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Information processing for biological data - examples

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Regional thematic school on the Vulnerability of Reefs heritage *DIDEM program*

Information processing for biological data - examples



June 13, 2024 – Blue Economy Research
University of Seychelles

Understand what are you doing (science approach or other).... to do what ?

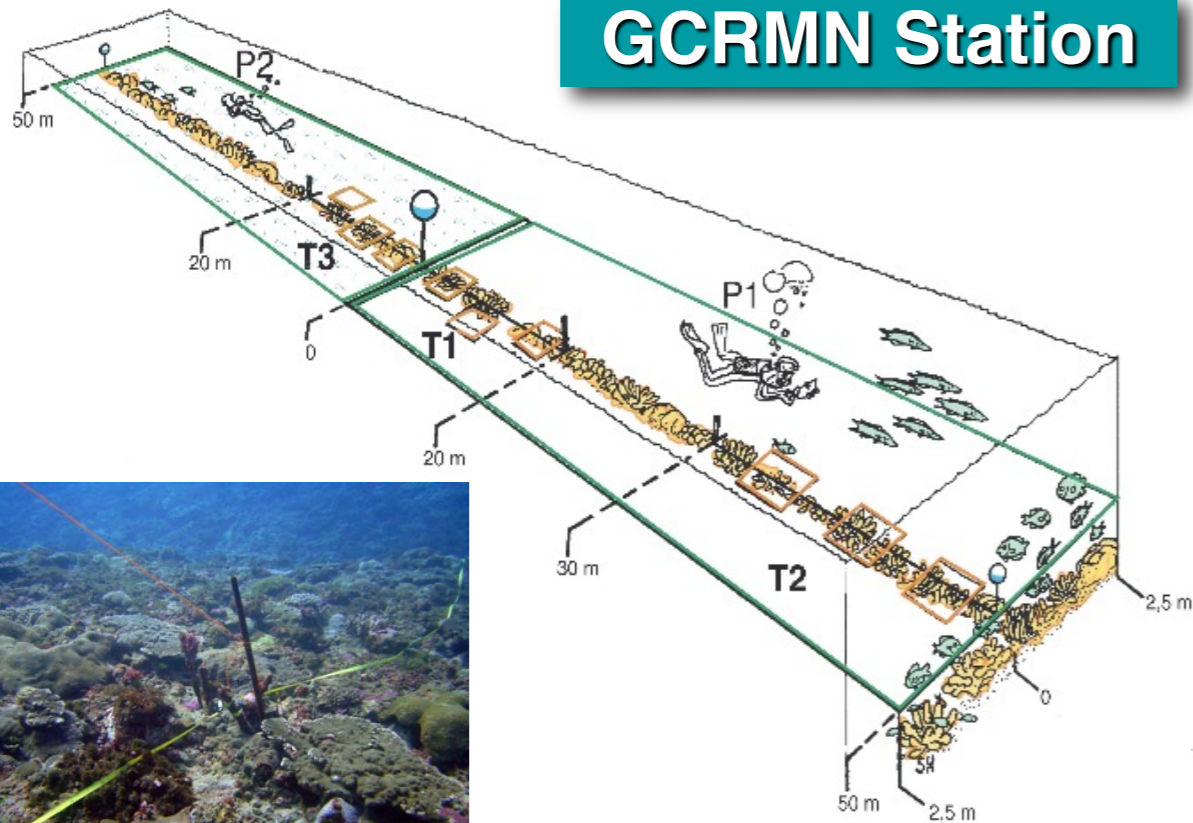
- 😓 Well understanding sampling strategy & habitats mapping ?
- 😎 Choice of the best methodology (LIT, PIT, Coram, photo-quadrat, random time course, ..?) and know their limits ... according to available resources !
- 😜 Define (the best) and possible parameters (indicators) that you can used to answer initial question(s)
- 👑 Don't used « fantastic » statistical tool ...if you don't understand the meanings, ... prefer raw data, simple tools
- 🙄 Be careful of agregating data (for political, communication reasons)... => to make sure your data doesn't talk (ecological) nonsense
- 😍 Research best quality and (if possible..) high expert level for your data => wide range to possible uses

LIT methods (example)

Underwater Visual Census (fishes)

Standardized methodology consistent with GCRMN method at highest taxonomy level

GCRMN Station



Reef slope (10-15 m)
Reef flat (1-4 m)

Substrate **HOMOGENEITY**



BENTHOS transect LIT (20 m) x 3 – benthic categories & coral genus / species

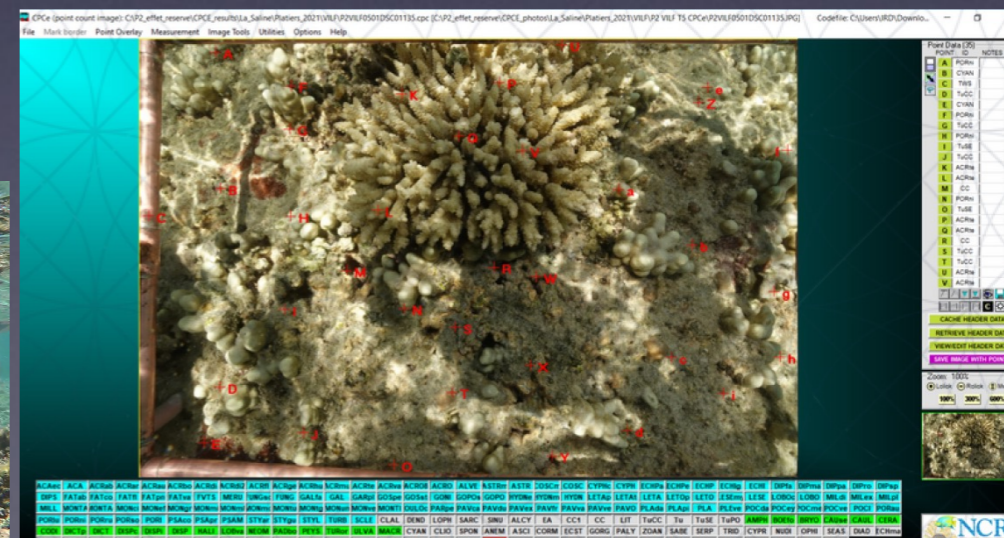
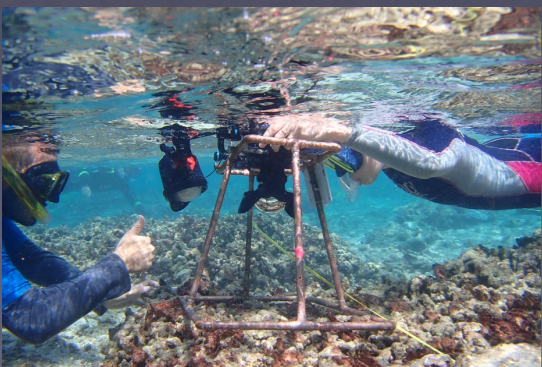
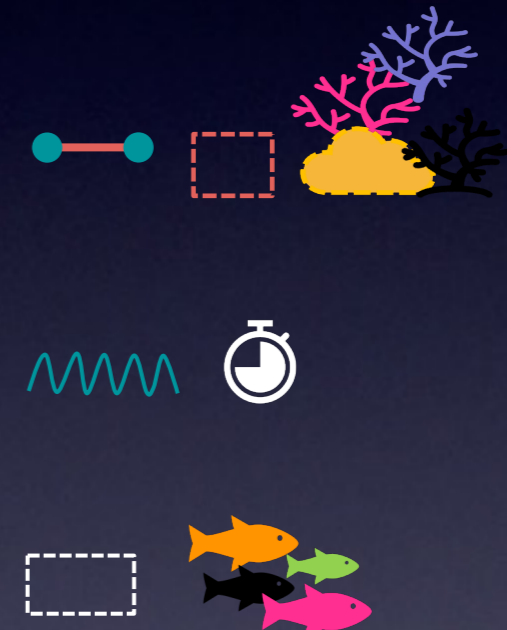
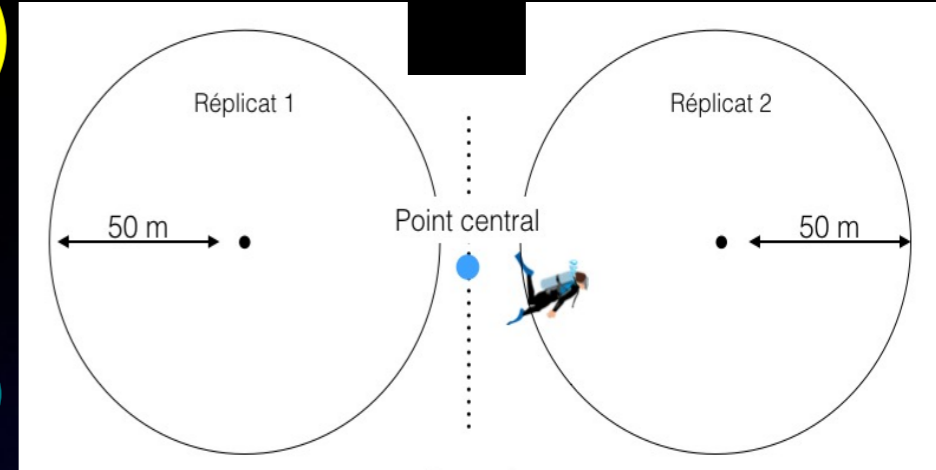
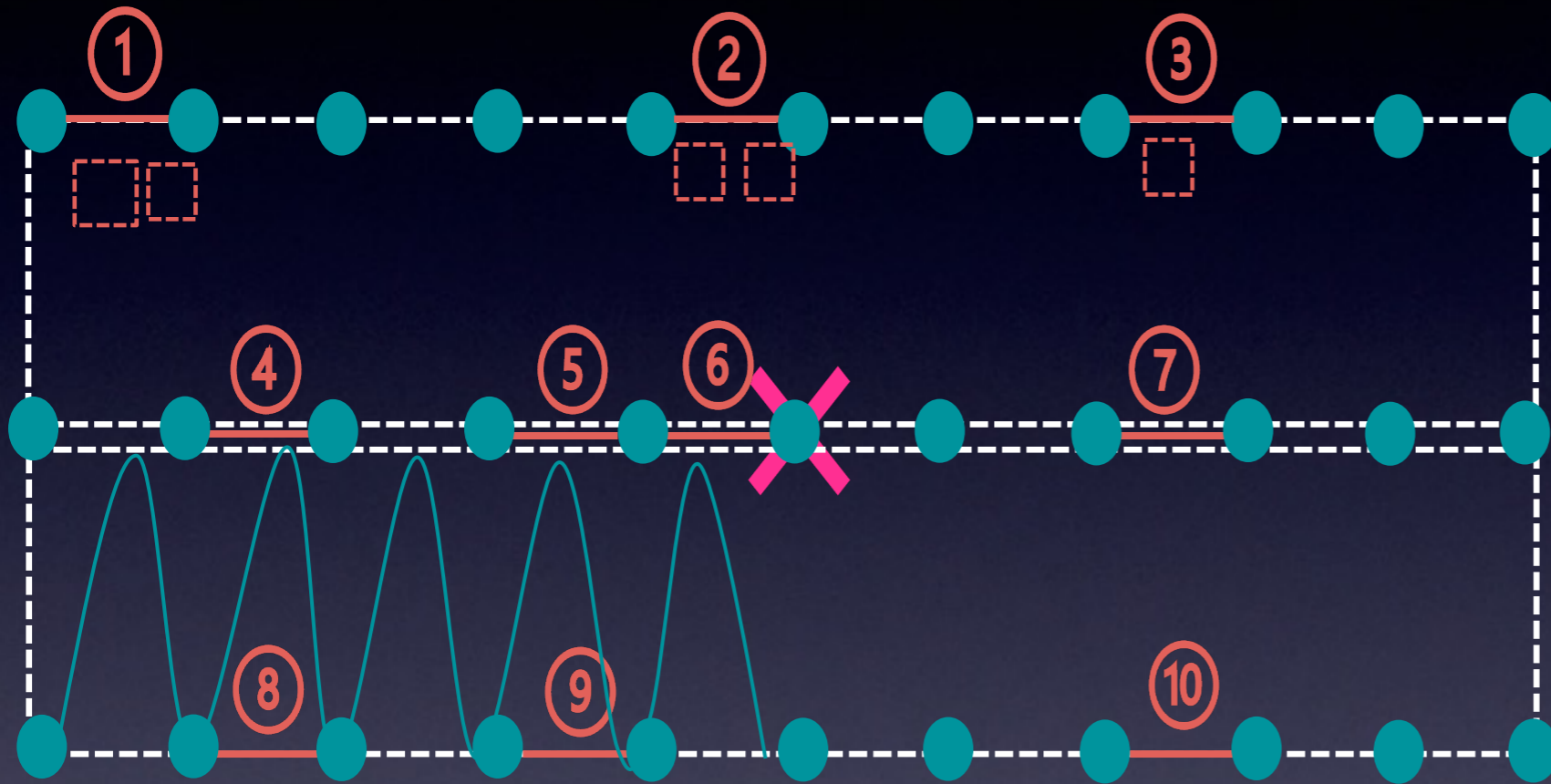
FISH BELT transect (50 x 5 m) x 3 – species, abundance & size

Invertebrates BELT transect (20 x 2m) x 3 – if you want (be careful “night / day” period)



Example of MPA methodology survey

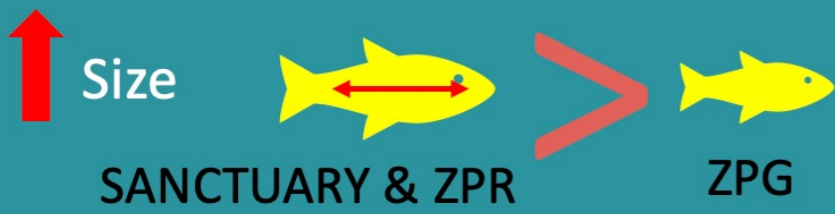
(Fish/benthos/ invertebrates)



USEABLE BIOMAS

> 10 cm Fishes

Size & abundance

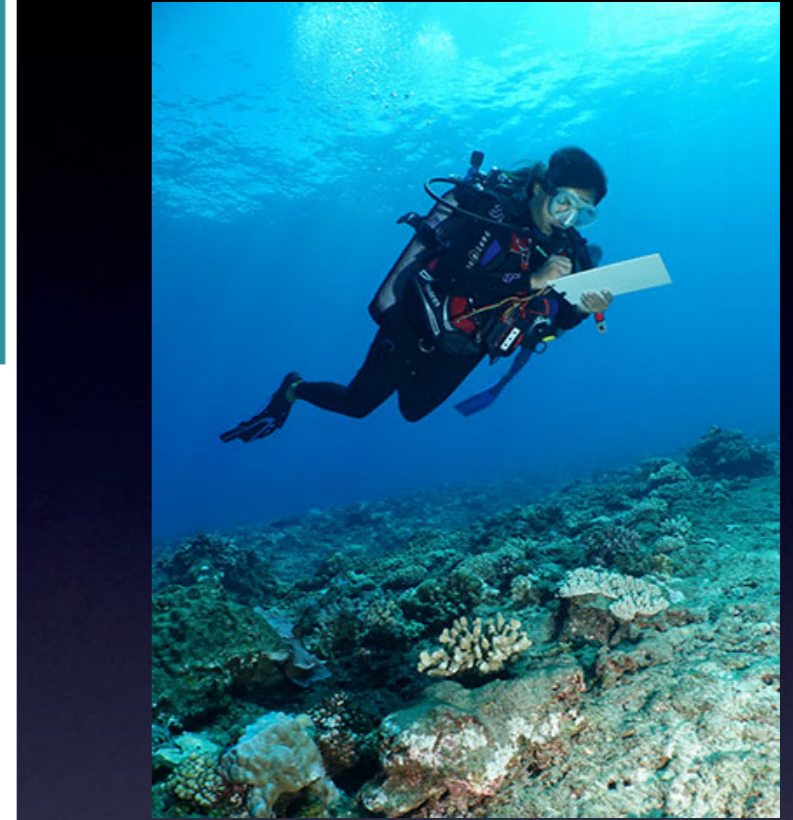


Number

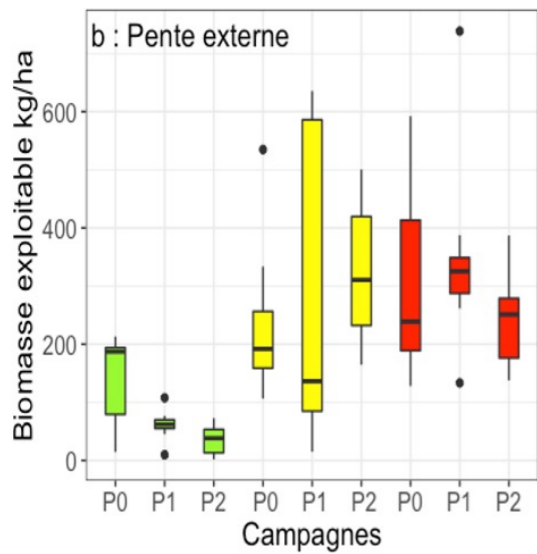
Abondance relative familles ciblées ●

RESERVE EFFECT

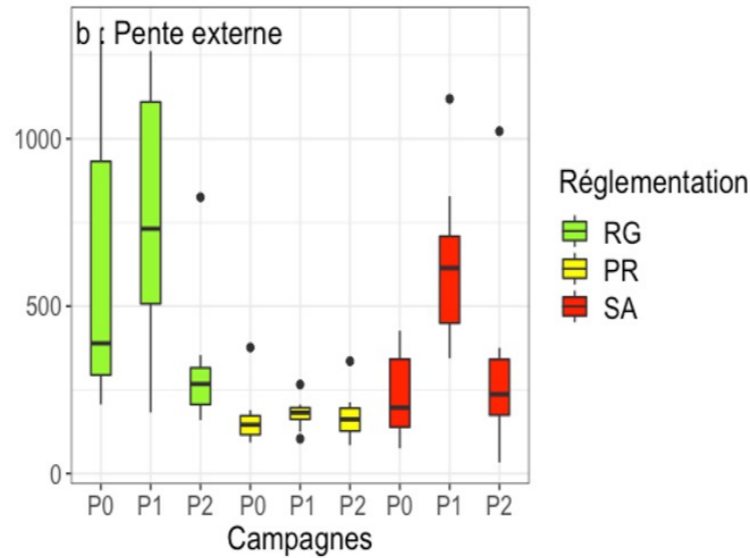
RESERVE EFFECT



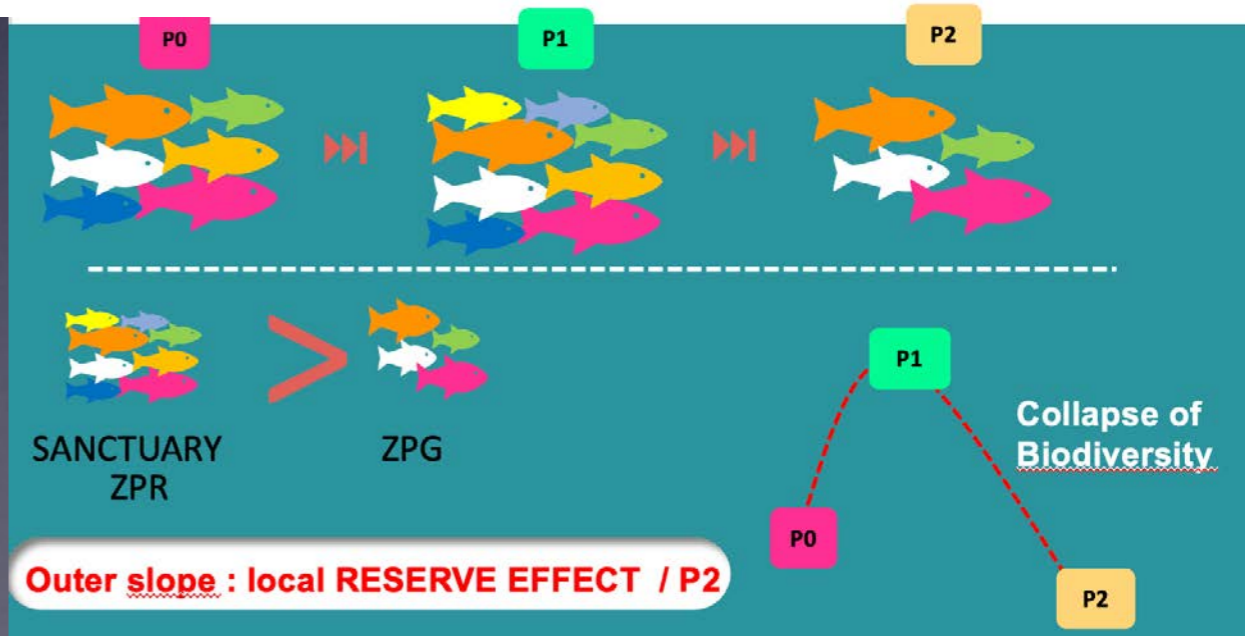
La Saline

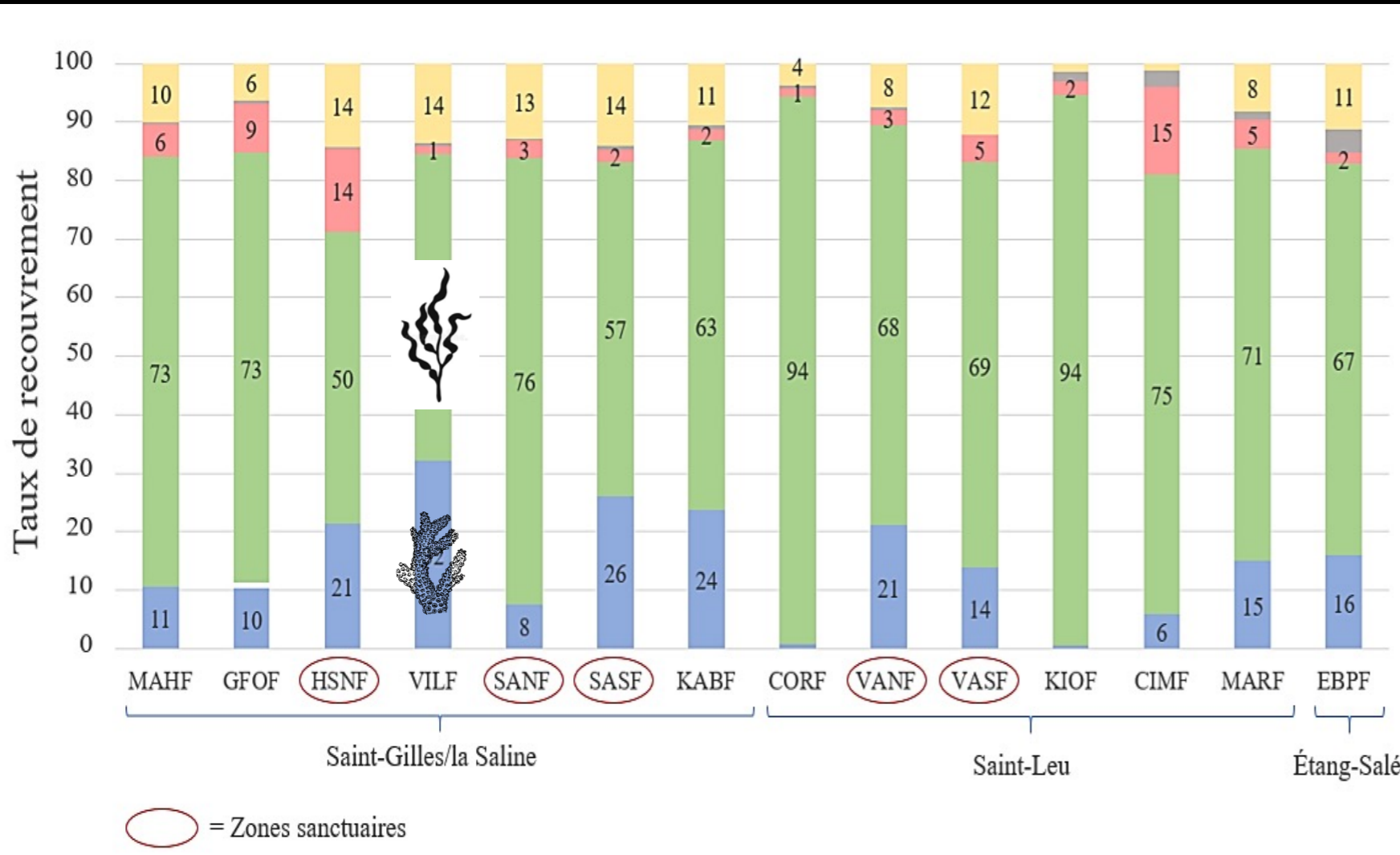


Saint-Leu







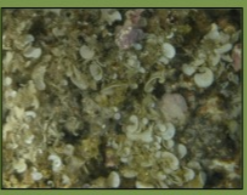

Sciences & Communication

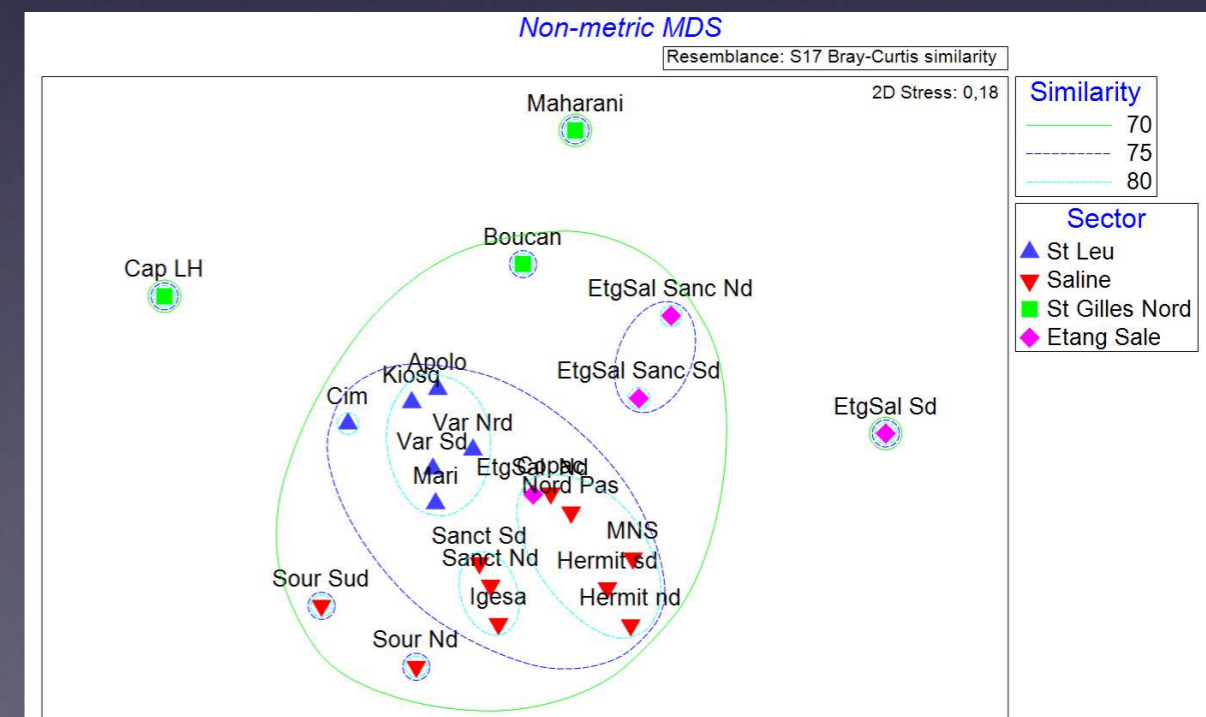




Spatial approach
BENTHOS transect -
 global mean % (sd)
 - relative taxa %
 - station comparison
 - nMDS
 (multifactorial approach)
 for corals – species level



I	Coraux durs = Sclératinières + millépores <i>Acropora</i> sp "C"			<i>Millepora</i> "MILL"
II	Coraux mous = Alcyonaires <i>Sarcophyton</i> sp "SC"			
III	Algues = gazons algaux (turfs algal + filamentous turf) + macro-algues + algues endolithes + calcaires encroûtantes + cyanobactéries Sub-catégorie CC = algues calcaires encroûtantes <i>Lithophyllum</i> sp "CC"			Gazons algaux Turf "TU"
IV	Autres métazoaires = éponges + autres sessiles + autres mobiles <i>Disidea</i> sp "SP"			
V	Substrat non vivant = sable + débris + dalle			



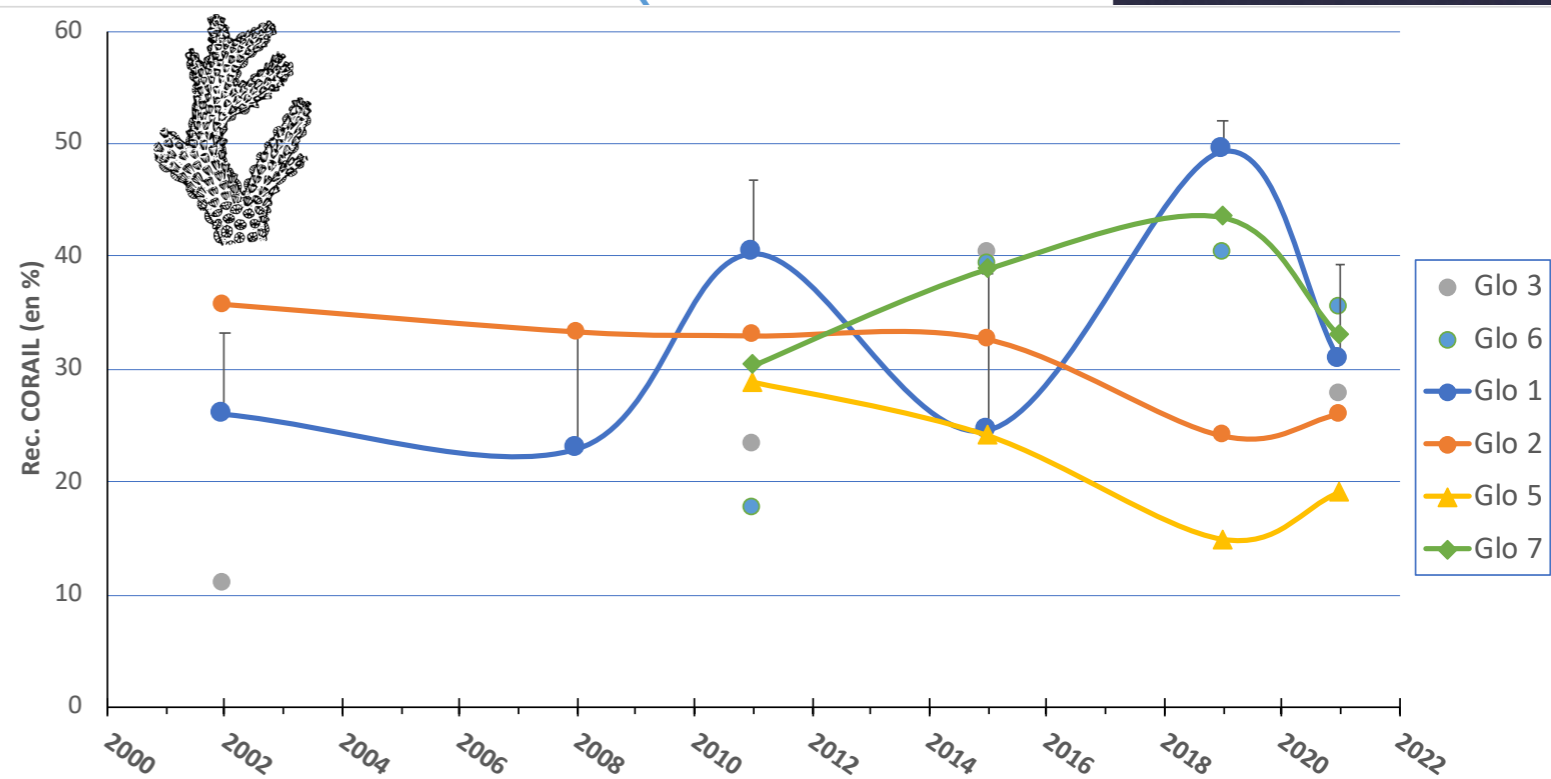
Example of temporal approach – GCRMN (La Reunion) - Benthos



Evolution of coral cover and algae on "La Corne reef flat station" (Saint Leu /La Réunion)
1999 to 2023

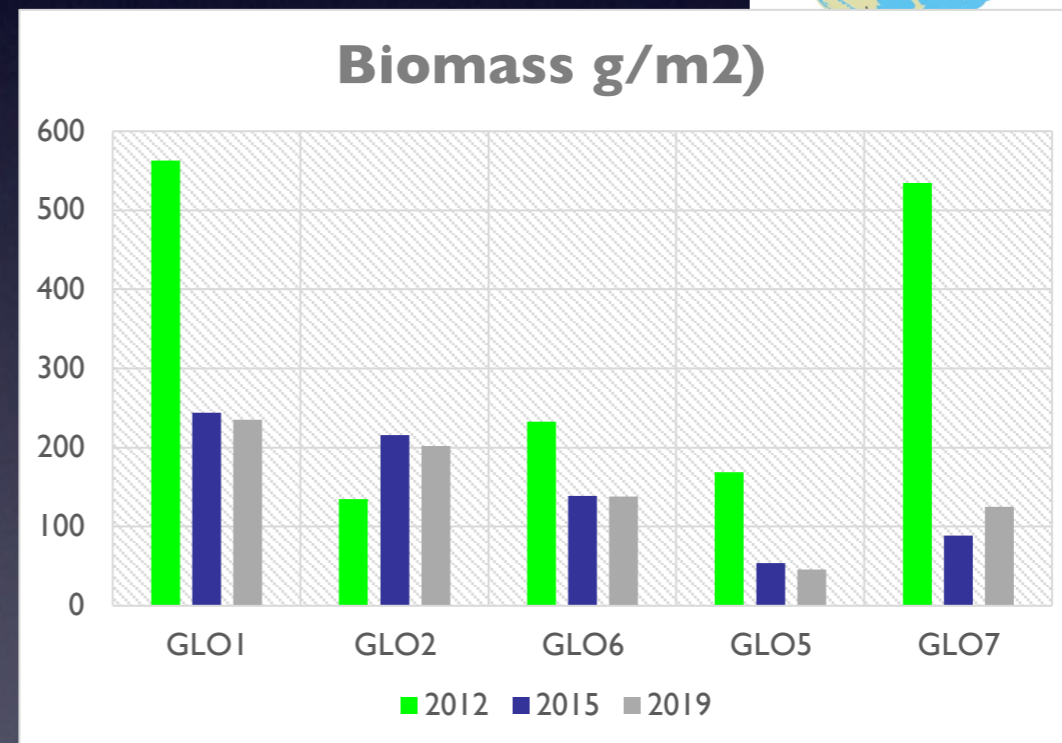
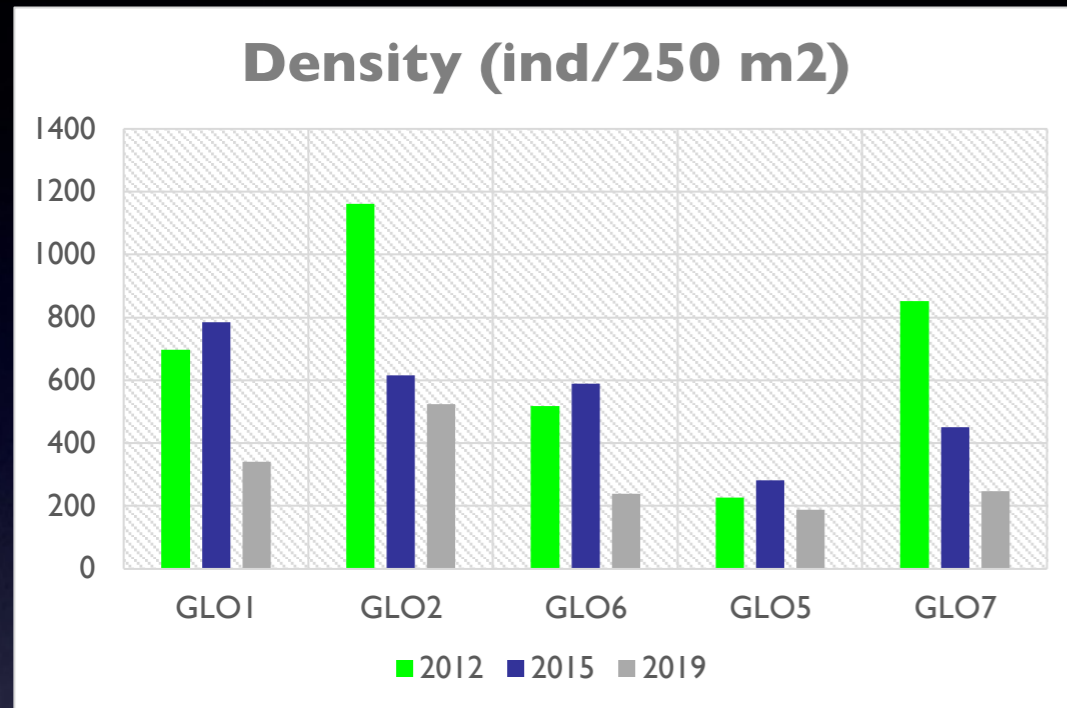
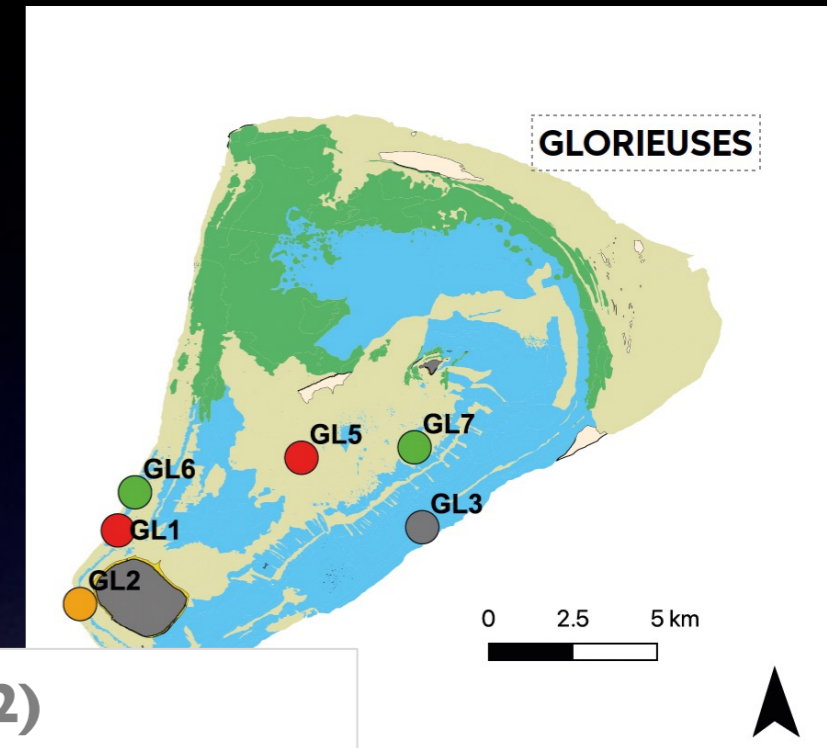


Compl = more monitor



Example of spatio-temporal approach Eparses (Glorieuses)

GCRMN - Fish



Example of comparison between islands (Mozambic channel- Eparses)

Biomass outer slope (2011-2013)

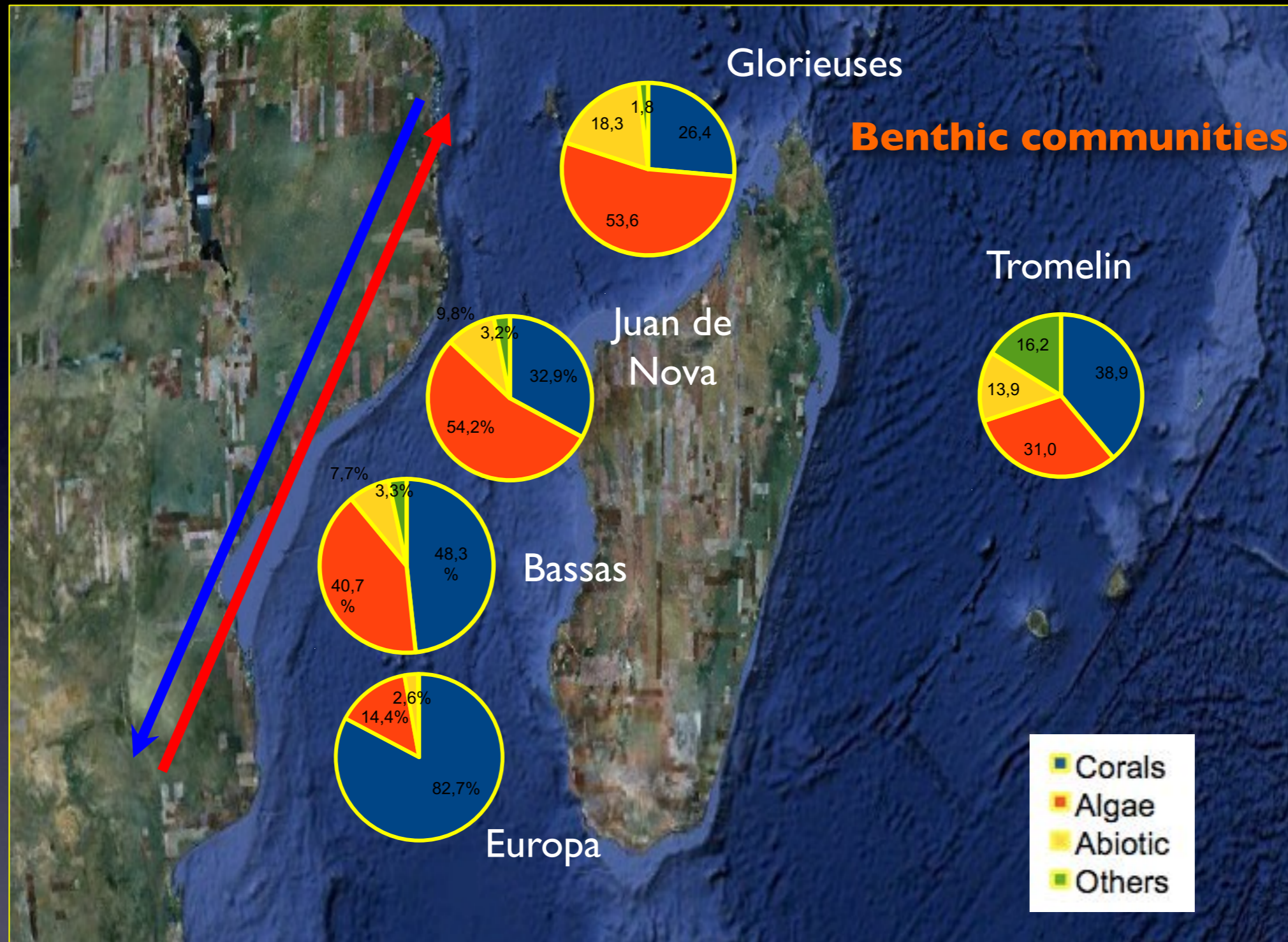
Europa = 7525 Kg/ha

Glorieuses = 2579 Kg/ha

Maldives = 1400 Kg/ha

Reunion = 350 Kg/ha





Gradient along the Mozambic channel (2011-2013) - Chabanet et al., 2015

Coral cover decreases Europa -> Glorieuses

Algae cover Glorieuses increases Europa -> Glorieuses

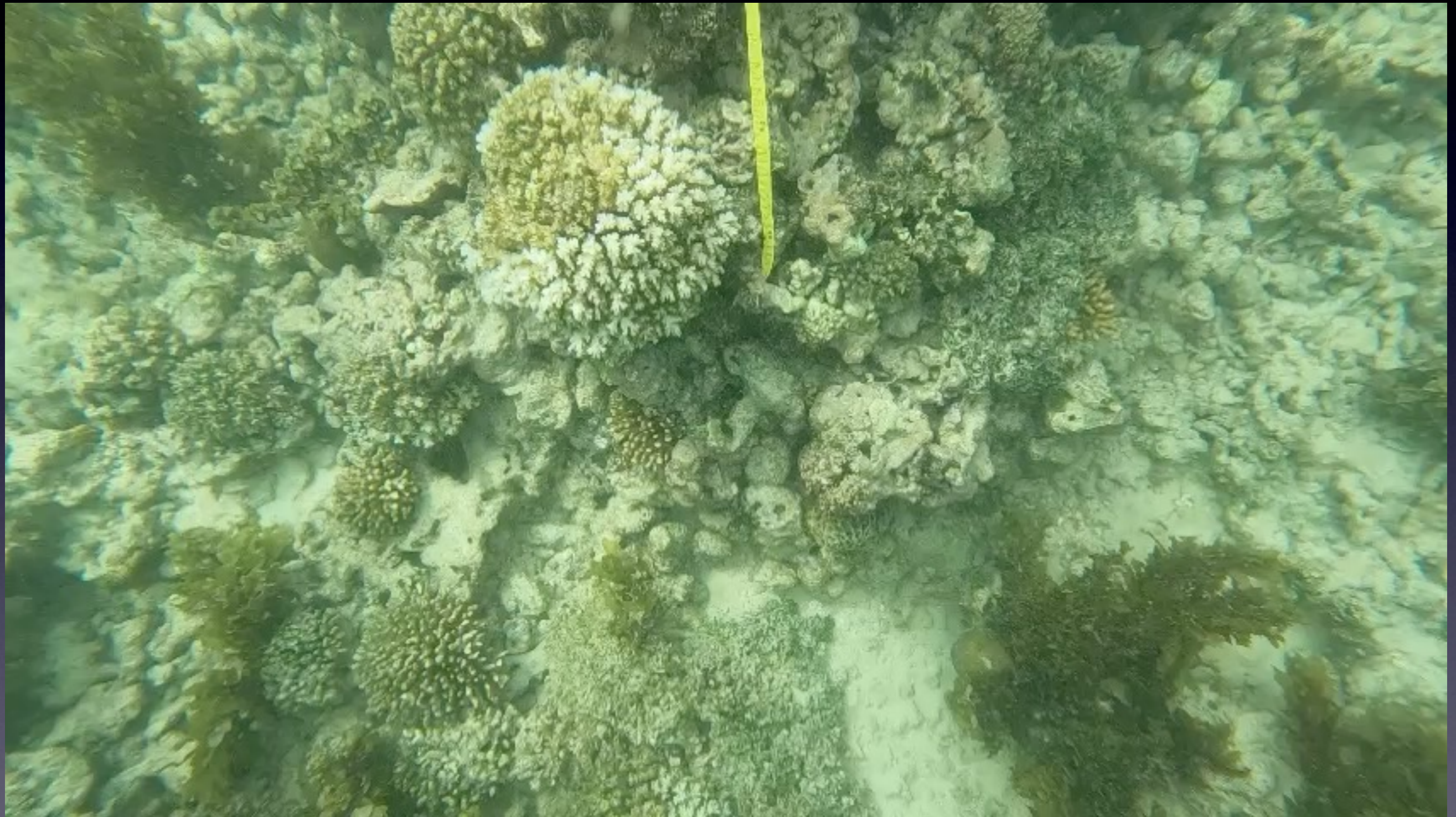
Differences could be due to their geomorphology, isolation and thermal stress



Our field trip ... !!



LIT – TI – Ile Moyenne – Seychelles 12/6/24



Results – « DIDEM teams » – Ile Moyenne SEY

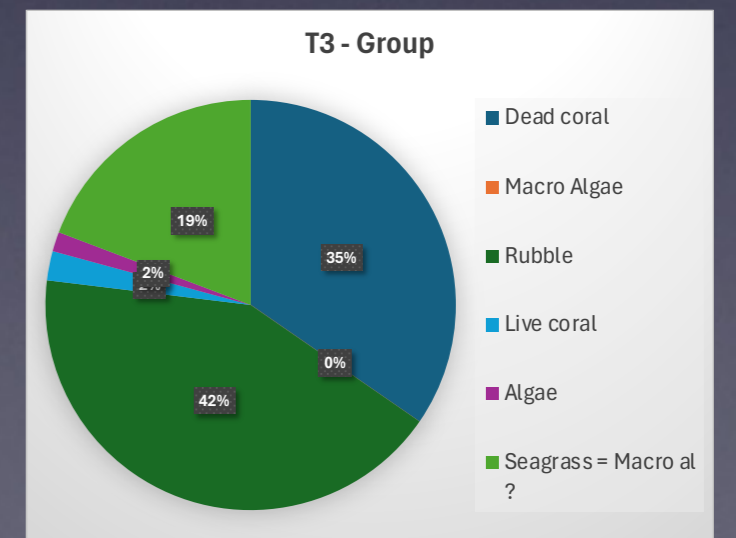
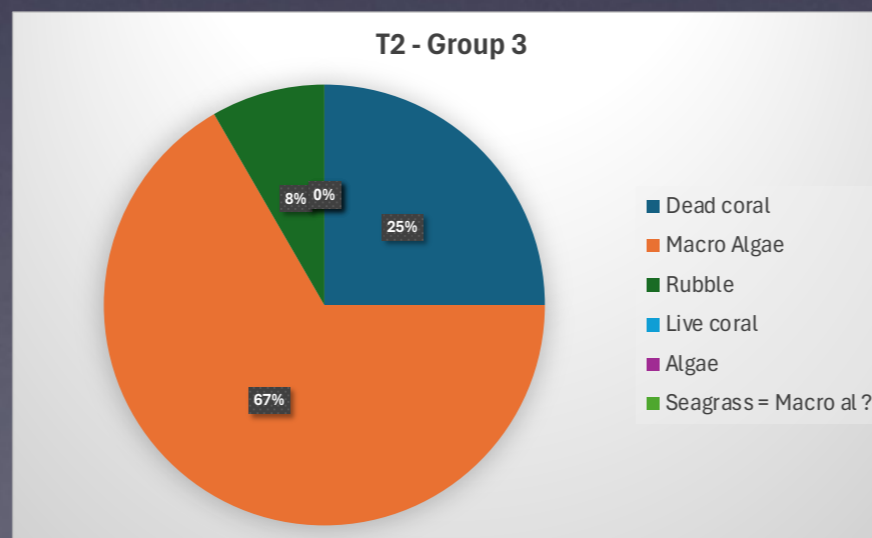
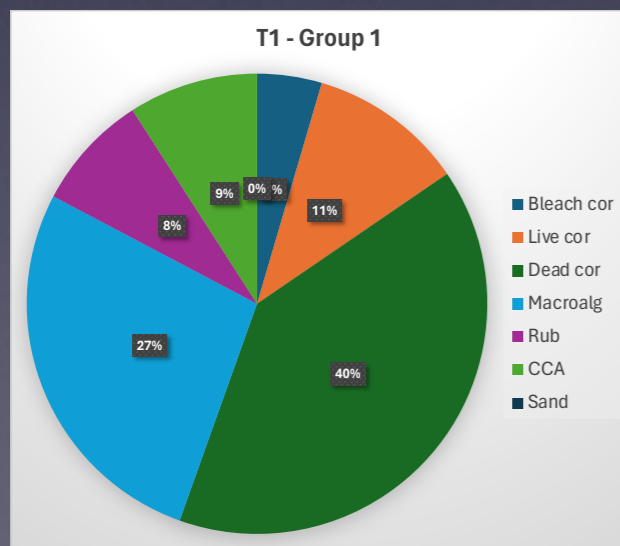
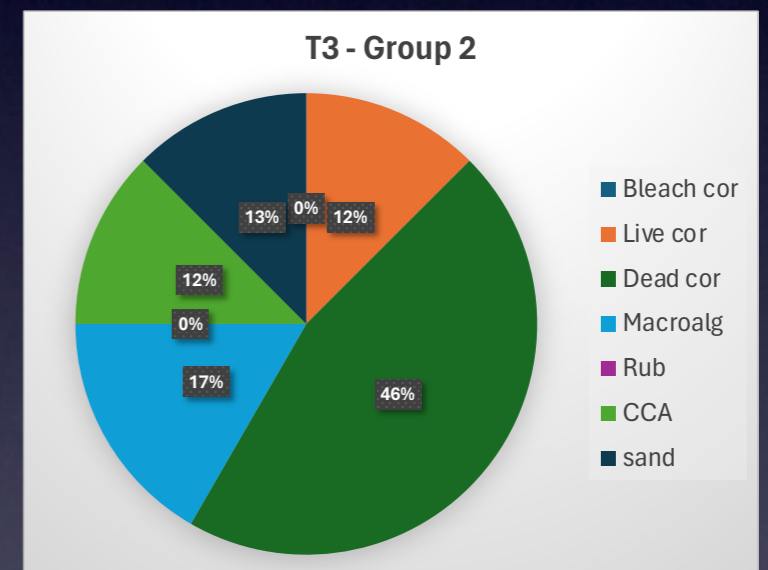
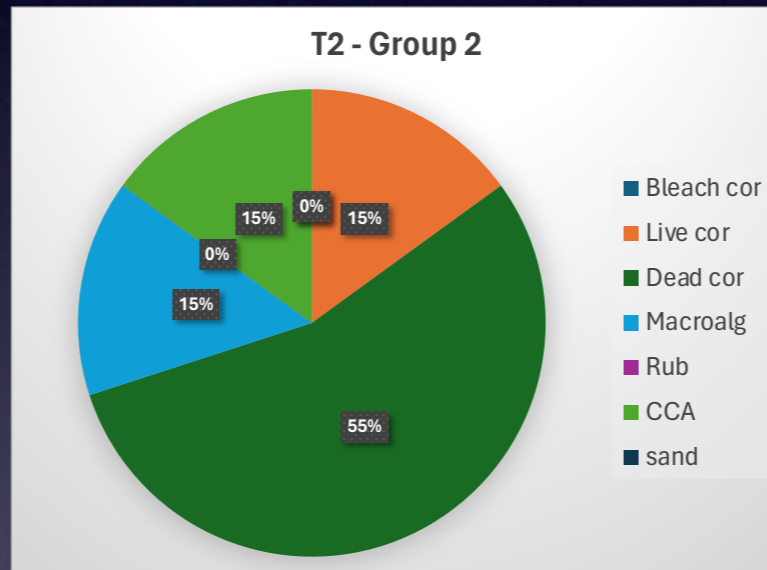
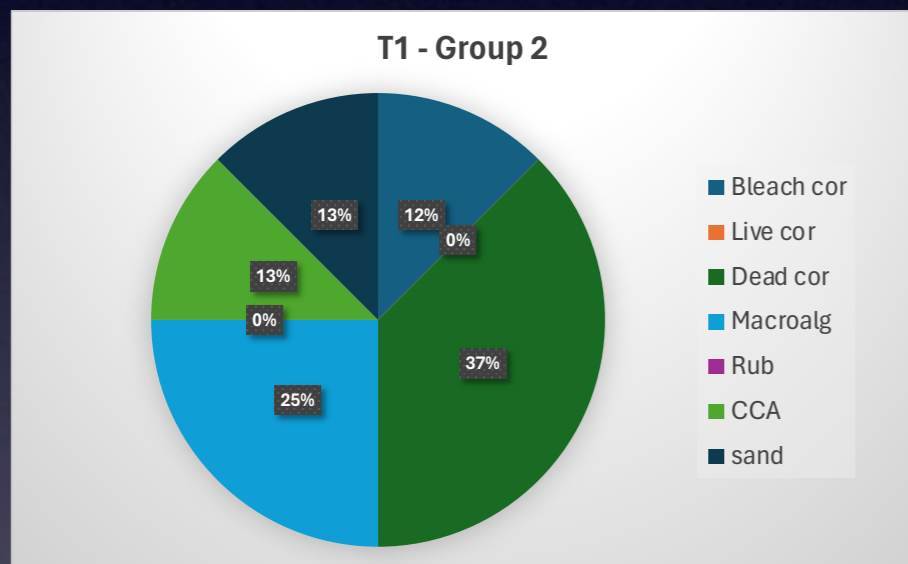
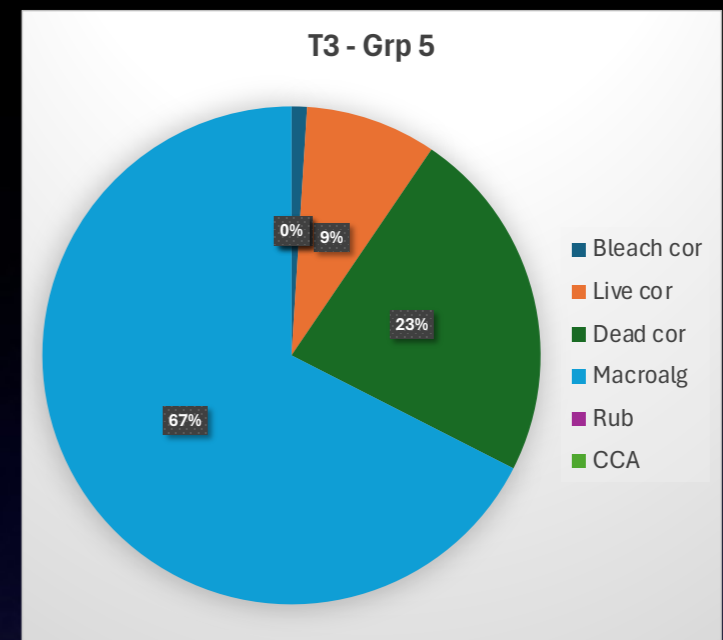
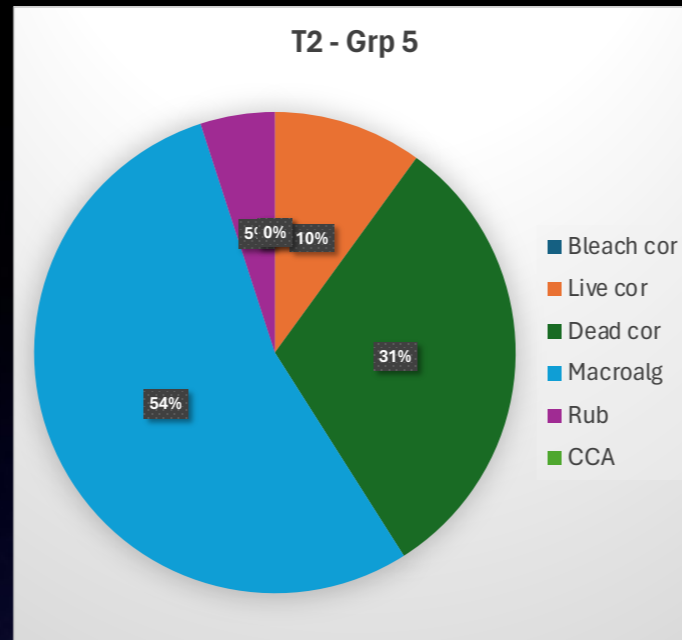
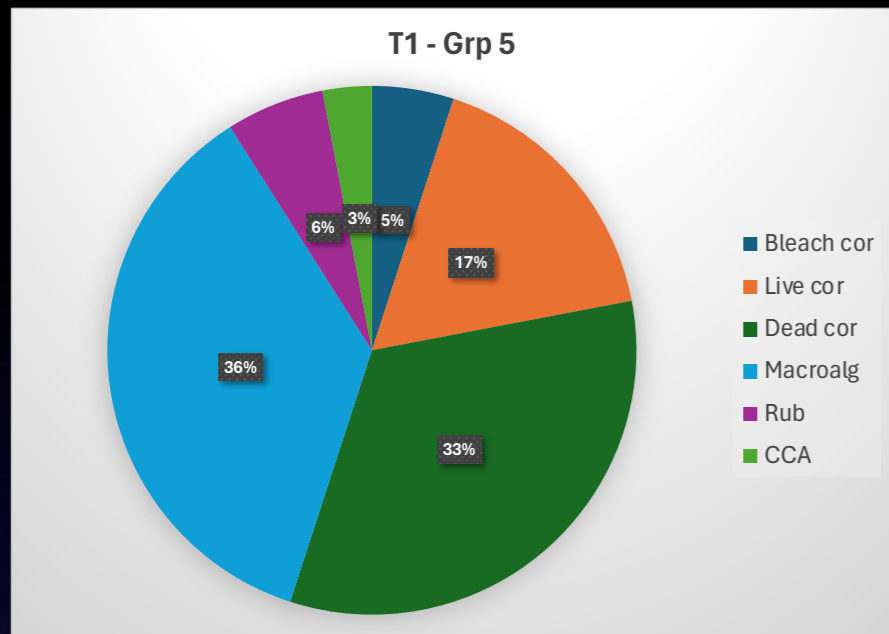
Group 1			
Ella, Yvonne, Judy, Lio			
LIT	DATA	CODE DESCRIPTION	
T1	0-0.5	CRB	CRD CORAL BLEACHING
	0.5-0.9	CRD,CCA	CRD CORAL DEAD
	1.0-1.0	CCA,CRB,CRD	CCA CRUSTOSE CORALINE ALGAE
	1.2-1.3	MA	MA MACROALGAE
	1.-1.5	CRD	COR LIVE CORAL
	1.6-2.0	COR	RUBBLE RUBBLE
	2.1-2.3	CRD	TA Tough algae
	2.4-2.6	CRD,MA	
	2.7-3.0	CRD	
	3.0-4.0	CRD,MA,COR	
	4.1-4.2	CCA	
	4.2-4.3	MA	
	4.4-.4.6	RUBBLE, CRD	
	4.6-4.8	COR	
	4.8-5.0	RUBBLE	
	5.0-5.5	RUBBLE	
	5.5-5.9	MA	
	5.9-6.0	COR	
	6.0-6.2	COR	
	6.2-6.9	MA	
	6.9-7	MA	
	7-7.2	COR	
	7.2-7.6	CCA,TA	
	7.2-7.6	CCA,TA	
	7.6-7.9	CCA,COR	
	7.9-8	MA	
	8-8.2	MA	
	8.2-8.3	MA	
	8.3-8.6	CRD	
	8.6-9	MA	
	9-9.2	COR	
	9.2-9.7	CRD	
	9.7-10	MA	
	10-10.6	CRD	
	10.6-11	CRD	

Group 2				
Eric,				
Survey Method	Transsect	Distance (M)	Substrate type	
T1	1	0-1.5	Dead coral	
	1	1.5-3	macroalgae	
	1	3-4.5	bleached coral	
	1	4.5-6	sand	
	1	6-7.5	macroalgae	
	1	7.5-9	coraline algae	
	1	9.5-12	Dead coral	
	T2	2	0-1.5	Dead coral
		2	1.5-3	live coral
		2	3-4.5	macro algae
2		4.5-6	coraline algae	
2		6-7.5	rubble	
2		7.5-9	Dead coral	
T3	3	0-1.5	Dead coral	
	3	1.5-3	sand	
	3	3-4.5	live coral	
	3	4.5-6	macroalgae	
	3	6-7.5	Dead coral	
	3	7.5-9	coraline algae	
	3	9.5-12	Dead coral	

Groupe 3 ile moyenne 12/06/2024			
Victorya, ...			
Site	Transect	Metric (m)	Categories
Sainte-Anne	T2	0	Dead coral
Sainte-Anne	T2	1	Dead coral
Sainte-Anne	T2	2	Dead coral
Sainte-Anne	T2	3	Dead coral
Sainte-Anne	T2	4	Macro Algae
Sainte-Anne	T2	5	Macro Algae
Sainte-Anne	T2	6	Macro Algae
Sainte-Anne	T2	7	Macro Algae
Sainte-Anne	T2	8	Macro Algae
Sainte-Anne	T2	9	Macro Algae
Sainte-Anne	T2	10	Rubble
Sainte-Anne	T2	11	Macro Algae
Sainte-Anne	T2	12	Macro Algae
Sainte-Anne	T3	0	Dead coral
Sainte-Anne	T3	1	Dead coral
Sainte-Anne	T3	2	Dead coral
Sainte-Anne	T3	3	Dead coral
Sainte-Anne	T3	0	Rubble
Sainte-Anne	T3	1	Rubble
Sainte-Anne	T3	2	Rubble
Sainte-Anne	T3	3	Rubble
Sainte-Anne	T3	4	Dead coral
Sainte-Anne	T3	5	Dead coral
Sainte-Anne	T3	6,5	Dead coral
Sainte-Anne	T3	4	Rubble
Sainte-Anne	T3	5	Rubble
Sainte-Anne	T3	6,5	Rubble
Sainte-Anne	T3	7	Rubble
Sainte-Anne	T3	7,5	Seagrass
Sainte-Anne	T3	7,8	Live coral
Sainte-Anne	T3	8	Algae
Sainte-Anne	T3	9	Seagrass
Sainte-Anne	T3	10	Seagrass

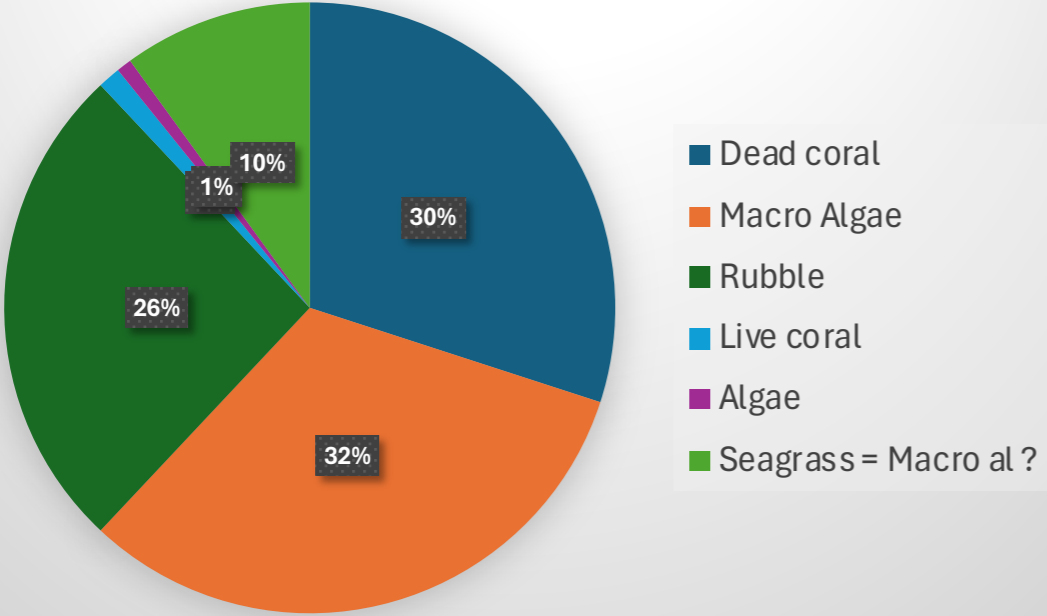
Group 5										
Didier, Sandra, Alice, Katrin, Ameer										
LIT METHOD		Transect number	Metric (m)	Benthic category	Transect num	Metric (m)	Benthic category	Transect num	Metric (m)	Benthic category
	T1	0-0.50	Bleached coral	T2	0-0.80	Dead coral	T3	0-0.9	Dead coral	
	T1	0.50-0.90	Live coral	T2	0.80-0.90	Live coral	T3	0.90-1.0	Live coral	
	T1	0.90-1.60	Dead coral	T2	0.90-1.0	Dead coral	T3	1.0-1.10	Dead coral	
	T1	1.60-2.10	Live coral	T2	1.0-1.90	Live coral	T3	1.10-1.20	Live coral	
	T1	2.10-2.60	Dead coral	T2	1.90-2.0	Dead coral	T3	1.20-1.60	Macroalgae	
	T1	2.60-3.20	Dead coral	T2	2.0-3.5	Macroalgae	T3	1.60-2.25	Live coral	
	T1	3.20-4.80	Macroalgae	T2	3.5-4.0	Dead coral	T3	2.25-2.40	Macroalgae	
	T1	4.80-5.40	Rubble	T2	4.0-5.30	Macroalgae	T3	2.40-2.50	Bleached coral	
	T1	5.40-6.30	Macroalgae	T2	5.30-6.90	Dead coral	T3	2.5-3.60	Macroalgae	
	T1	6.30-7.10	Live coral	T2	6.90-7.40	Rubble	T3	3.60-4.5	Dead coral	
	T1	7.10-9.1	Algae	T2	7.40-10	Macroalgae	T3	4.5-7.0	Macroalgae	
	T1	9.1-9.70	Dead coral				T3	7.0-7.4	Dead coral	
	T1	9.70-10.0	Corraline algae				T3	7.4-10	Macroalgae	

By transect / group.... (T1 left / T2 middle / T3 right)

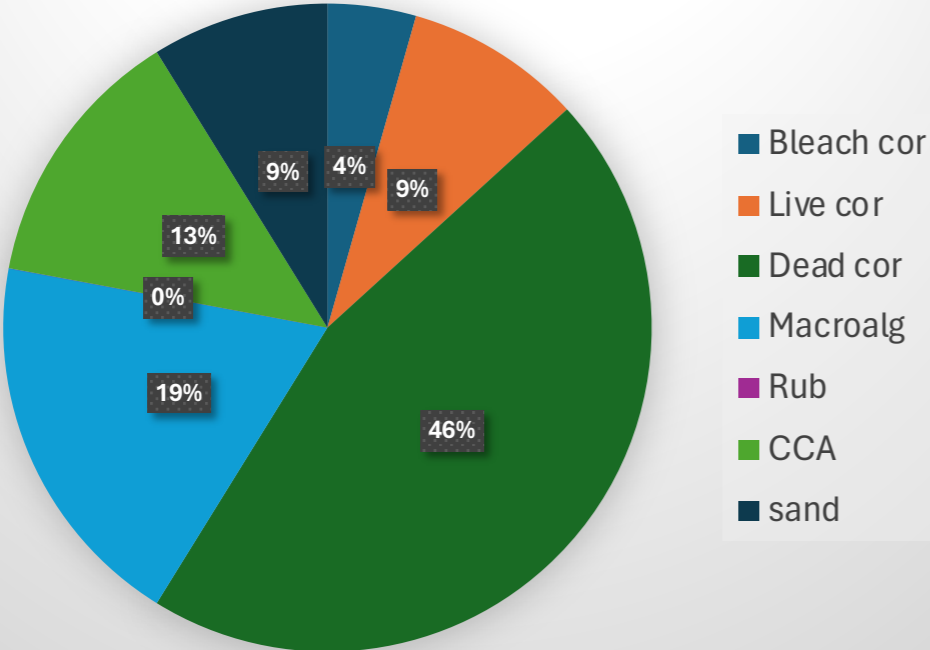


Mean by group !

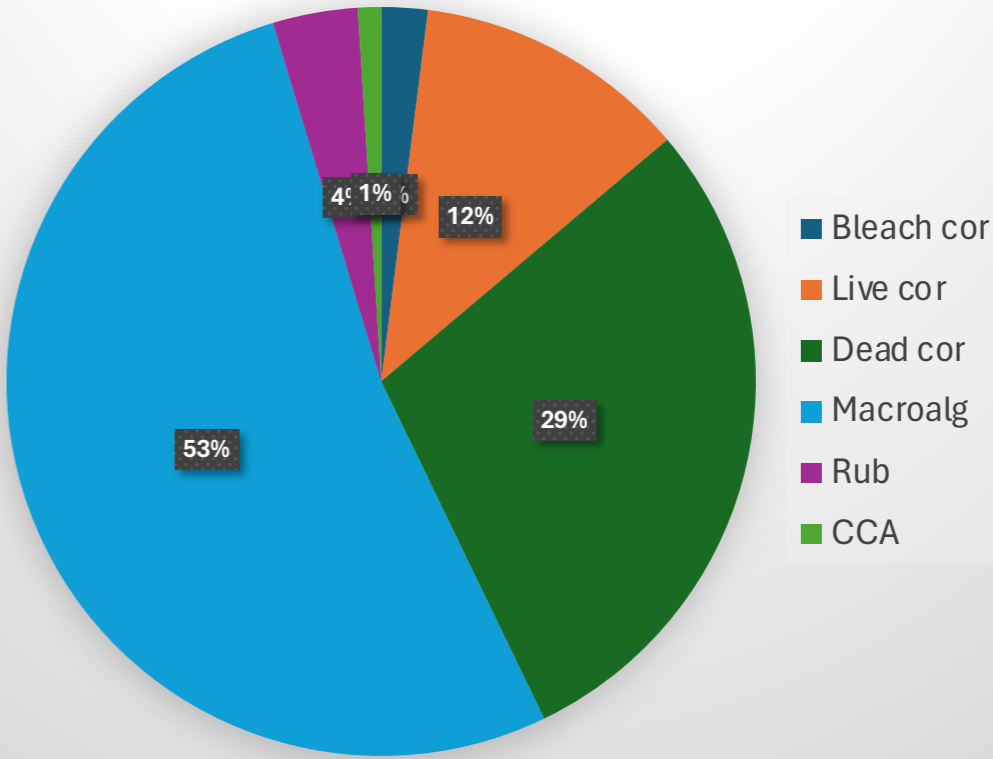
Mean - Group 3 (T2 /T3)



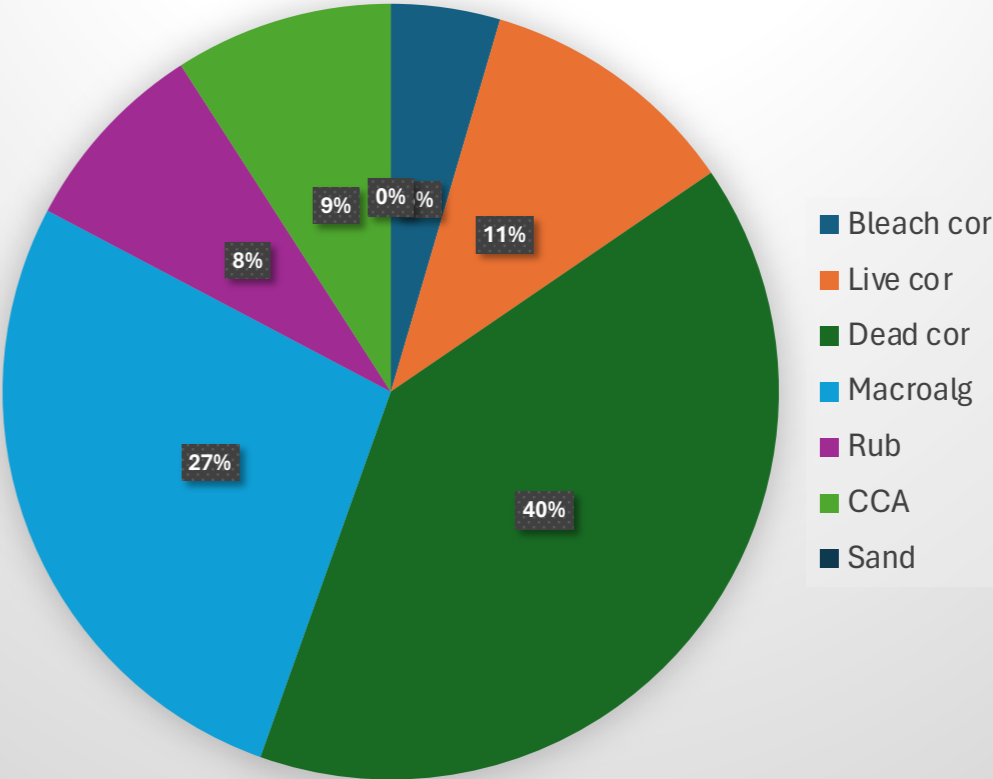
Mean - Group 2



Mean - Group 5



T1 - Group 1



That's all folks !