



Fundamental knowledge on *Sargassum* and their associated microorganisms

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24/10/2019

ECO3SAR : an interdisciplinary project combining knowledge, values and applications

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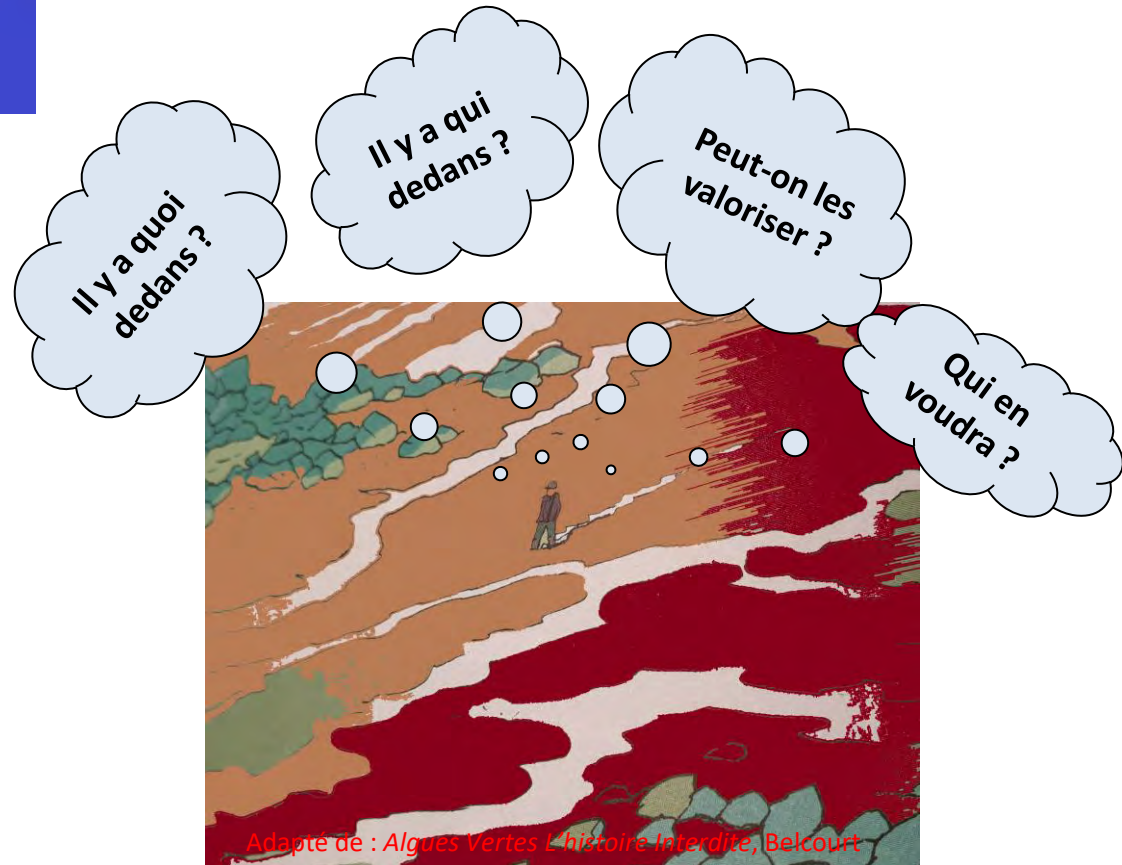
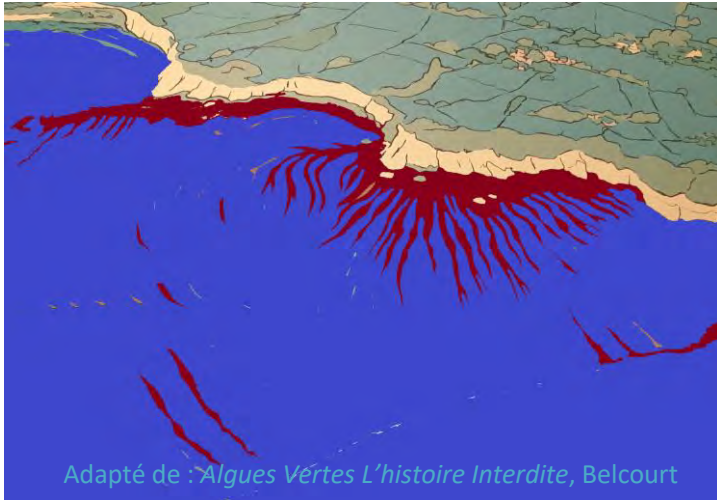
Holdex Environnement



Agence De l'Environnement de la Maitrise de l'Energie (ADEME)



ECO3SAR : an interdisciplinary project combining knowledge, values and applications



ECO3SAR : Ecology, Ecotoxicology and Economy of *Sargassum*

WP 1 : Ecotoxicology of beached *Sargassum* from Martinique and Guadeloupe

WP 2 : Preliminary studies on contamination/decontamination processes



WP 3 : Diversity of the micro-organisms associated to *Sargassum* tides

WP 4 : Studies of sectors and social acceptances

« pratiques, usages et représentations »
« l'action de l'homme sur la nature et la vision d'une nature perturbée et en évolution »

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Guadeloupe landscapes

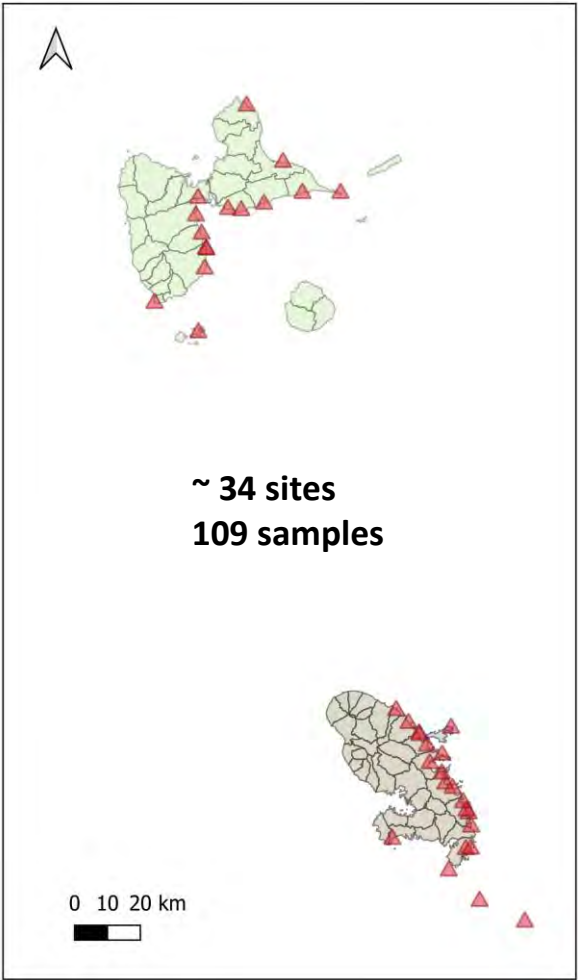


Martinique landscapes

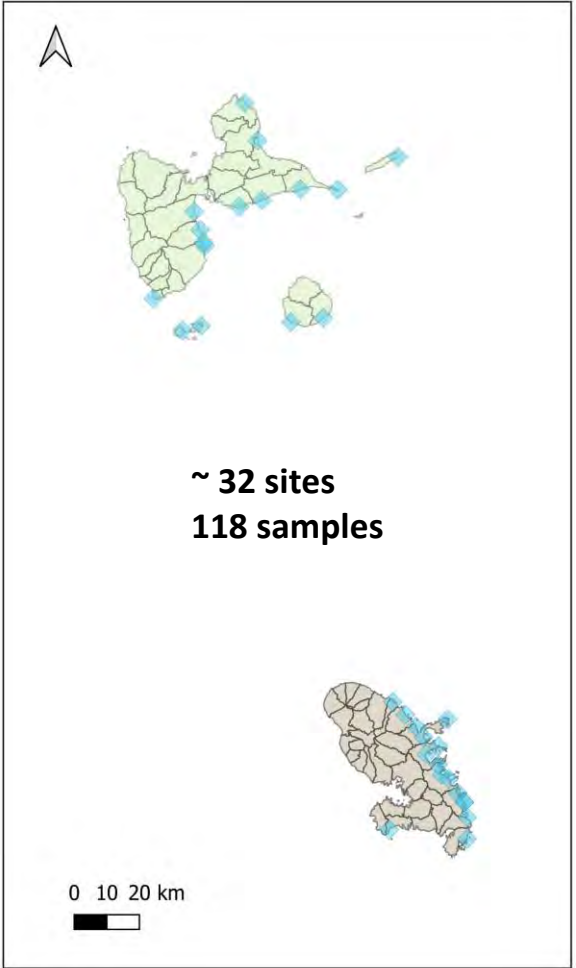


Sampling periods and sites

Campaign 1 : July-August 2018



Campaign 2 : February-March 2019



57 sites; 227 analyzes

- Sargassum floating in seawater or washed up on the beach
- “new” and “old” *Sargassum*
- A few storage sites
- A few “less coastal” sites (~ 27 km)

Metals, semimetals, and nonmetals compounds

Dry weight

Mineral matter

Total organic matter (C)

Nitrogen (N)

Phosphorus (P)

Sulfur (S)

Lead (Pb)

Cadmium (Cd)

Nickel (Ni)

Cobalt (Co)

Zinc (Zn)

Copper (Cu)

Chromium : Cr (III), Cr (VI)

Mercury: Hg, H₃C-Hg⁺X⁻

Mineral arsenic: As (III), As (V)

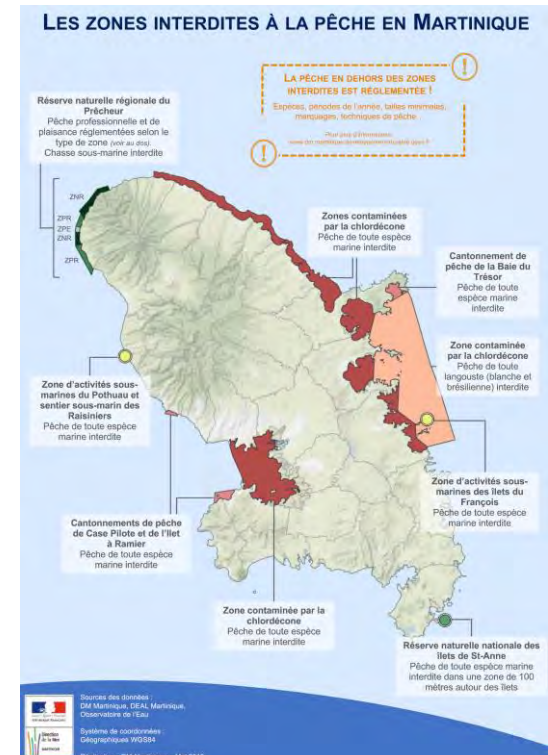
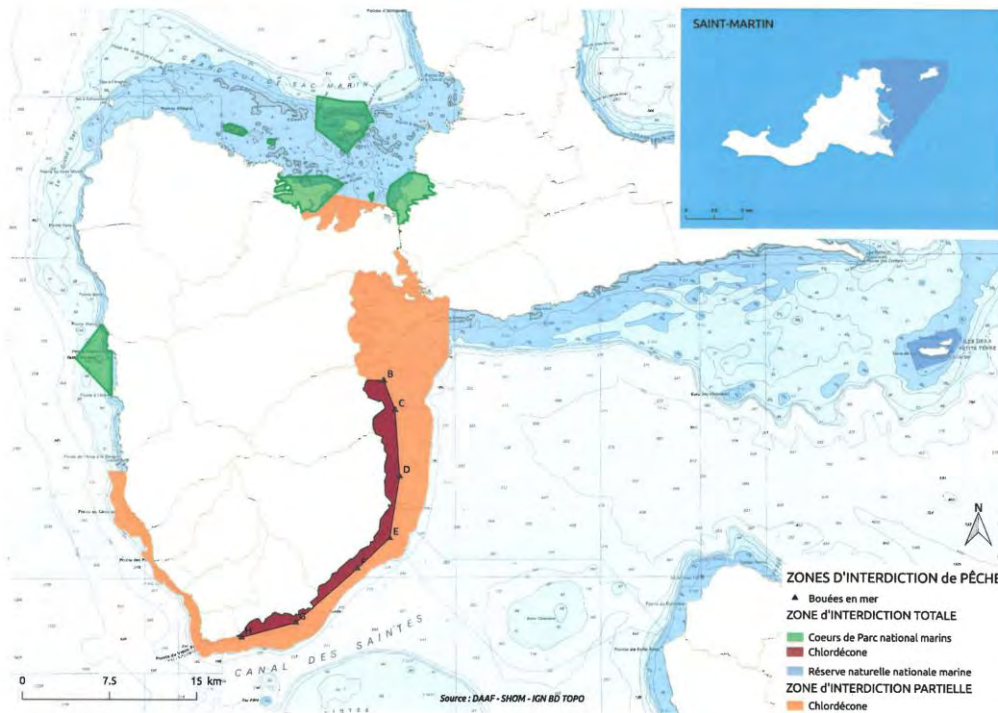
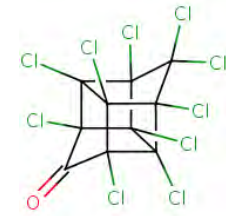
Organic arsenic: Monomethylarsonic acid (MMA), Dimethylarsinic acid (DMA), Arsenobetain (AsB), arsenocholine (AsC)

1 H Hydrogen Nonmetal																	2 He Helium Noble Gas						
3 Li Lithium Alkali Metal	4 Be Beryllium Alkaline Earth Metal																	5 B Boron Metalloid	6 C Carbon Nonmetal	7 N Nitrogen Nonmetal	8 O Oxygen Nonmetal	9 F Fluorine Halogen	10 Ne Neon Noble Gas
11 Na Sodium Alkali Metal	12 Mg Magnesium Alkaline Earth Metal																	13 Al Aluminum Post-Transition Metal	14 Si Silicon Metalloid	15 P Phosphorus Nonmetal	16 S Sulfur Nonmetal	17 Cl Chlorine Halogen	18 Ar Argon Noble Gas
19 K Potassium Alkali Metal	20 Ca Calcium Alkaline Earth Metal	21 Sc Scandium Transition Metal	22 Ti Titanium Transition Metal	23 V Vanadium Transition Metal	24 Cr Chromium Transition Metal	25 Mn Manganese Transition Metal	26 Fe Iron Transition Metal	27 Co Cobalt Transition Metal	28 Ni Nickel Transition Metal	29 Cu Copper Transition Metal	30 Zn Zinc Transition Metal	31 Ga Gallium Post-Transition Metal	32 Ge Germanium Metalloid	33 As Arsenic Metalloid	34 Se Selenium Nonmetal	35 Br Bromine Halogen	36 Kr Krypton Noble Gas						
37 Rb Rubidium Alkali Metal	38 Sr Strontium Alkaline Earth Metal	39 Y Yttrium Transition Metal	40 Zr Zirconium Transition Metal	41 Nb Niobium Transition Metal	42 Mo Molybdenum Transition Metal	43 Tc Technetium Transition Metal	44 Ru Ruthenium Transition Metal	45 Rh Rhodium Transition Metal	46 Pd Palladium Transition Metal	47 Ag Silver Transition Metal	48 Cd Cadmium Transition Metal	49 In Indium Post-Transition Metal	50 Sn Tin Post-Transition Metal	51 Sb Antimony Metalloid	52 Te Tellurium Metalloid	53 I Iodine Halogen	54 Xe Xenon Noble Gas						
55 Cs Cesium Alkali Metal	56 Ba Barium Alkaline Earth Metal	*	72 Hf Hafnium Transition Metal	73 Ta Tantalum Transition Metal	74 W Tungsten Transition Metal	75 Re Rhenium Transition Metal	76 Os Osmium Transition Metal	77 Ir Iridium Transition Metal	78 Pt Platinum Transition Metal	79 Au Gold Transition Metal	80 Hg Mercury Transition Metal	81 Tl Thallium Post-Transition Metal	82 Pb Lead Post-Transition Metal	83 Bi Bismuth Post-Transition Metal	84 Po Polonium Metalloid	85 At Astatine Halogen	86 Rn Radon Noble Gas						
87 Fr Francium Alkali Metal	88 Ra Radium Alkaline Earth Metal	**	104 Rf Rutherfordium Transition Metal	105 Db Dubnium Transition Metal	106 Sg Seaborgium Transition Metal	107 Bh Bohrium Transition Metal	108 Hs Hassium Transition Metal	109 Mt Meitnerium Transition Metal	110 Ds Darmstadtium Transition Metal	111 Rg Roentgenium Transition Metal	112 Cn Copernicium Transition Metal	113 Nh Nihonium Post-Transition Metal	114 Fl Flerovium Post-Transition Metal	115 Mc Moscovium Post-Transition Metal	116 Lv Livermorium Post-Transition Metal	117 Ts Tennessine Halogen	118 Og Oganesson Noble Gas						
		+	57 La Lanthanum Lanthanide	58 Ce Cerium Lanthanide	59 Pr Praseodymium Lanthanide	60 Nd Neodymium Lanthanide	61 Pm Promethium Lanthanide	62 Sm Samarium Lanthanide	63 Eu Europium Lanthanide	64 Gd Gadolinium Lanthanide	65 Tb Terbium Lanthanide	66 Dy Dysprosium Lanthanide	67 Ho Holmium Lanthanide	68 Er Erbium Lanthanide	69 Tm Thulium Lanthanide	70 Yb Ytterbium Lanthanide	71 Lu Lutetium Lanthanide						
		**	89 Ac Actinium Actinide	90 Th Thorium Actinide	91 Pa Protactinium Actinide	92 U Uranium Actinide	93 Np Neptunium Actinide	94 Pu Plutonium Actinide	95 Am Americium Actinide	96 Cm Curium Actinide	97 Bk Berkelium Actinide	98 Cf Californium Actinide	99 Es Einsteinium Actinide	100 Fm Fermium Actinide	101 Md Mendelevium Actinide	102 No Nobelium Actinide	103 Lr Lawrencium Actinide						

1	Atomic Number
H	Symbol
Hydrogen	Name
Nonmetal	Chemical Group Block

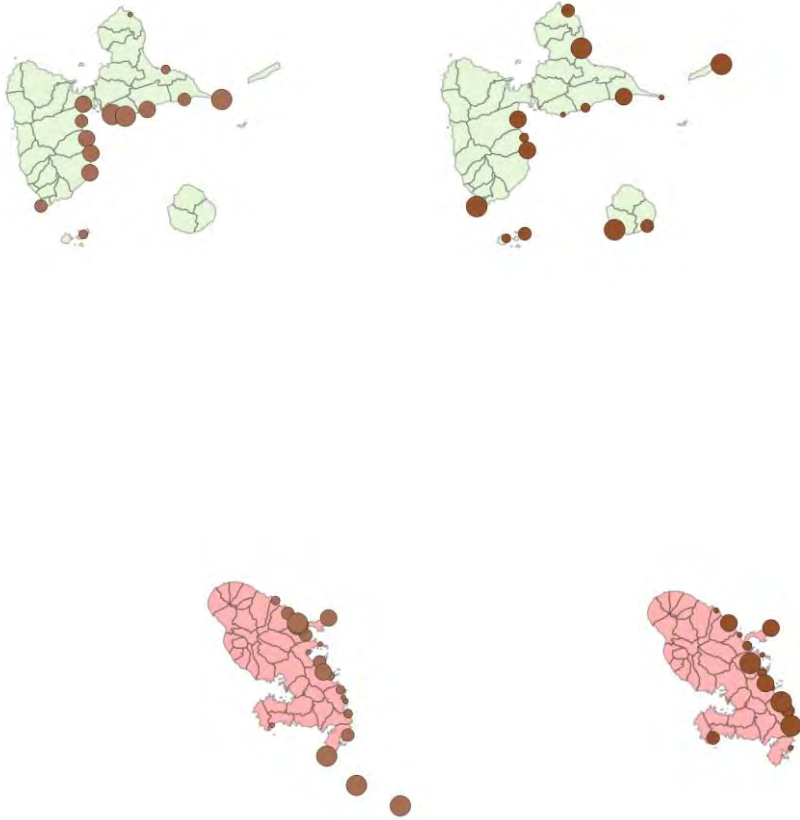
Persistent Organic pollutants

Chlordécone (Kepone)
 5β-hydro-chlordécone
 chlordécol

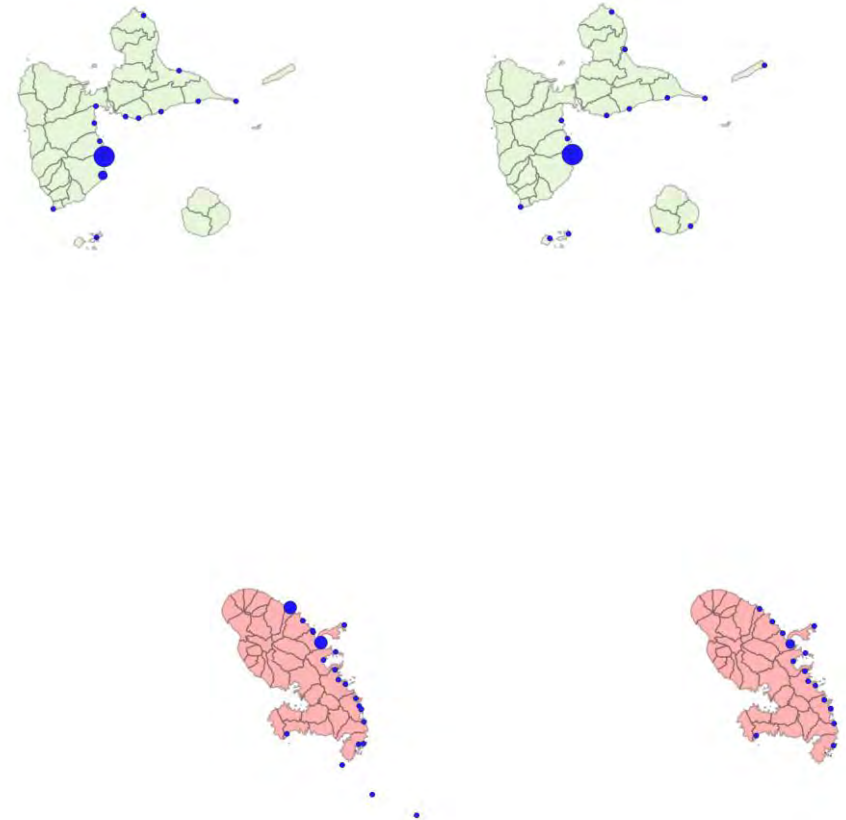


Sargassum can contain both oceanic and costal contaminants

[Arsenic] = 78 mg.kg⁻¹ DM



0 < [CLD] < 1.2 mg.kg⁻¹ DM



North Atlantic Ocean : 0,64-1,94 µg.l⁻¹ (Middelburg *et al.* 1988)

Atlantic Ocean : 0,41 – 1,57 µg.l⁻¹ (Braman and Foreback, 1973)

On the same order of magnitude than **estuarine and fluvial waters**

Virgin soils varies from 0.1 to 40 µg.kg⁻¹

Continental crust of the earth: 1.5–2 µg.kg⁻¹

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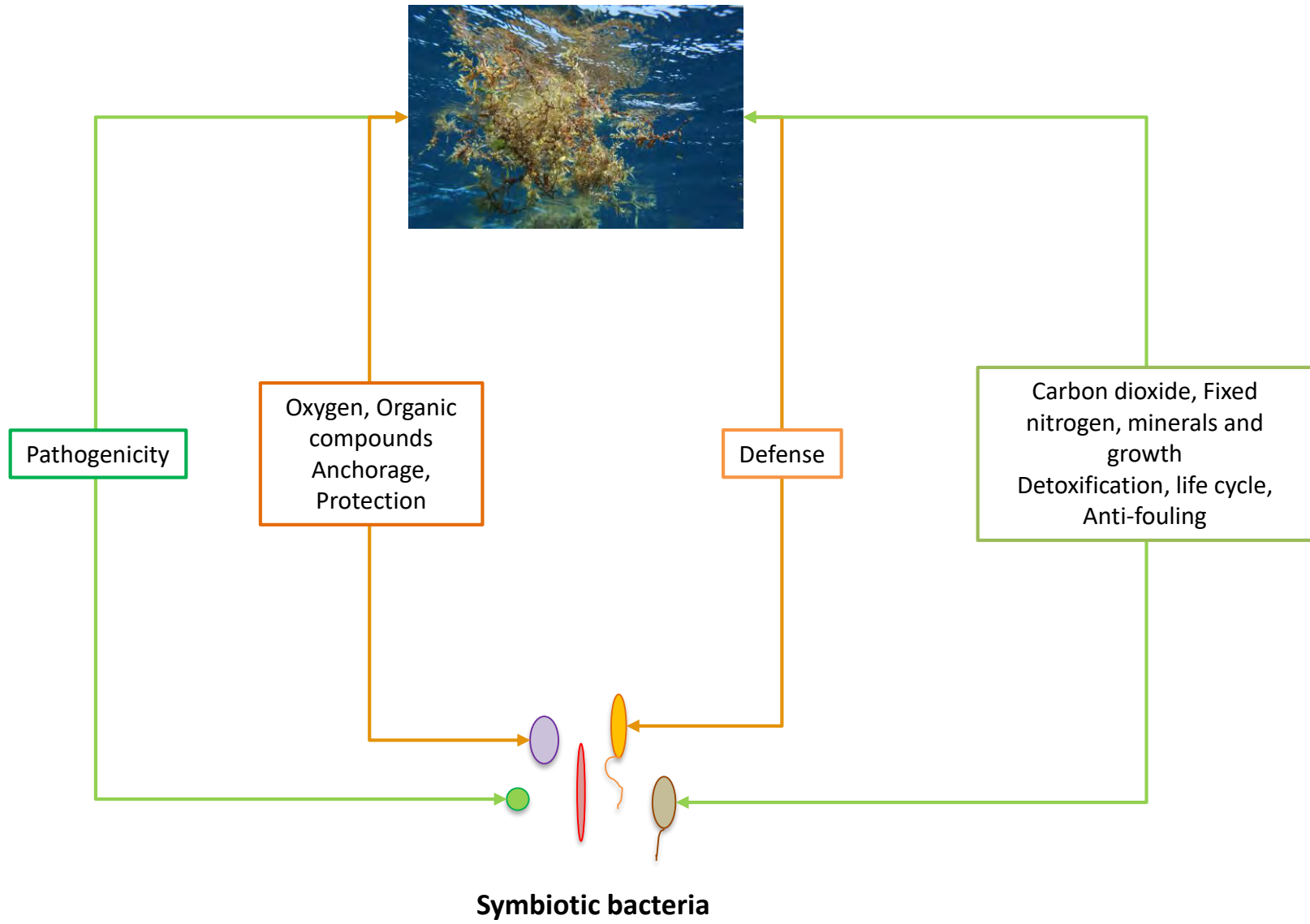


WP 3 : Diversity of the micro-organisms associated to *Sargassum* tides

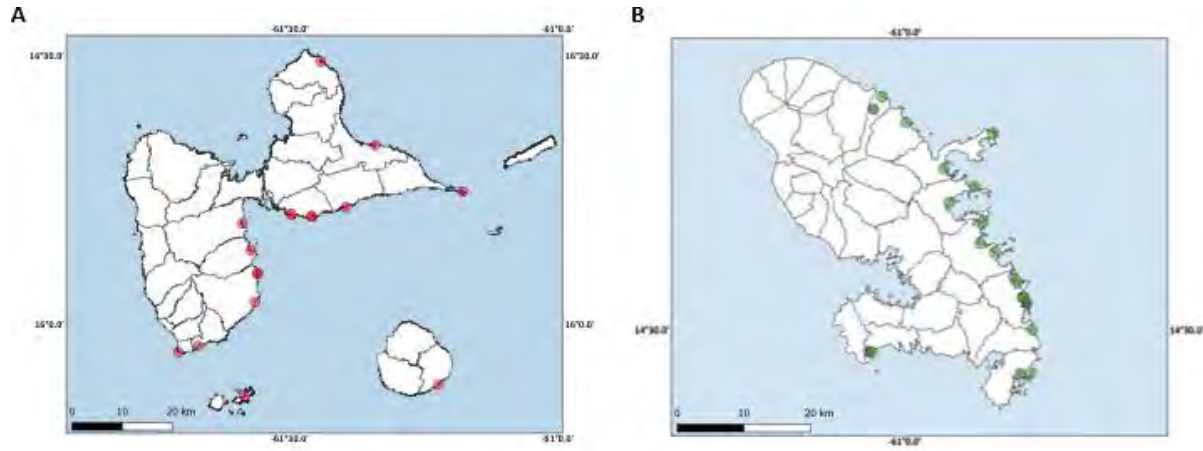
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Algae microbiome

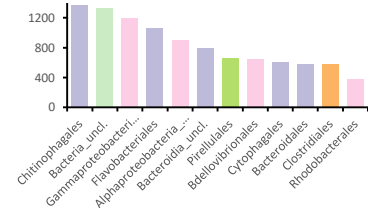
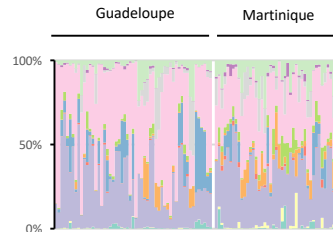


Metabarcoding of the 16S rDNA*

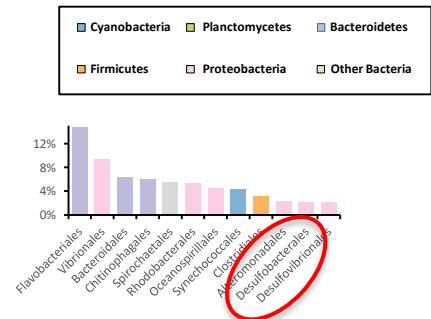
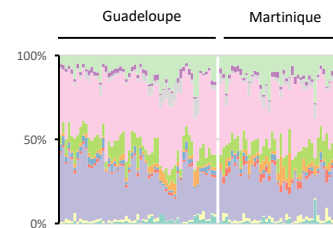


100 samples: **Seaweeds** and **Surrounding seawater**

Relative abundance: 2,849,100 reads



Diversity: ~ 22,200 OTUs

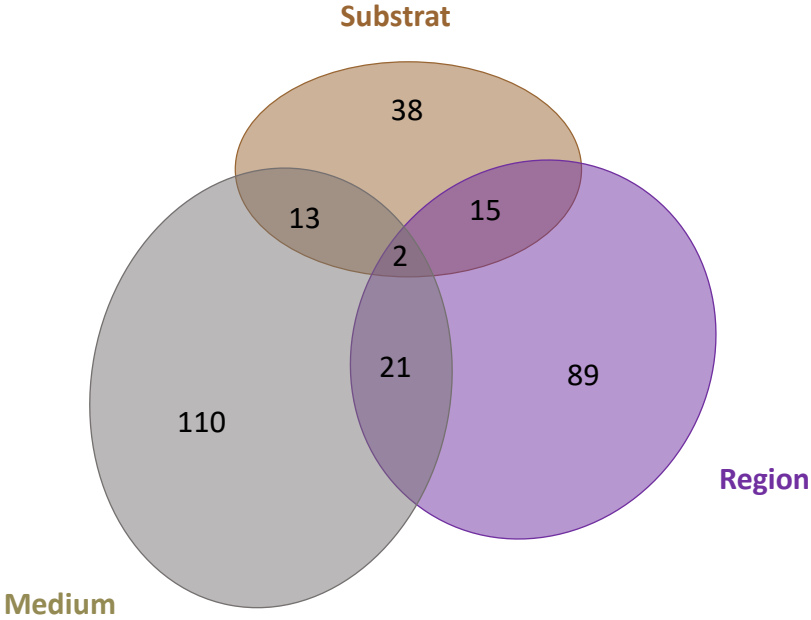
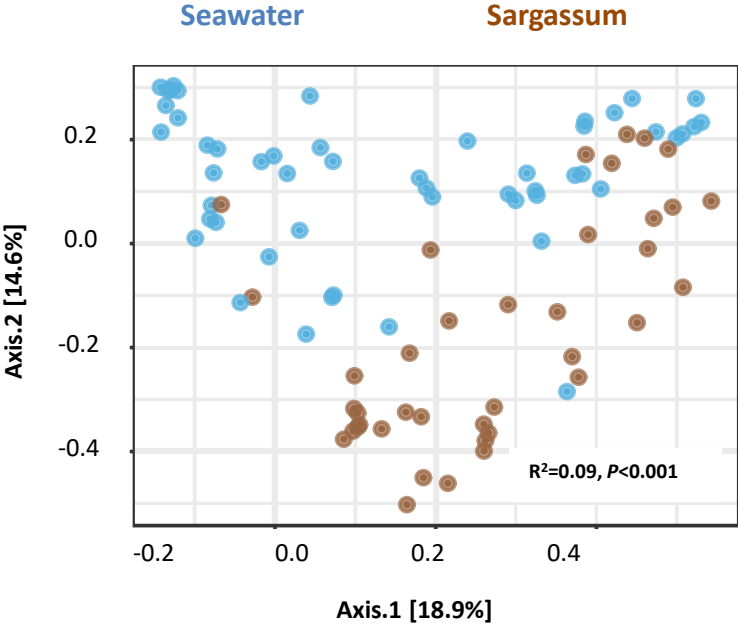


* Unpublished data

Regional, substrat and medium specific bacterial diversity *

Functional categories:

Respiration_of_sulfur_compounds	404
Fermentation	314
Human_pathogens_all	142
Intracellular_parasites	491



* Unpublished data

Thank you



Algues

la relance ici se fait
par le vent qui d'Afrique vient
par la poussière d'alizée
par la vertu de l'écume
et la force de la terre

nu

l'essentiel est de sentir nu
de penser nu

la poussière d'alizé
la vertu de l'écume
et la force de la terre

la relance ici se fait par l'influx
plus encore que par l'afflux
la relance

se fait

algue laminaire

Rimé Césaire

« Global and local scale »
« Not one but many/various Sargassum ecosystems »

