

Temporal changes in polychaete assemblages on soft-bottoms of the Bay of Biscay

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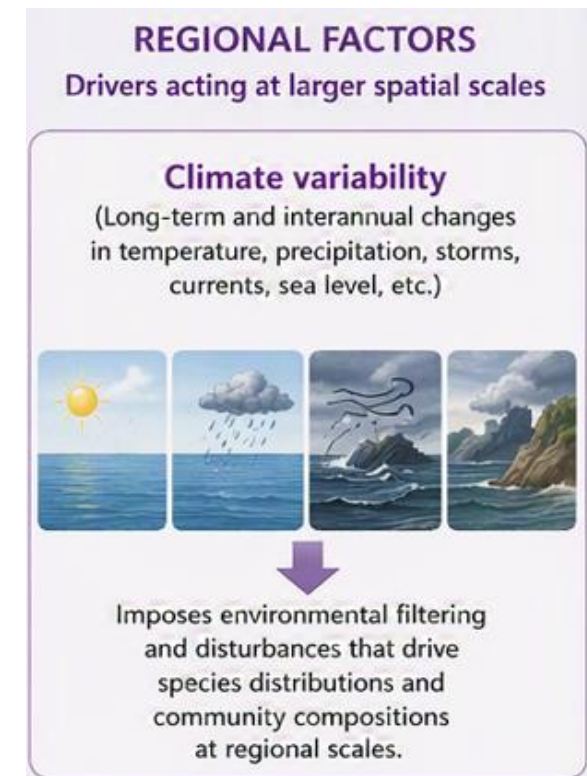
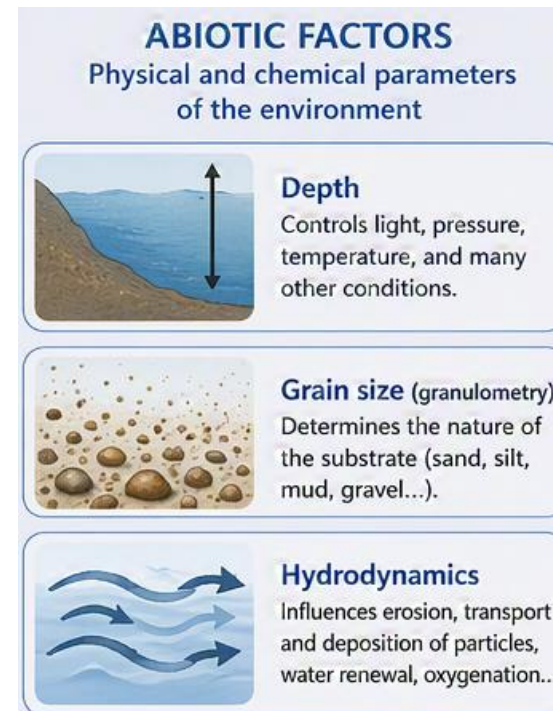
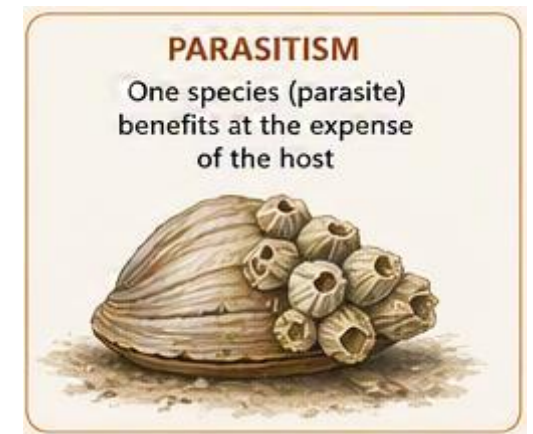
Community structure

- Natural

- Biotic: interaction between individuals (e.g. predator-prey relationship or competition)
- Abiotic: physic-chemistry of environment (e.g. sediment grain size, hydrodynamics or organic content).
- At large scale: climate variability serving as proxy of hydrosedimentary forces for instance

- Anthropic pressure

- Organic enrichment
- Trawling
- Offshore wind farm development



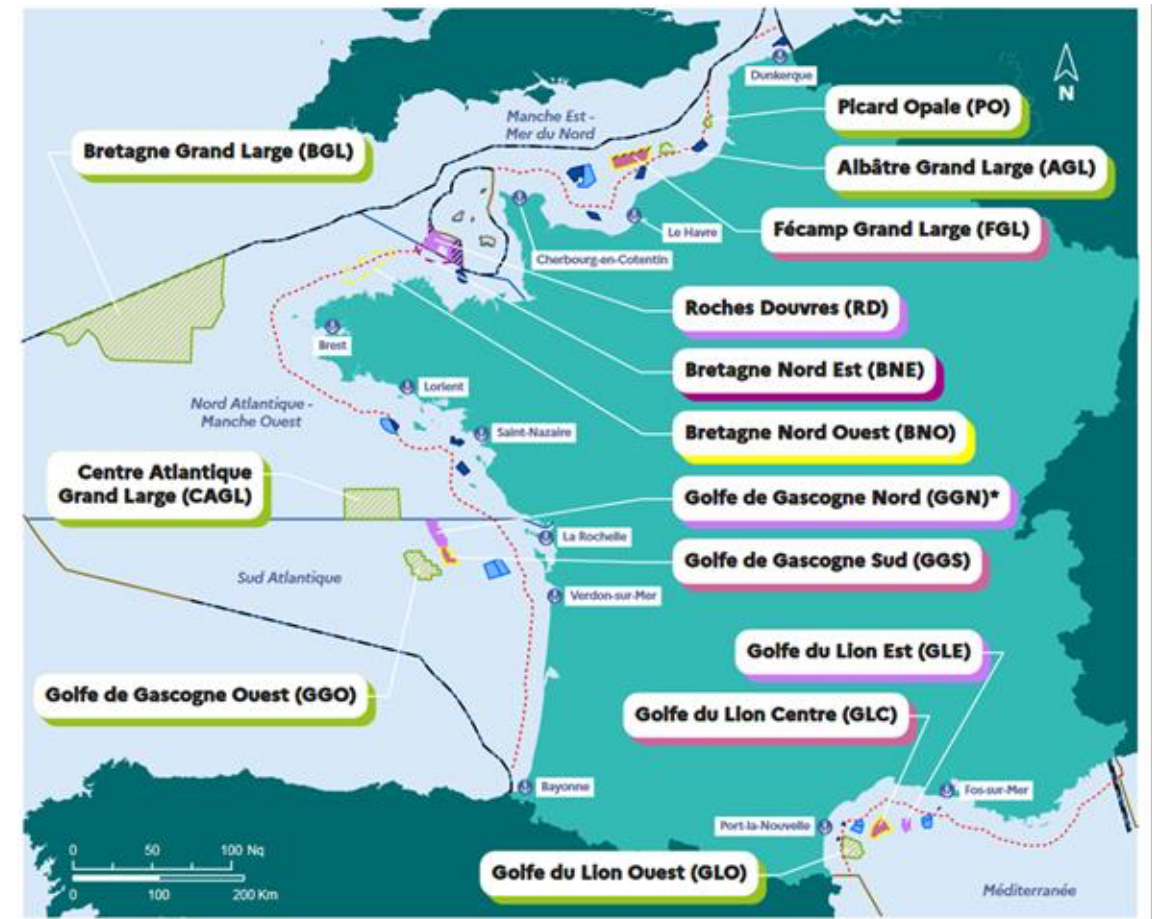
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Parcs éoliens en mer en service ou en développement

- Zones déjà attribuées
- Zones en cours d'appels d'offres
- Principaux ports

Développement de l'éolien en mer à l'horizon 10 ans

- Zones prioritaires retenues pour la procédure de mise en concurrence - AO10
- Zone indicative de poursuite de la concertation, retenue pour la procédure de mise en concurrence - AO10
- /// Zones nécessitant des études complémentaires
- Autres zones prioritaires pour le développement de l'éolien en mer à l'horizon 10 ans
- - - Autre zone indicative de poursuite de la concertation, qui pourra intégrer des zones complémentaires limitrophes

Développement de l'éolien en mer à l'horizon 2050

- Zones prioritaires pour le développement de l'éolien en mer à l'horizon 2050 (ces zones pourront être précisées et revues ultérieurement lors de la révision de la cartographie, à l'issue de nouvelles concertations et au regard de l'évolution des enjeux et des technologies)

Délimitations maritimes

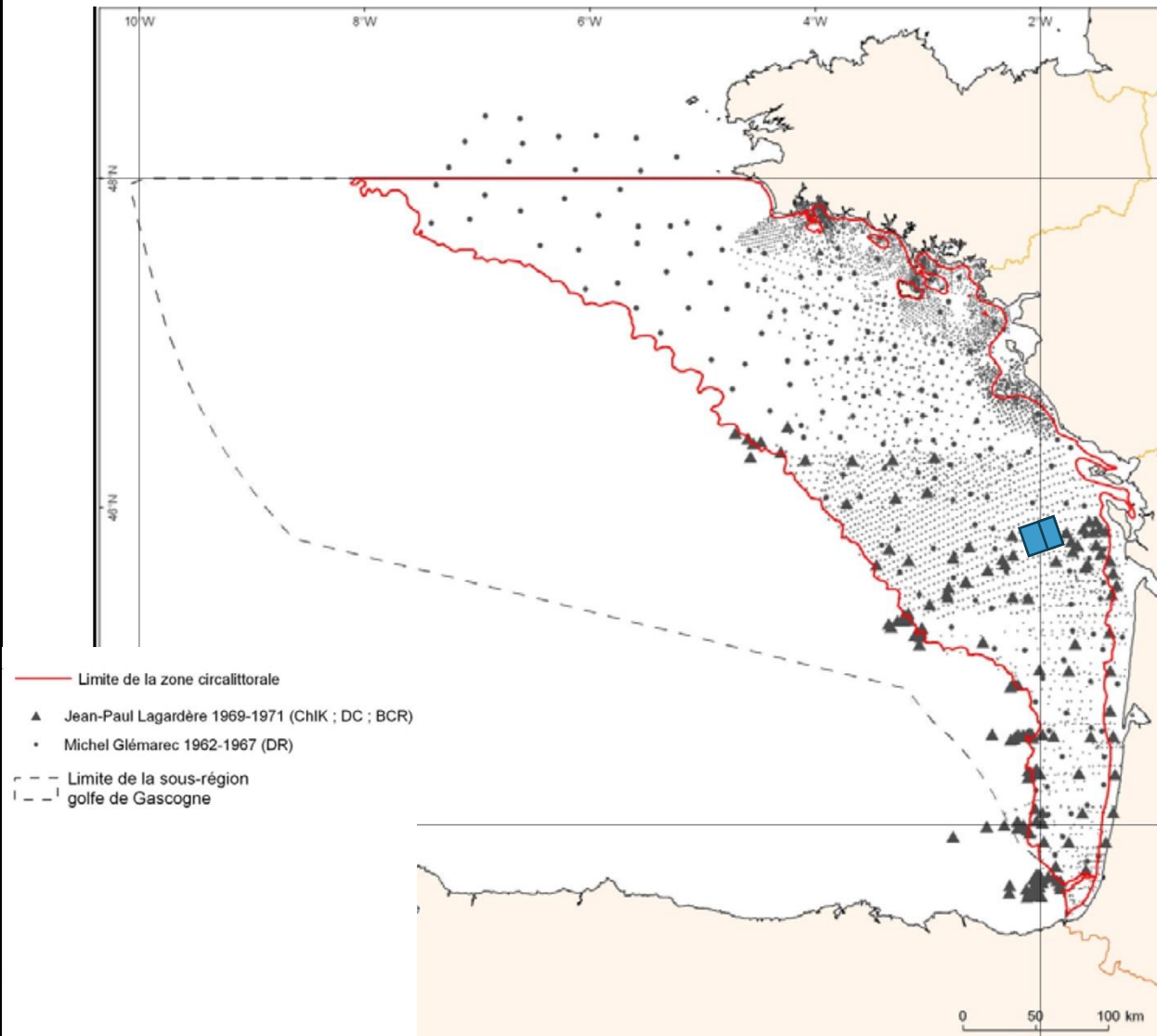
- Limite extérieure de la mer territoriale (12 Nq)
- - - Délimitation maritime avec accord entre États
- Limites des eaux sous souveraineté ou juridiction revendiquée par la France sans avoir fait l'objet d'un accord de délimitation avec un autre État

* Cette zone fera l'objet de concertations spécifiques complémentaires de façon à réduire son périmètre de moitié

Sources : RTE, IGN, SHOM, EMODnet, Gouvernement
Projection : WGS84 pseudo Mercator (EPSG : 3857)
Réalisation : Cerema Normandie - Centre, Dicom MTEECPR, Octobre 2024

Benthic macrofauna in the Bay of Biscay

- Benthic macrofauna studies started in 40 decade (Le Danois, 1948)
- Large studies (Glémarec, 1969a, b; Le Loc'h, 2004) most of them showing the important dominance of polychaetes



Acronymes des engins :
ChIK : Chalut IK ("high-speed diving dredge"
de J.D. ISAACS & L.W. KIDD)
DC : Drague de type Charcot
BCR : Benne C.R.E.O.
DR : Drague Rallier du Baty

Projection Mercator (46°N)

Sources des données :
SHOM, IGN, ESRI, OSPAR
Campagnes d'échantillonnage de la faune benthique par
Michel Glémarec et Jean-Paul Lagardère

Main questions

- How the polychaete assemblages change over time?
- What factors are driving changes in composition and diversity patterns?

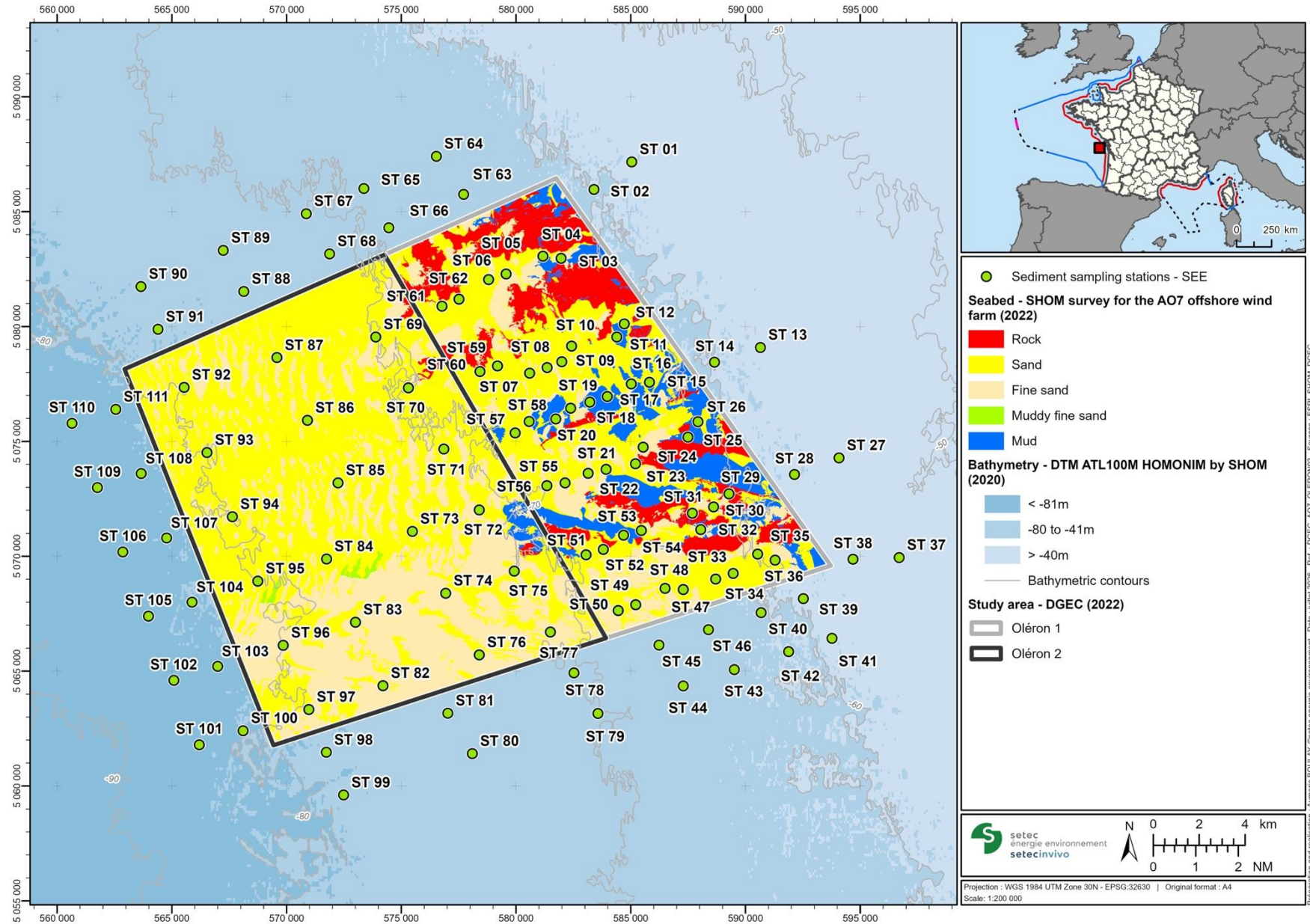
Methods

- Sampling

- 111 stations between 60 and 80 m depth
- Four sampling times (2 in autumn 2023-2024; 2 in spring 2024-2025)
- Day grab (0.1 m²) : 5 replicates for fauna analysis (sieved on 1 mm mesh-size) and 1 for granulometry analysis
- Morphology based

- Data analyses

- Abundance, species richness, evenness, diversity (Chao1; Chao 1984) from pooled replicates by station
- Hierarchical clustering, nMDS (Hellinger, Bray-Curtis), IndVal

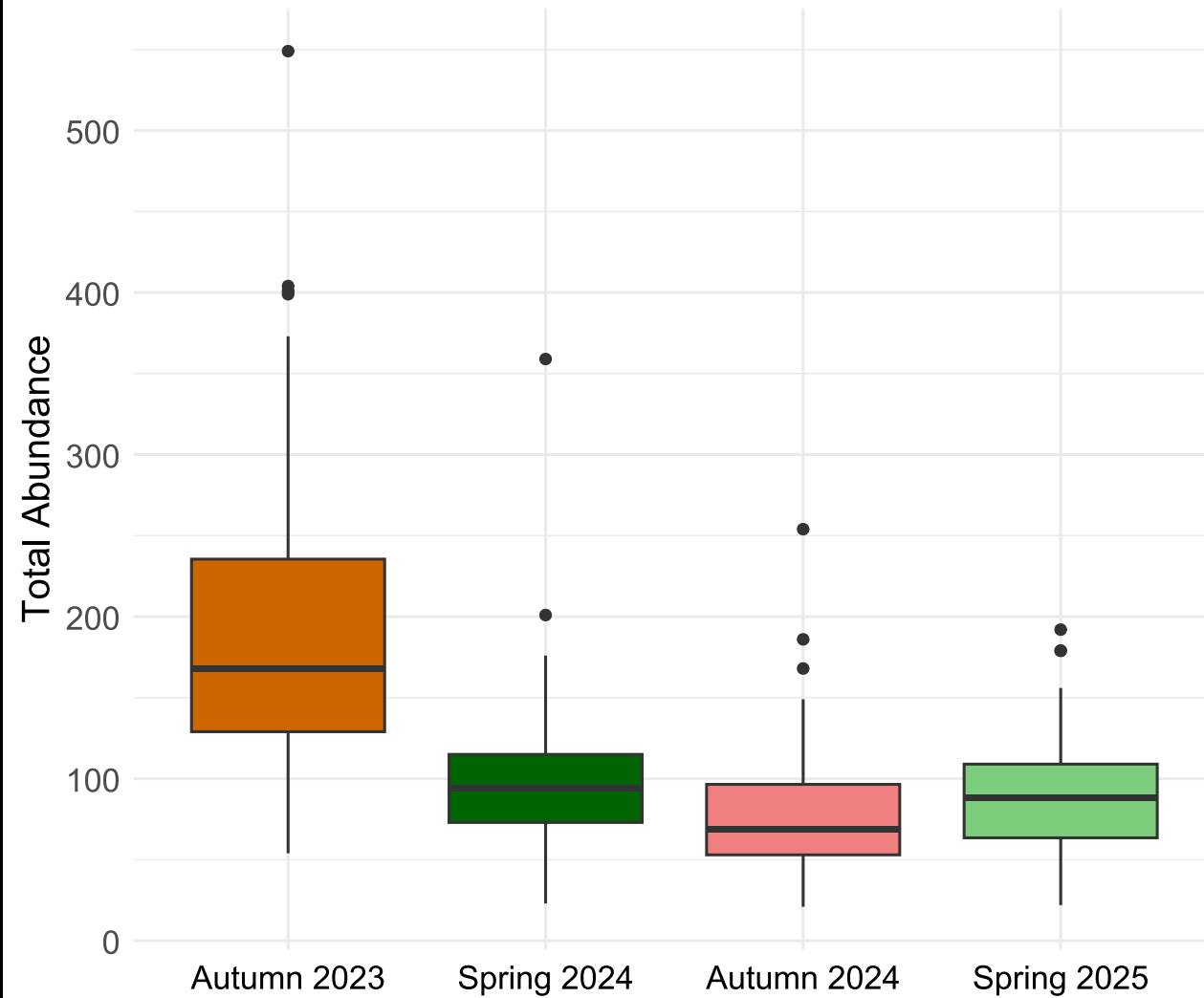


Results

-preliminary results-

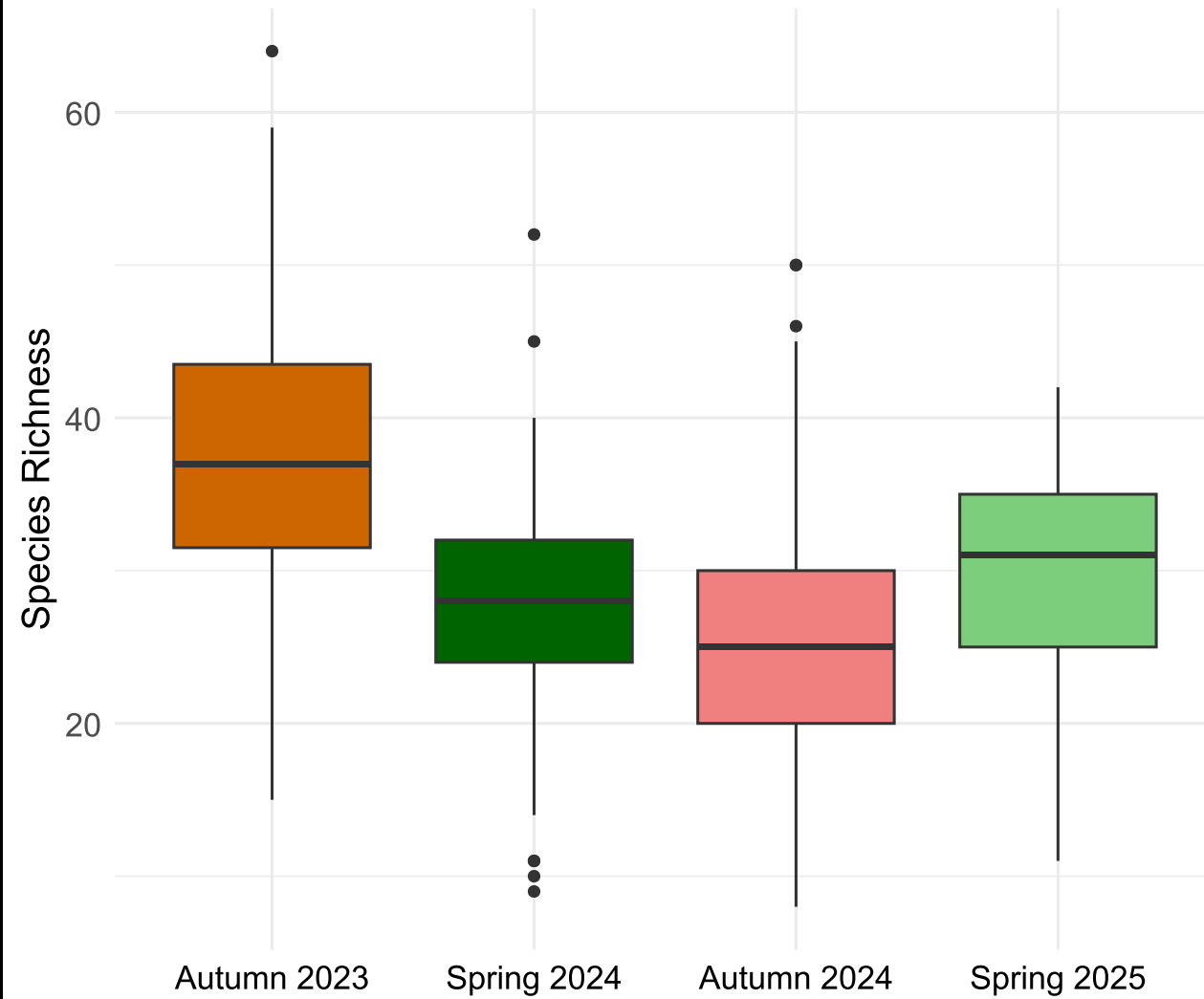
Abundance

- 50,095 individuals of worms
- Autumn 2023: 20,740
- Spring 2024: 10,902
- Autumn 2024: 8,519
- Spring 2025: 9,934



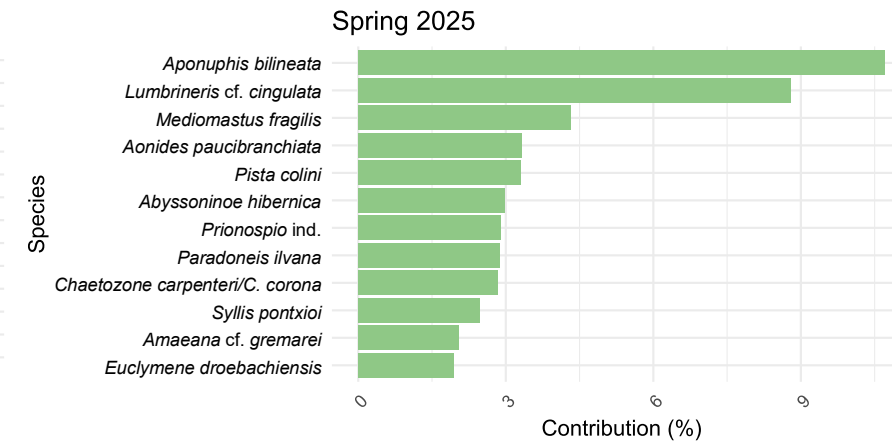
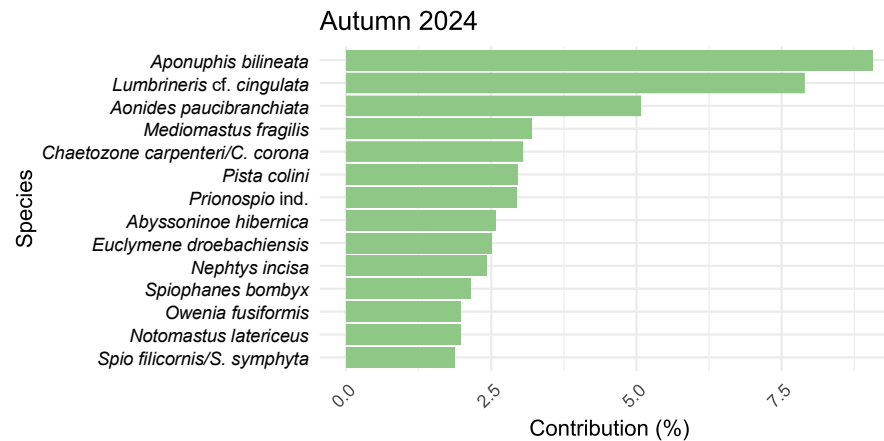
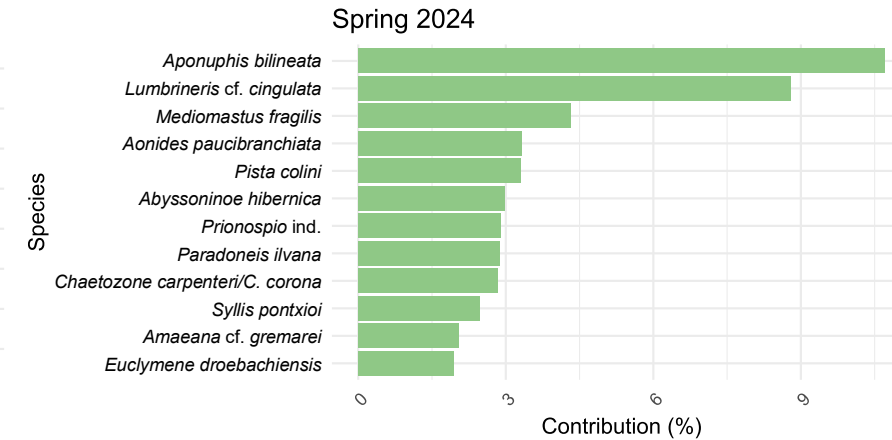
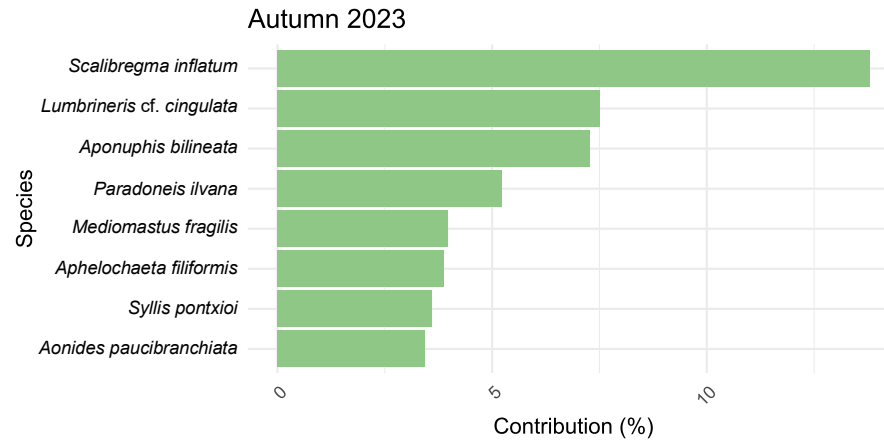
Species richness

- 184 species
- 48 families



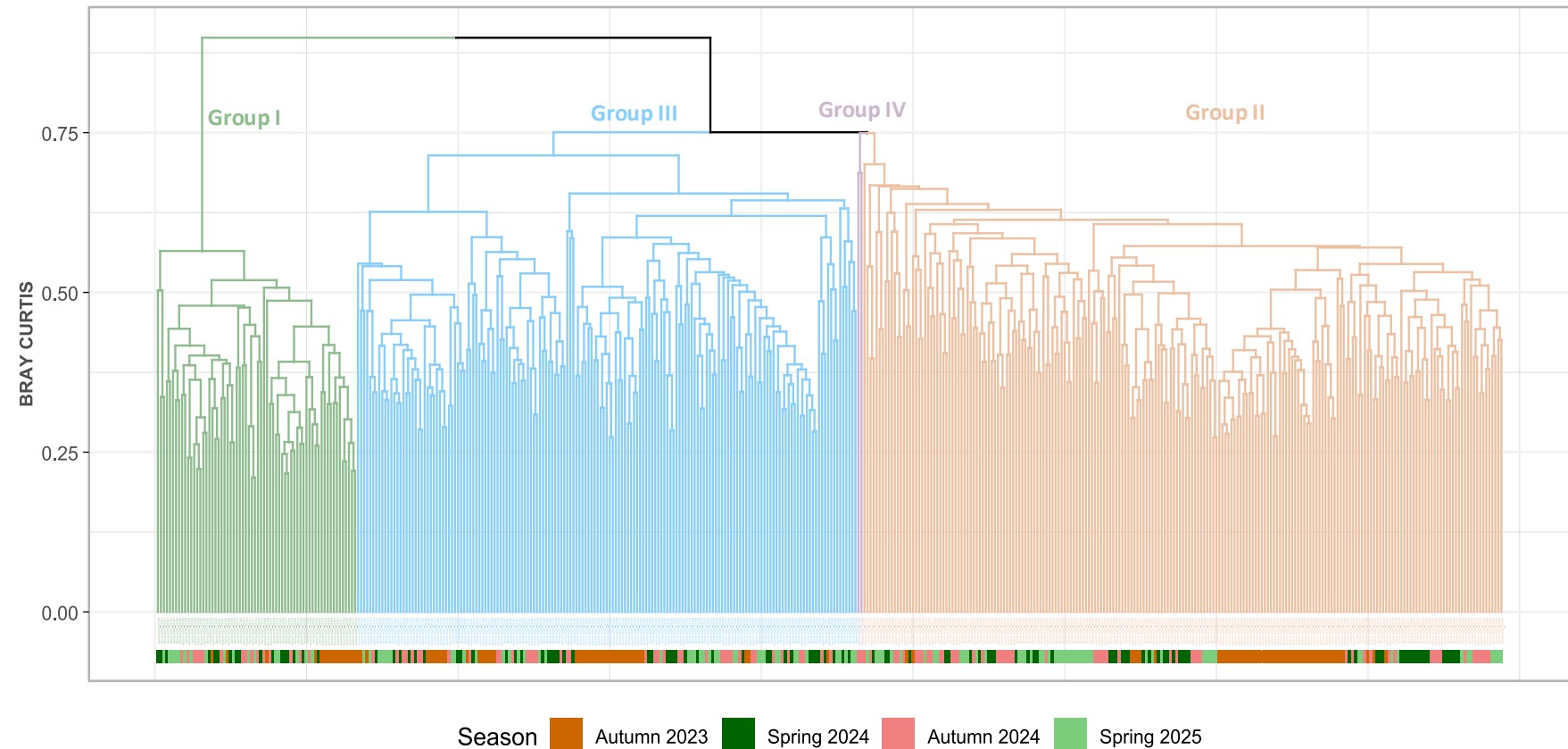
Abundance

- The total abundance was dominated by deposit feeders
- Limited number of dominant species remained relatively consistent
- Strong temporal stability in community composition



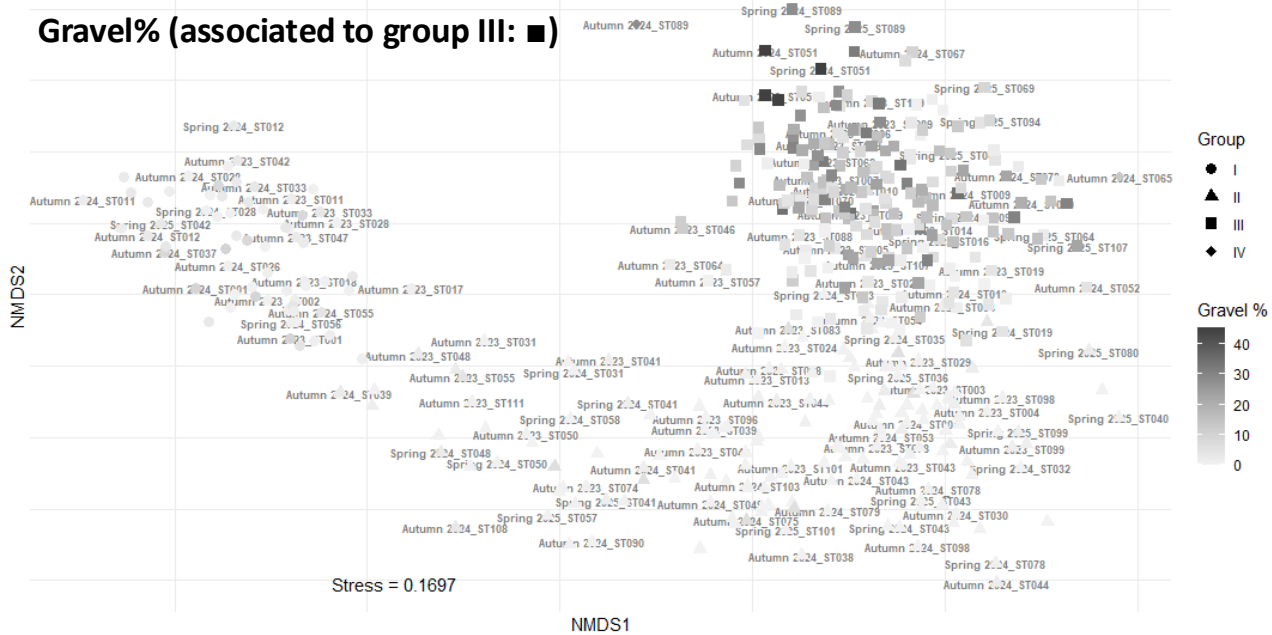
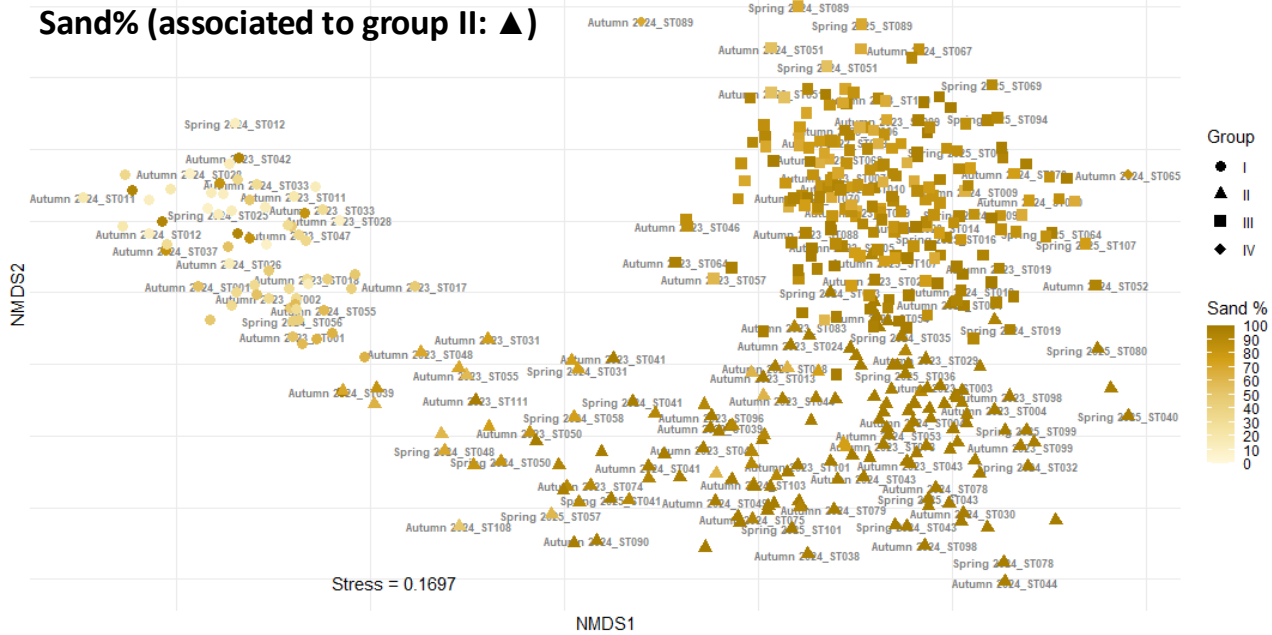
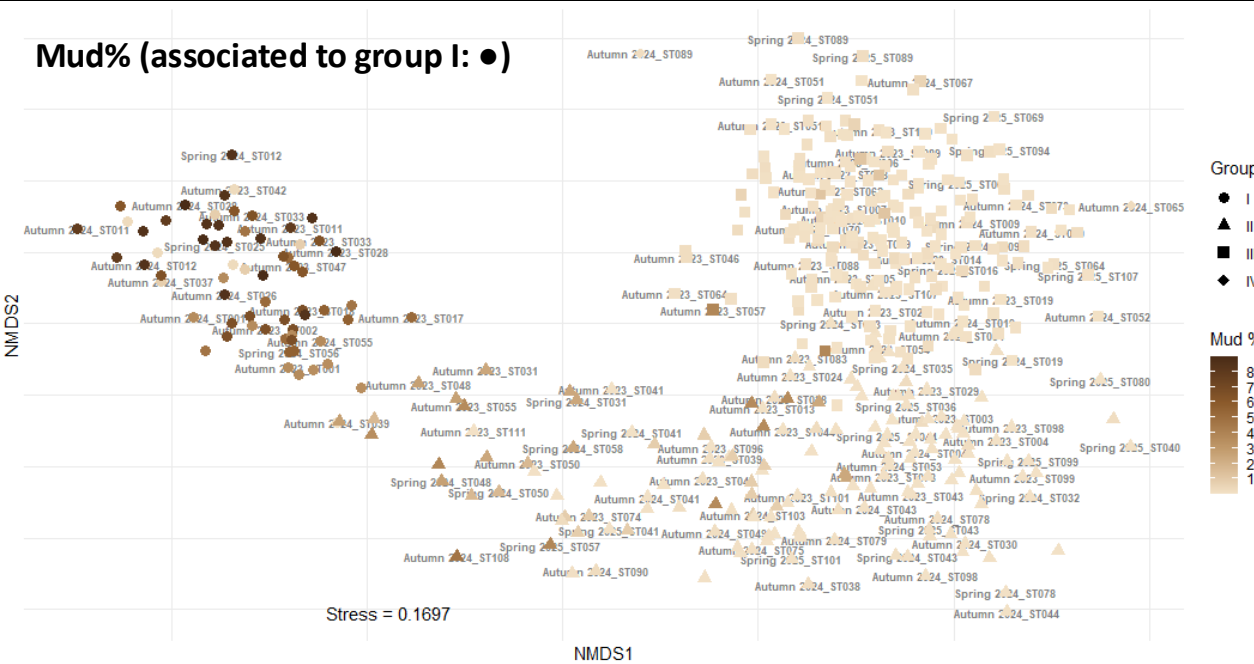
Clustering

- Group I : 66 stations
- Group II : 211 stations
- Group III : 165 stations
- Group IV : 2 stations in artificial condition, only two stations in Autumn 2024



Granulometry

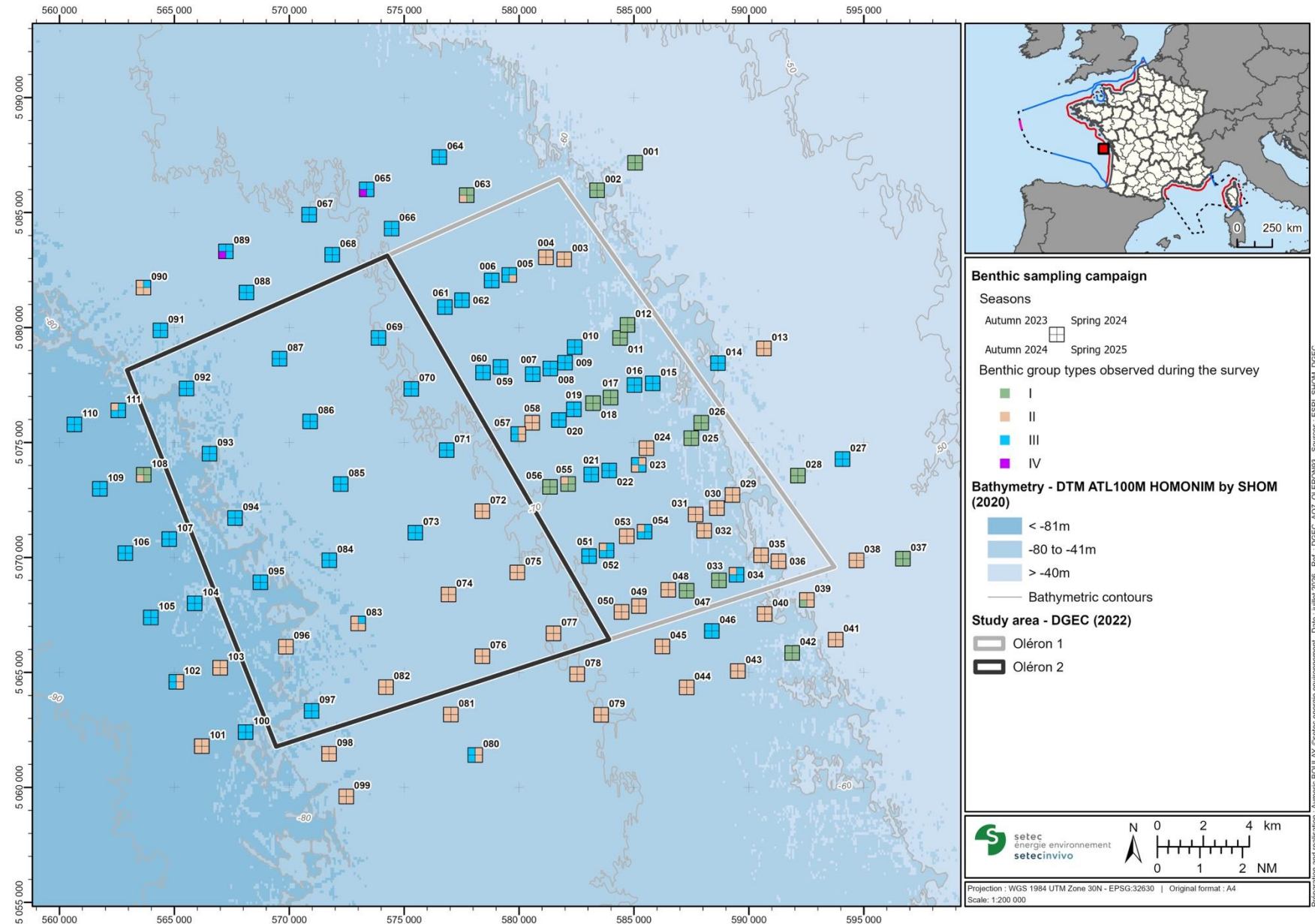
- Grain size: main driver (Petersen 1913)
- Snelgrove and Butman (1994): not grain size itself that matters biologically — it's what comes with it: organic matter content, porewater chemistry, microbial abundance, and hydrodynamics



Non-metric multidimensional scaling (NMDS) ordination of benthic community composition based on Bray–Curtis dissimilarity.

Clustering through time

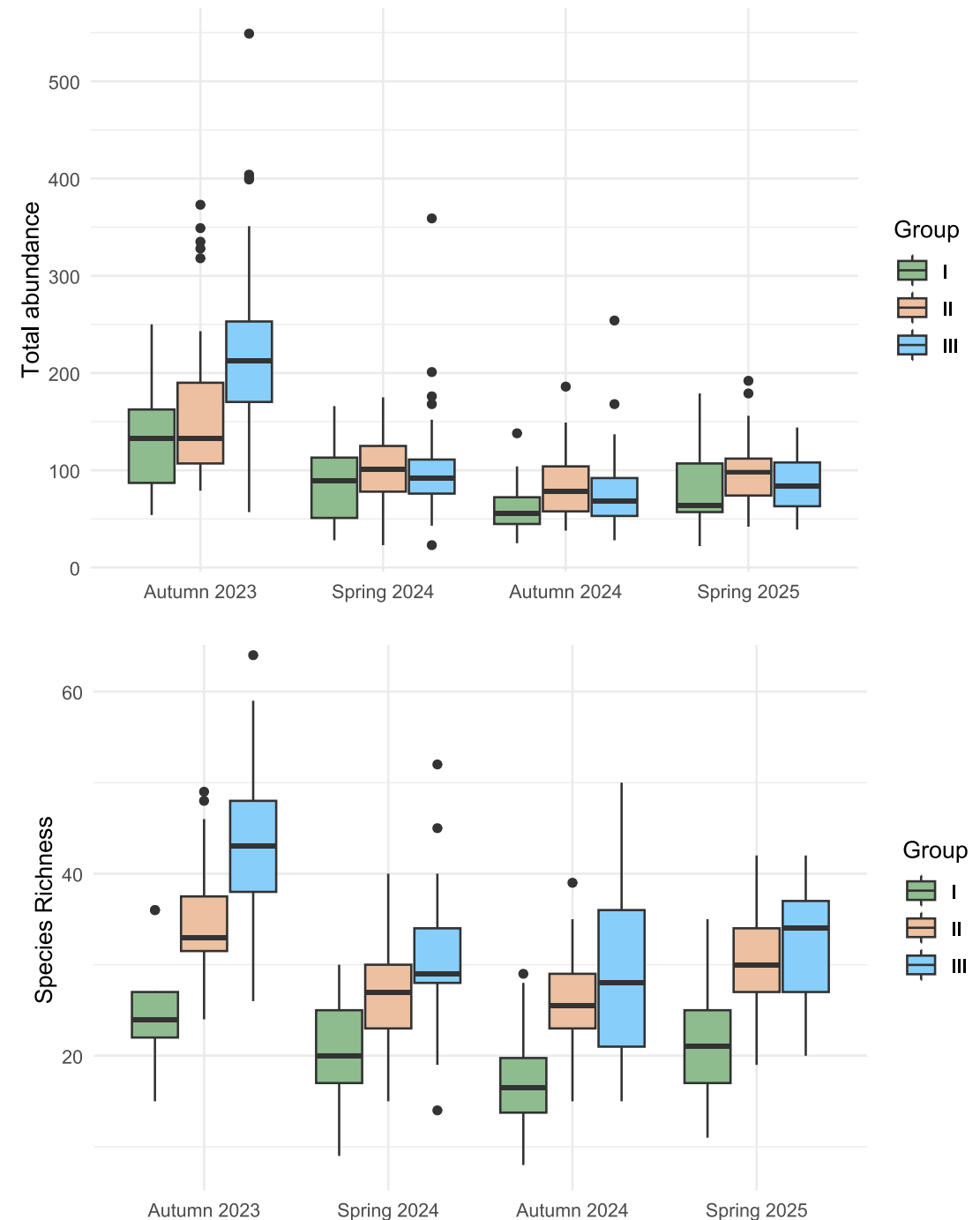
- Same groups same saison: 94/111 (85%)
- Different group in one season: 13/111 (12%)
- Different groups in two seasons: 4/111 (3%)



Temporal variation by group

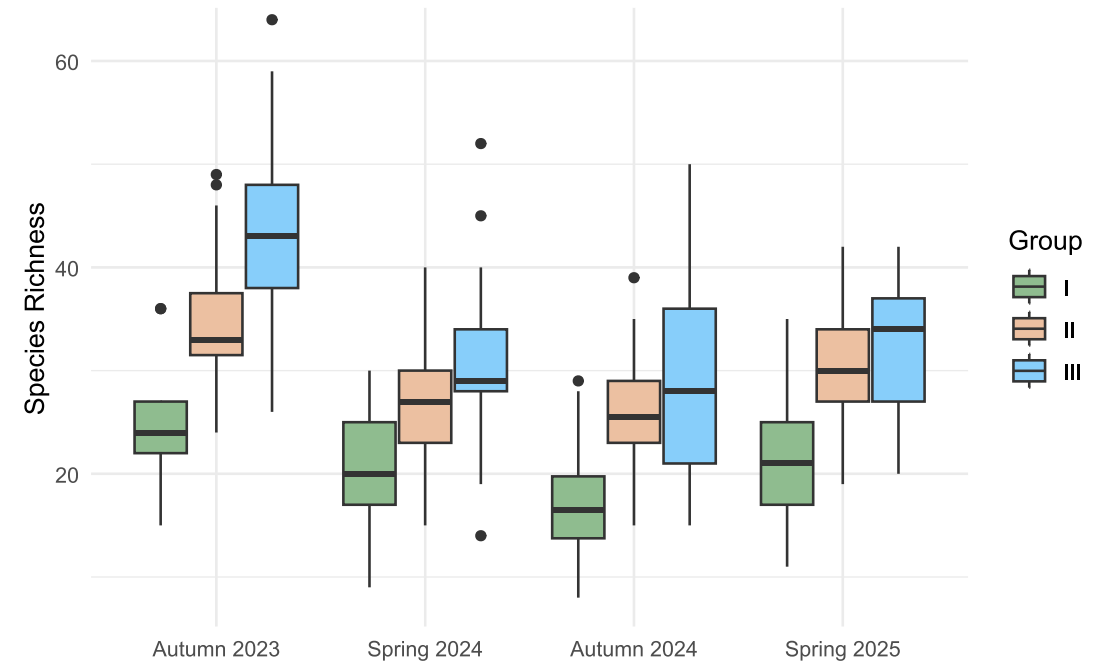
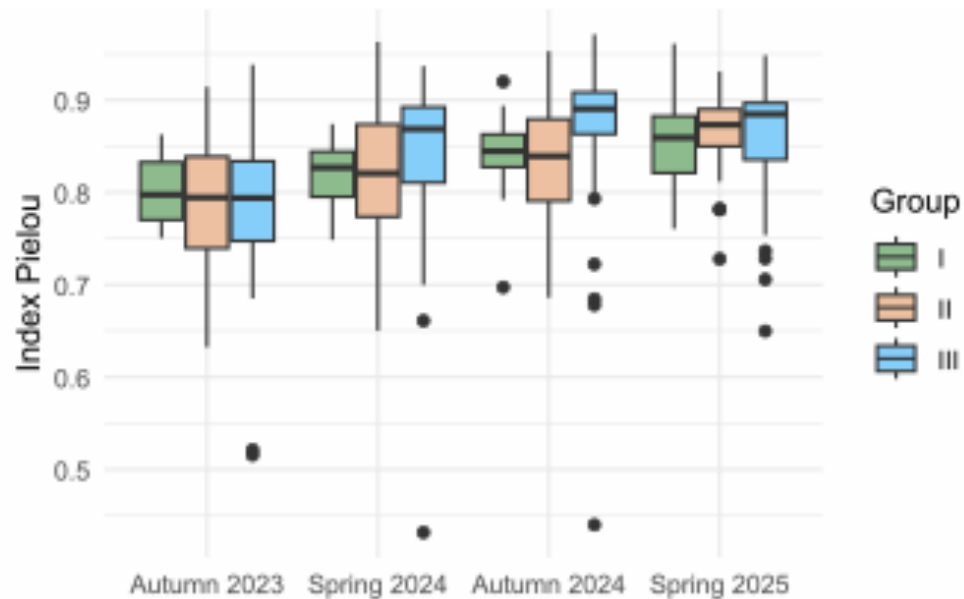
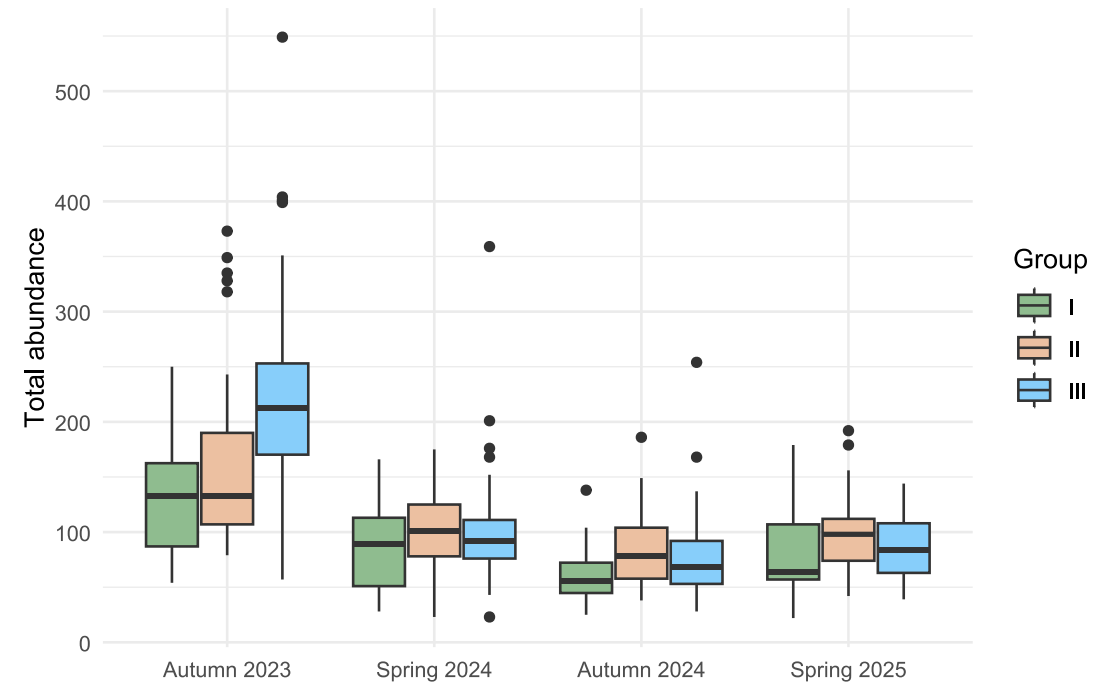
- Abundance
 - Autumn 2023 exhibited **high abundance** at all groups, particularly group III
 - Similar on following campaigns
- Species richness
 - **Autumn 2023** showed high species richness
 - Group I showed low species richness in Autumn 2024

Muddy community (group I) showing lower abundance and richness than sandy community (group II) supports Labrune et al. (2007) and Sardá et al. (2014)



Temporal variation by group

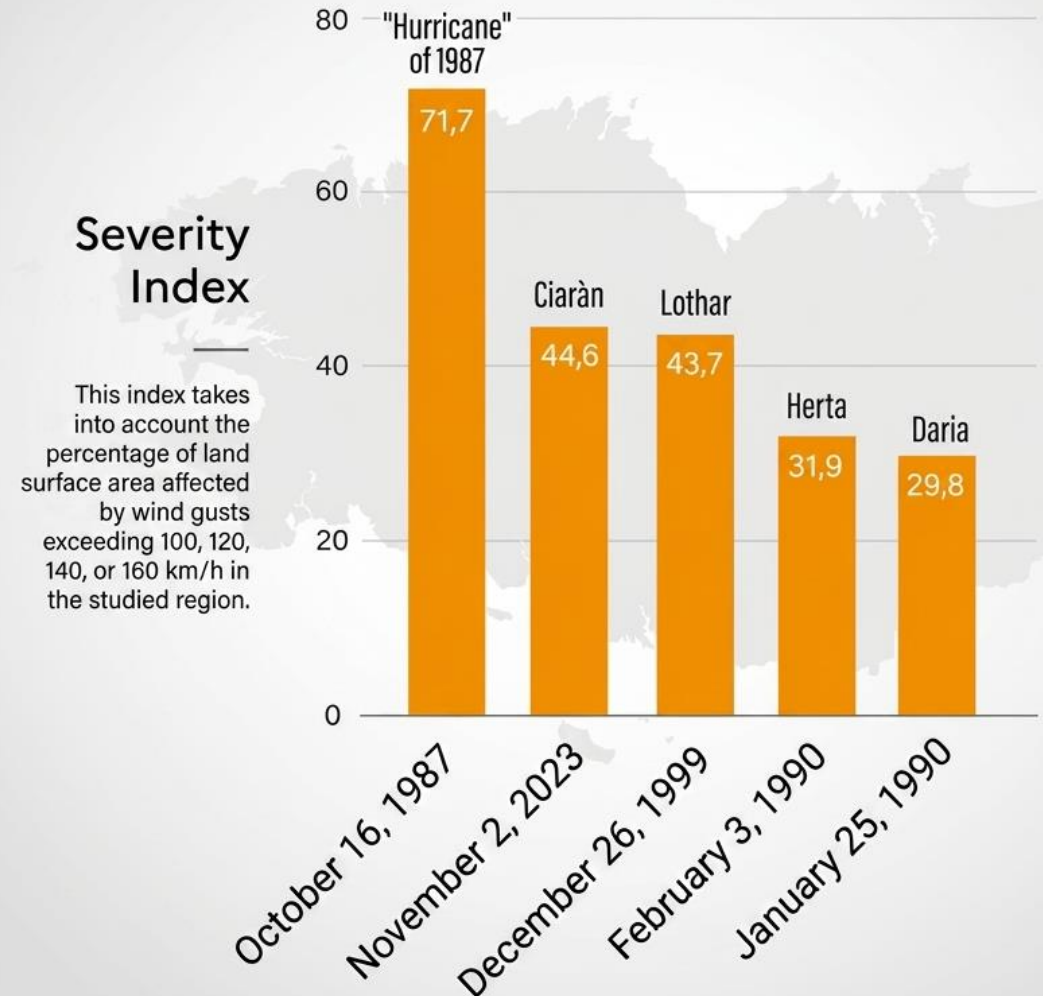
- Evenness (Pielou)
 - Autumn 2023 exhibited low values at all groups
 - Similar on following campaigns



Some clues

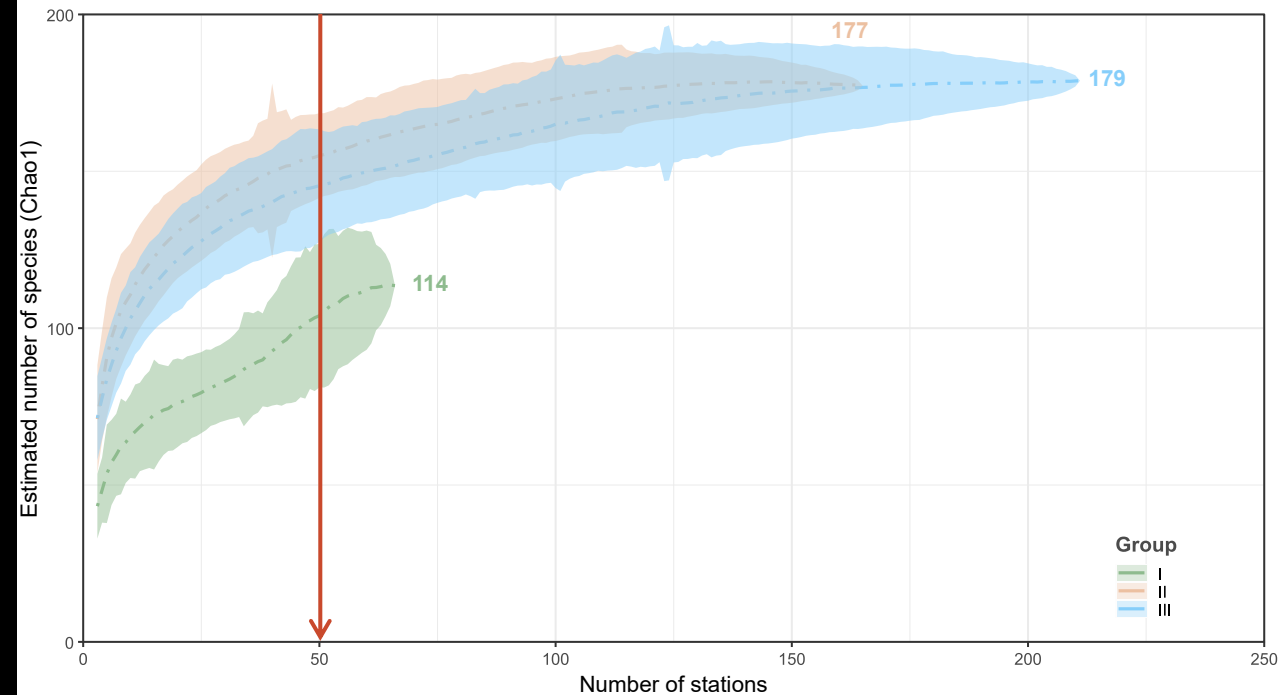
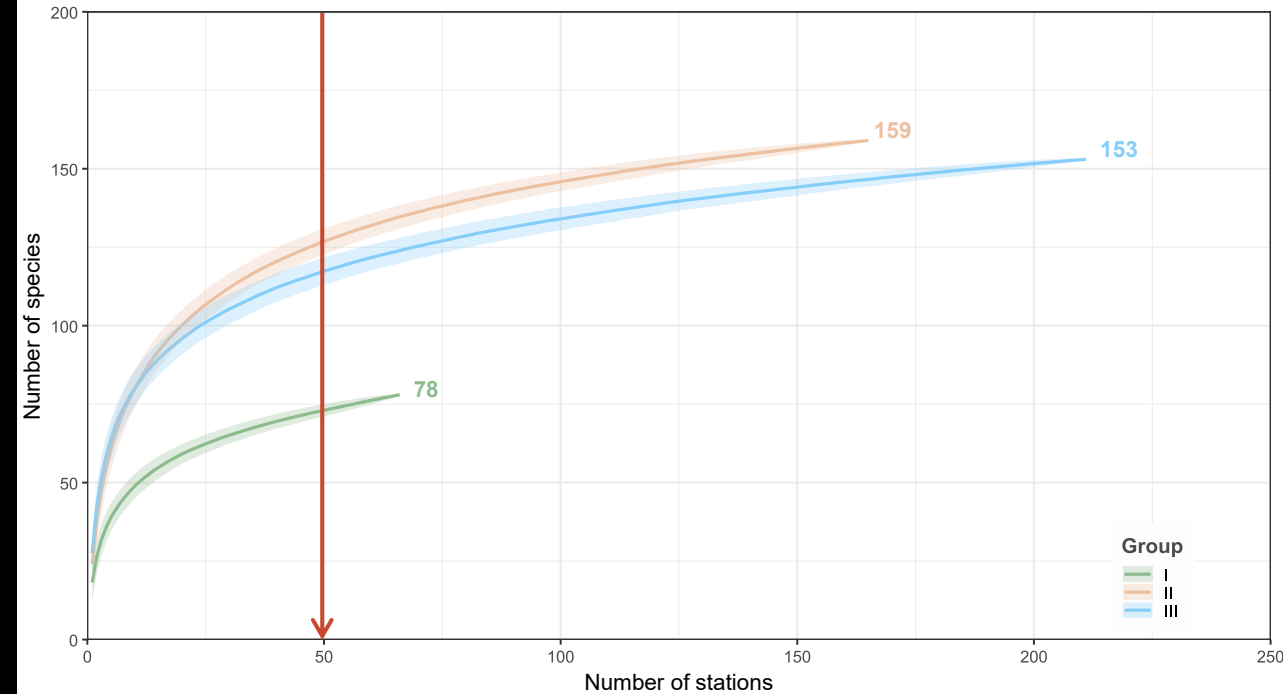
- *Scalibregma inflatum*
 - It **dropped dramatically** in Group III, from 42.9 ind./0.5m² in average in Autumn 2023 to 0.8 ind./0.5m² in average in Spring 2024
- Ciarán et Domingos storms
 - They hit Brittany about a month after our Autumn 2023 sampling
 - Ciaran was the **second most severe** storm to hit Brittany in recent decades

THE FIVE MOST SEVERE STORMS THAT HAVE HIT BRITTANY



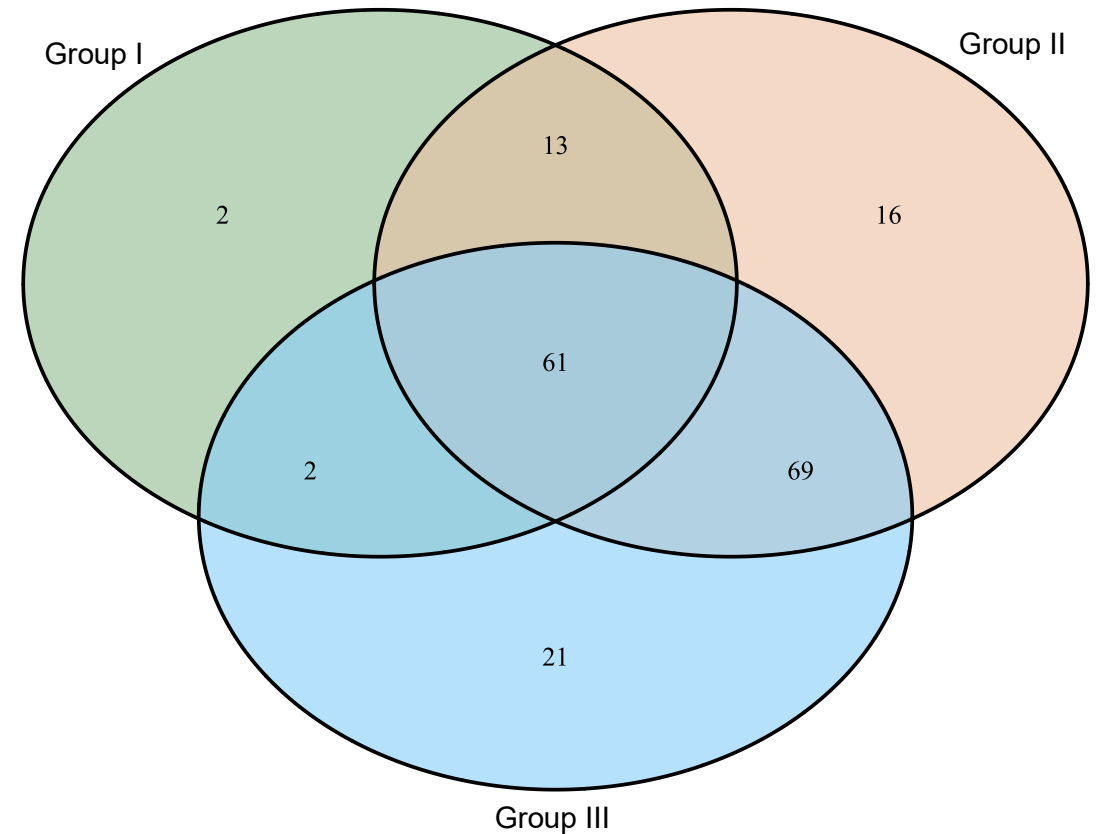
Diversity patterns

- Diversity by group based on number of stations suggests **higher sampling effort** could increase the number of species
- Up to **179** estimated species for group III with 68 to **89** % of estimated pool
- Group 2 and 3 similar, **more diverse** than group 1 at same sampling effort



Species distribution

- 184 species:
 - Low rate of **rare species** (recorded only for one group): 21.2% of total
 - High rate of **common species**
 - 45.7% of species recorded to 2 assemblages
 - 33.1% of species recorded to all 3 groups



Indicator species by group

- Group I presents **higher** values of IndVal in comparison to groups II and III

I	II	III
<i>Nephtys incisa</i> IndVal = 0.94 pvalue = 0.001 pvalue-adj = 0.015	<i>Spiophanes bombyx</i> IndVal = 0.7 pvalue = 0.001 pvalue-adj = 0.015	<i>Caulleriella alata</i> IndVal = 0.78 pvalue = 0.001 pvalue-adj = 0.015
<i>Abyssoninoe hibernica</i> IndVal = 0.94 pvalue = 0.001 pvalue-adj = 0.015	<i>Aonides paucibranchiata</i> IndVal = 0.58 pvalue = 0.001 pvalue-adj = 0.015	<i>Syllis pontxioi</i> IndVal = 0.77 pvalue = 0.001 pvalue-adj = 0.015
<i>Sternaspis scutata</i> IndVal = 0.91 pvalue = 0.001 pvalue-adj = 0.015		<i>Chaetozone carpenteri/ C. corona</i> IndVal = 0.69 pvalue = 0.001 pvalue-adj = 0.015
<i>Ninoe armoricana</i> IndVal = 0.87 pvalue = 0.001 pvalue-adj = 0.015		<i>Aponuphis bilineata</i> IndVal = 0.53 pvalue = 0.001 pvalue-adj = 0.015

Take home messages

- **Polychaete abundance and species richness** **changed** over time.
- **Community composition** remained **remarkably stable**.
- **Sediment granulometry** appears to be the **principal structuring factor** for these assemblages.

Next steps

- Small dataset including more abiotic data (biogeochemical variables)
- Regional factors to investigate (climate variability and bottom trawling)

Absence of exciting results: **best scenario to evaluate future impact of offshore wind farm!**

References

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Thank you and all involved people!

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