent le Garrec

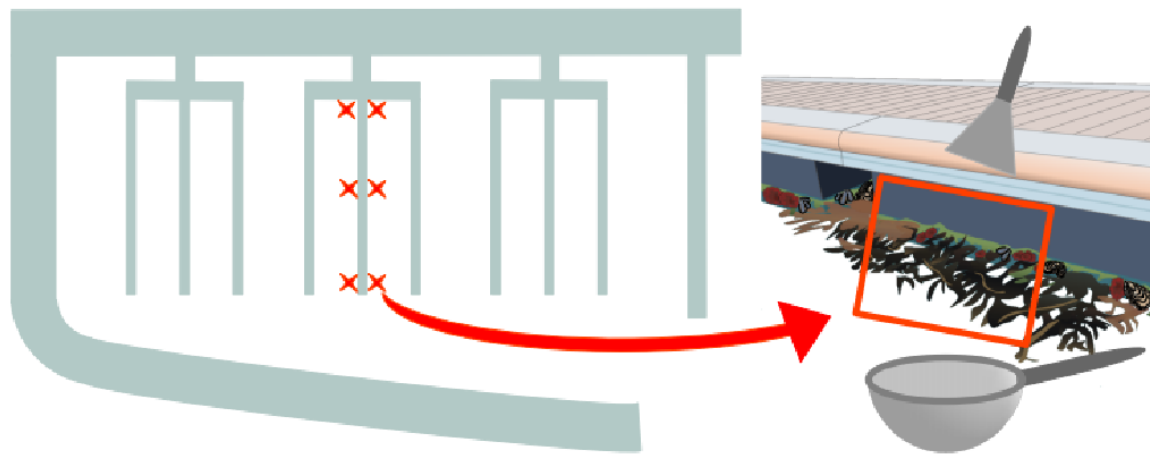


Deux manips :

8 sites

du 6 au 22 avril 2023

grattage et biomasse



6 prélèvements par port

Grattage et biomasse



Stage de M1 d'Annaëlle Anquet

Objectifs :

1. Caractériser les communautés faune-flore des pontons le long des côtes Manche-Atlantique
2. Evaluer l'importance des ENI
3. Tester un protocole basé sur du grattage pour le descripteur 2 de la DCSMM



Grattage et biomasse



MENTION BIOLOGIE

PARCOURS Sciences de la Mer et du Littoral Spécialité Individu

Annaëlle ANQUET

Caractérisation et évaluation des communautés de substrats durs dans les ports

Mémoire de stage de Master 1
Année Universitaire 2022-2023

Structure d'accueil : LEMAR

Tuteur universitaire : Valérie STIGER-POUVREAU

Mâîtres de stage : Thomas BUREL & Vincent LE GARREC



L'Université est en ligne



Communities in marinas along the Channel-Atlantic Coast of France: native and non-indigenous species assemblages and distribution

Annaëlle Anquet¹, Mathieu Hellas², Anaëlle Bizien³, Michel Le Duff¹, Vincent Le Garrec³, Thomas Burel¹

¹Univ. Brest, CNRS, IRO, Ifremer, LEMAR, F-29200 Plouzané, France ²Univ. Brest, CNRS, IRO, Observatoire, CSU-HUETM, F-29200 Plouzané, France



Context

With the globalization of maritime transport, the number of marinas has been on the rise, together with the expansion of artificial structures like floating pontoons. These pontoons provide an ideal substratum for the colonization of non-indigenous species (NIS), known for their ability to spread via maritime traffic. The consequences of NIS introduction on native biodiversity can be substantial, resulting in significant ecological problems and possibly in socio-economic issues. As part of the Marine Strategy Framework Directive (MSFD), it is therefore crucial to closely monitor the early detection and spread of these species.

Characterize fauna/flora communities of pontoons Assess the relative importance of NIS Evaluate the protocol efficiency for the MSFD descriptor 2

Materials & Method

In April 2023, sampling was performed in each marina considering 6 different replicates: landwards, middle and seaward, consistently on each side of the pontoon.

8 marinas along the french Channel-Atlantic coasts

For each sample, a 20 cm wide section, encompassing the entire depth of the pontoon (from 15 to 20 cm) was considered. Both benthic fauna and flora was collected (2 mm mesh) and stored in the freezer (-20°C).

Then they were:

- (1) Sorted
- (2) Identified
- (3) Dried, oven at 60°C during 48h
- (4) Weighed

Results – Macro-benthic biodiversity

160 taxa found including 25 NIS, belonging to 10 phyla. A higher specific richness is observed in macroalgal phyla.

The most important biomass are also found in Mollusca and Arthropoda due to the presence of massive reefs of oysters (*Magallana gigas*), mussels (*Mytilus edulis*) and barnacles (*Parthenoclerus perforatus*).

NIS represent a significant part of benthic biomass despite a relative low specific richness.

Interestingly, there were no significant differences observed in the benthic diversity within a site, regardless of the position or side of the pontoon.

Results – exotic macroalgae across different sites

Most important NIS contributing to macroalgal biomass in pontoon communities:

NIS	North							South						
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
<i>Asterionella subulna</i>	1.0%	0.7%	0.7%	1.0%	0.7%	0.7%	0.7%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
<i>Microsetella lineata</i>	0.0%	0.0%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Polysiphonia lacustris</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Polysiphonia vesiculata</i>	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
<i>Sargassum muticum</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Siphonocladia striatula</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Ulva lactuca</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

The proportions of exotic seaweeds vary significantly across different ports, ranging from below 20% to over 50% of the total seaweed biomass. The dominant NIS differ among ports, with four main species thriving, each may account for fifth or more of the total macroalgal biomass.

Conclusion & Perspectives

Globally, NIS represent more than 15 % of the specific richness in marinas, a percentage higher than what was found in surrounding marine habitats (7 % for maerl beds and seaweed meadows). Some NIS seems commonly found in almost all sites (e.g. *A. subulna*), while others are site-specific (e.g. *P. lacustris*). However, the factors considered in the present study do not successfully reveal distribution patterns between and within marinas. It would be valuable to incorporate additional variables to distinguish between the sites, such as port size, surrounding habitats, impacts of pollutants, or biogeographic data. In addition to a Rapid Assessment Survey, the present protocol seems effective in detecting NIS.

References

Baños J, Viana C, Nunes J, Bafio C. 2024. Unintended arrival: non-native sessile macroalgae in marinas on the Iberian coast. *Science Advances* 10: 318-324. EURL T, Hellas M, Le Duff V. 2022. Range expansion of some non-indigenous species along the coast of Brittany (France). *Biodivers Conserv* 31: 181-190. EURL T, Hellas M, Le Duff V. 2021. Non-indigenous taxa as vectors of exotic species: faunal biological invasion by the Red Sea. *BMJ Open* 5: 20210111. EURL T, Hellas M, Le Duff V. 2022. Les algues marines invasives: une menace pour les écosystèmes marins. *Notes de la Société de Biogéographie* 124: 1-10. EURL T, Hellas M, Le Duff V. 2022. Les algues marines invasives: une menace pour les écosystèmes marins. *Notes de la Société de Biogéographie* 124: 1-10. EURL T, Hellas M, Le Duff V. 2022. Les algues marines invasives: une menace pour les écosystèmes marins. *Notes de la Société de Biogéographie* 124: 1-10.

Acknowledgments

We thank David Urvil, Pierre-Guy Bourin, Jérôme Jouan, Benjamin Deschamps-David, Jean-Charles Leclerc and the technicians for their help during sampling.



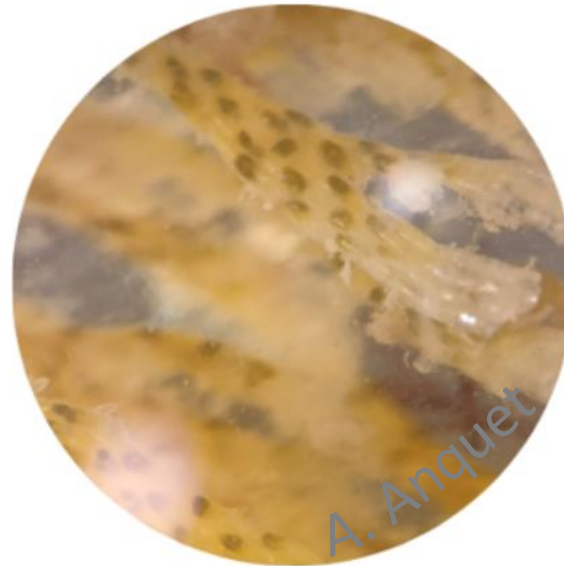
Richesse spécifique des communautés sessiles

Faune et flore fixée sur les pontons :

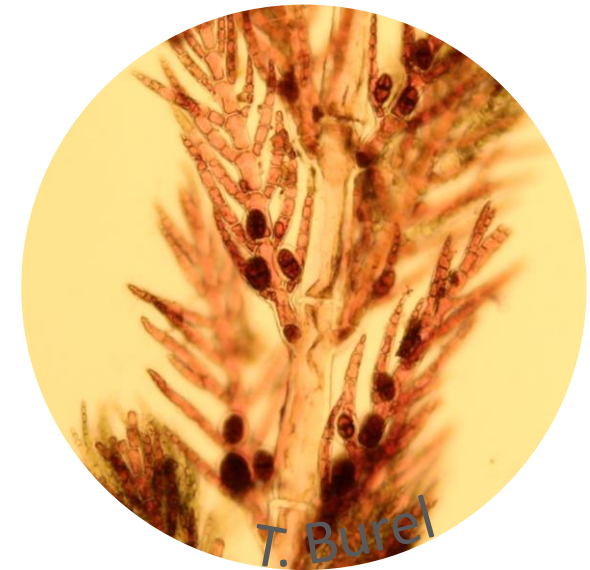
160 espèces identifiées dont **23 ENI** ($\approx 15\%$ de richesse totale)



Watersipora subatra

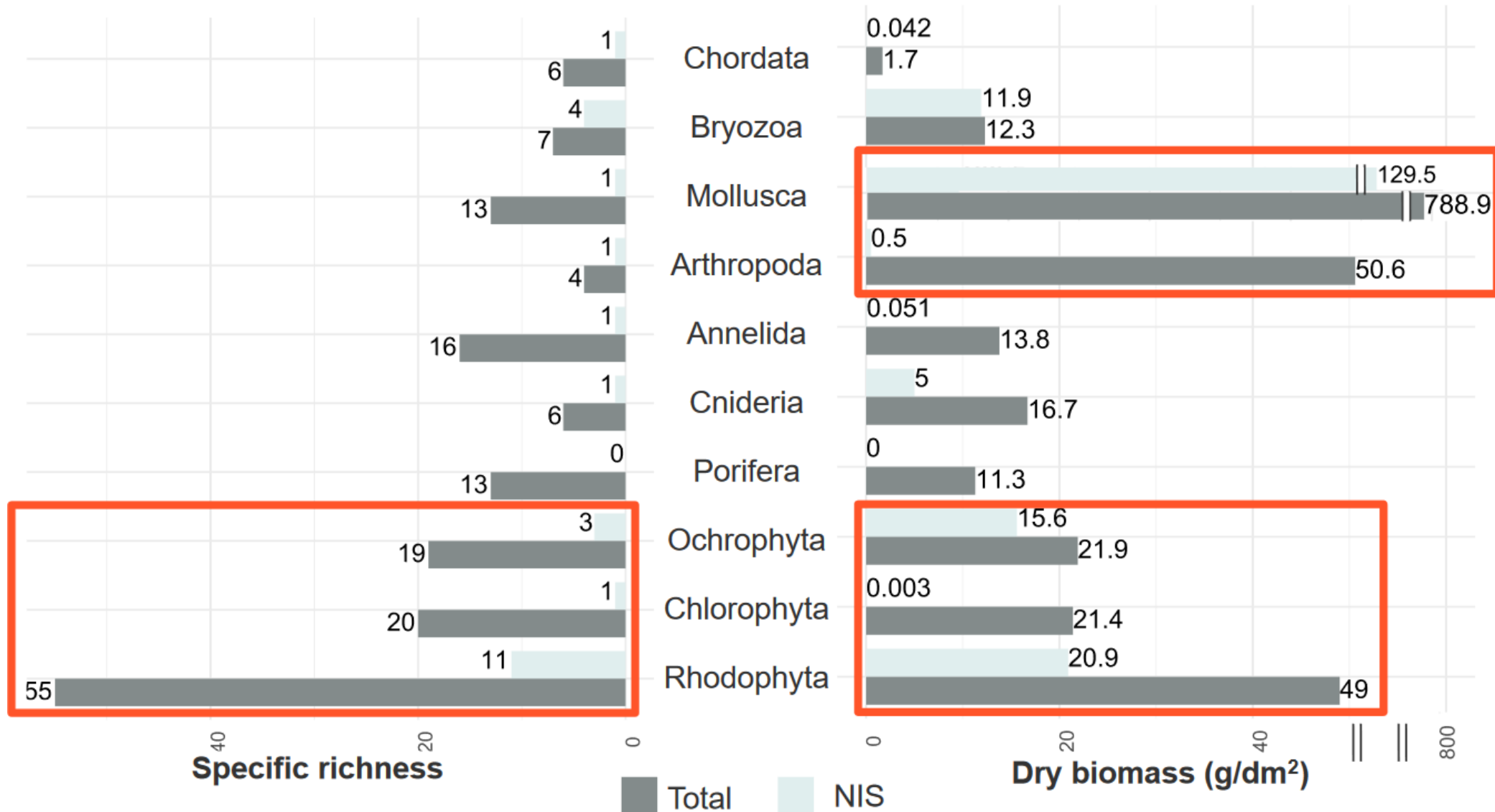


Tricellaria inopinata

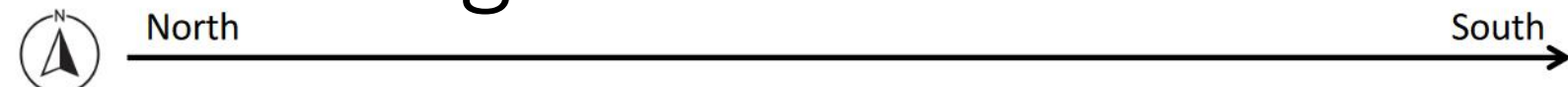


Antithamnion hubbsii

Part des ENI dans ces communautés



Focus sur les macroalgues



	St Servan	Roscoff	Brest MB	Brest Château	Concarneau	Arradon	La Rochelle	Arcachon
% of NIS in total macroalgal biomass	17.2%	29.2%	80.7%	30.9%	62.6%	48.5%	49,0 %	20.3%
<i>Antithamnion hubbsii</i>	1.2%		5.1%				2.5%	3.3%
<i>Melanothamnus harveyi</i>	0.6%		0.05%	0.2%	20.9%	0.2%		3.7%
<i>Pachymeniopsis lanceolata</i>						12,0 %		
<i>Polysiphonia morrowii</i>	0.1%		58.1%		39.4%	20.9%	0.04%	
<i>Sargasum muticum</i>		24.2%					4.8%	
<i>Symphycladiella dendroidea</i>	13.6%		0.3%		2.2%		8.9%	10.4%
<i>Undaria pinnatifida</i>		0.8%	17.1%	30.6%			32.7%	

Conclusions

ENI = 15 % de la richesse spécifique des ports de plaisance et jusqu'à **80% de la biomasse**

C'est + dans les habitats alentours (7 % pour les bancs de maërl et herbiers marins).

ENI communes dans presque tous les sites (*M. harveyi*), d'autres restent localisées (*P. lanceolata*)

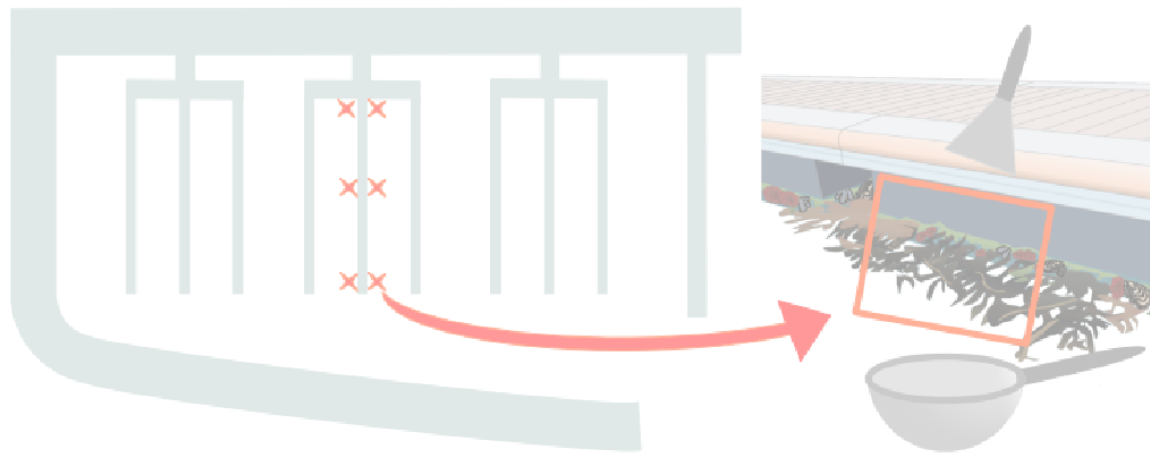
Analyses supplémentaires pour expliquer la distribution entre et au sein des marinas

Deux manips :

8 sites

du 6 au 22 avril 2023

grattage et biomasse



6 prélèvements par port

12 sites

du 26 au 28 Juin 2023

RAS classique + grattage et RAS « sous bino »



Comparaison RAS classique + grattage et RAS « sous bino »

Résultats préliminaires sur la
partie algue

Work in progress ... !



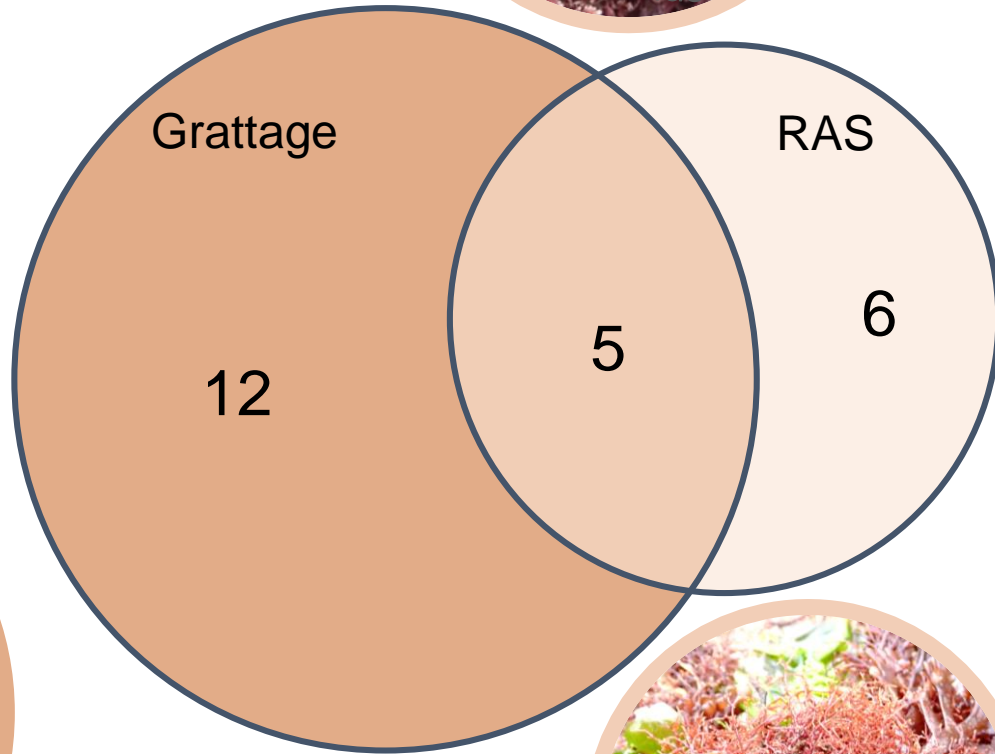
C. peregrina



B. wrightii



P. lanceolata



T. Burel
C. fragile



S. dendroidea

C. okamurae

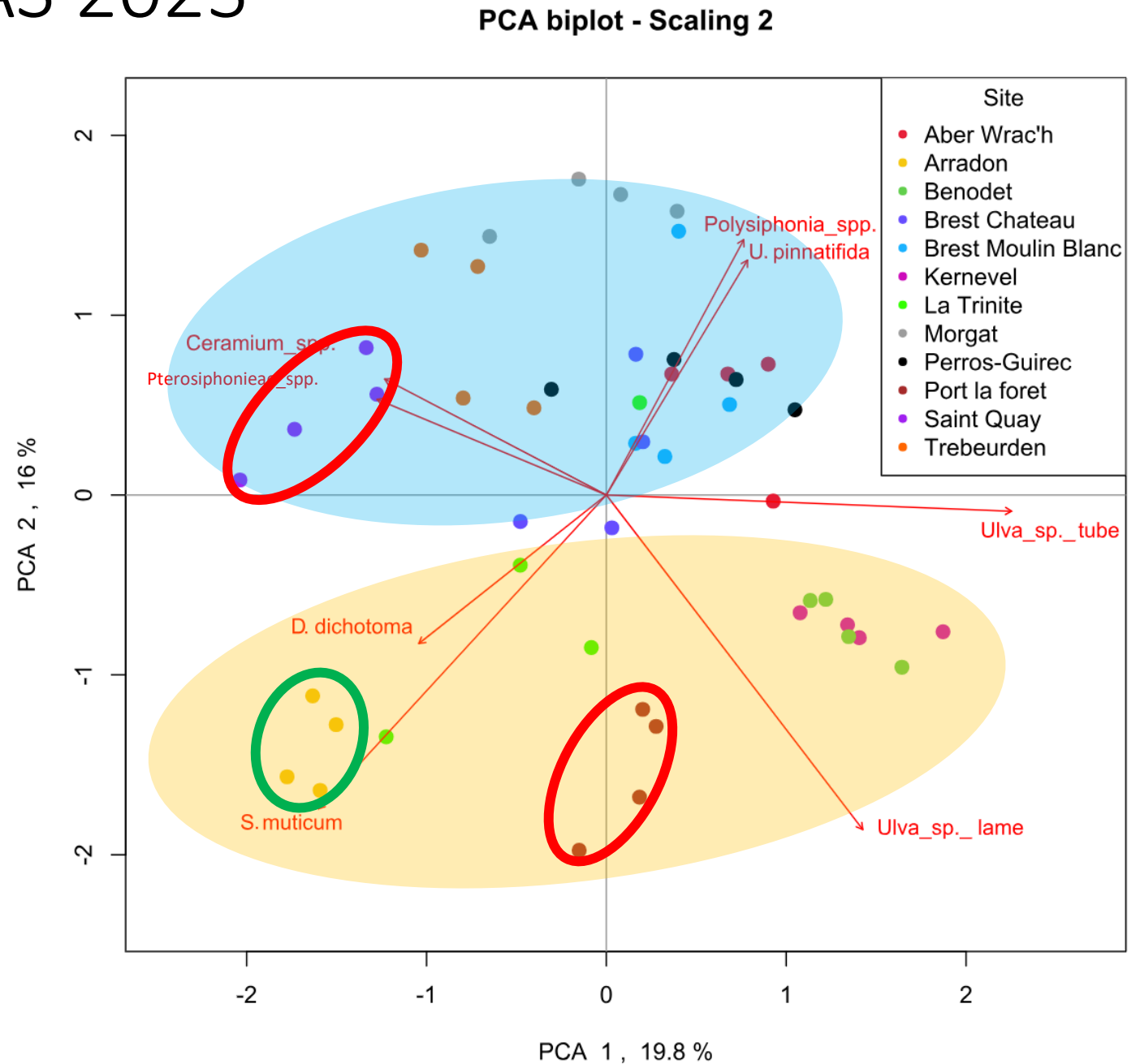


Résultats préliminaires RAS 2023

Certains sites sont **clairement identifiés** par leur **flore**

En particulier par certaines **ENI**

Distinction **Bretagne Nord** vs **Bretagne Sud**



Conclusions

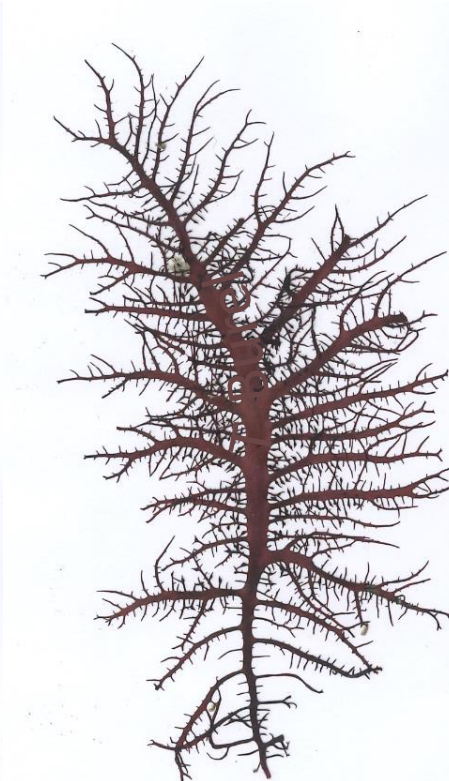
Bonne complémentarité pour les algues entre le RAS classique et le grattage et RAS « sous bino »

Investissement limité et protocole **facile à déployer**

La campagne de l'été 2023 a permis la détection d'espèces auparavant absente de l'habitat ponton (*e.g. Centroceras, Hypnea musciformis*)

Attention au nombre d'espèce important retrouvé (plus de 200 en 2023)



Chondracanthus teedei var. *lusitanicus*



Morbihan puis Manche Ouest
systématiquement sur pontons

Short communication

First record of *Chondracanthus teedei* var. *lusitanicus* (Rhodophyta) in the Mediterranean Sea from a restored Lagoon (North-Eastern Morocco)

[Mostafa Layachi](#)^a, [Abderrahmane Rahhou](#)^b  , [Nassir Kaddouri](#)^c,
[Nor-Eddine Rezzoum](#)^d, [Jamal Settih](#)^a, [Mourad Baghour](#)^b

The species *Chondracanthus teedei* var. *lusitanicus* (Gigartinaceae) has been found and reported for the first time from the Mediterranean Sea (April 2022, Marchica Lagoon, north east Morocco). It was collected from an open sea farm of seaweeds, growing with other macroalgae (*Ulva* spp, *Gracilaria* spp., and *Cystoseira* spp). The morphology, location, habitat, and water quality are presented and discussed in this work, and the known geographic

Quel statut pour les variétés ?

Hypnea musciformis

Introduit en Bretagne (fin
XXème)

Désormais : Pays Basque
(native), Belle-île, Morbihan
(introduit ?)

Quelle est la limite entre
l'extension d'aire de
distribution et
l'introduction ?



Perspectives

Ré actualisation de la liste nationale des ENI macroalgues

Constitution d'une collection de référence

Comparaison des données acquises en 2023 avec les données antérieure (depuis 2018 au moulin blanc)

Utilisation de la biologie moléculaire pour identifier certaines espèces de macroalgues



Suivi des ENI dans les ports



Thomas Burel, Michel Le Duff, Annaëlle Anquet, Anaëlle Bizien, Mathieu Helias, Lucas Pinsivy, Vincent le Garrec

Merci pour votre attention

et merci à Cecile Massé, Pierre-Guy Sauriau, Jérôme Jourde, Sandrine Derrien-Courtel, Jean-Charles Leclerc et collaborateurs !