

Environmental factors controlling microbial colonization of plastics in the North Sea

Emna Zeghal¹, Annika Vaksmaa¹, Judith van Bleijswijk¹ and Helge Niemann^{1,2}

¹ Royal Netherlands Institute for Sea Research (NIOZ) , Department of Marine Microbiology and Biogeochemistry, The Netherlands

² Faculty of Geosciences, Utrecht University, The Netherlands

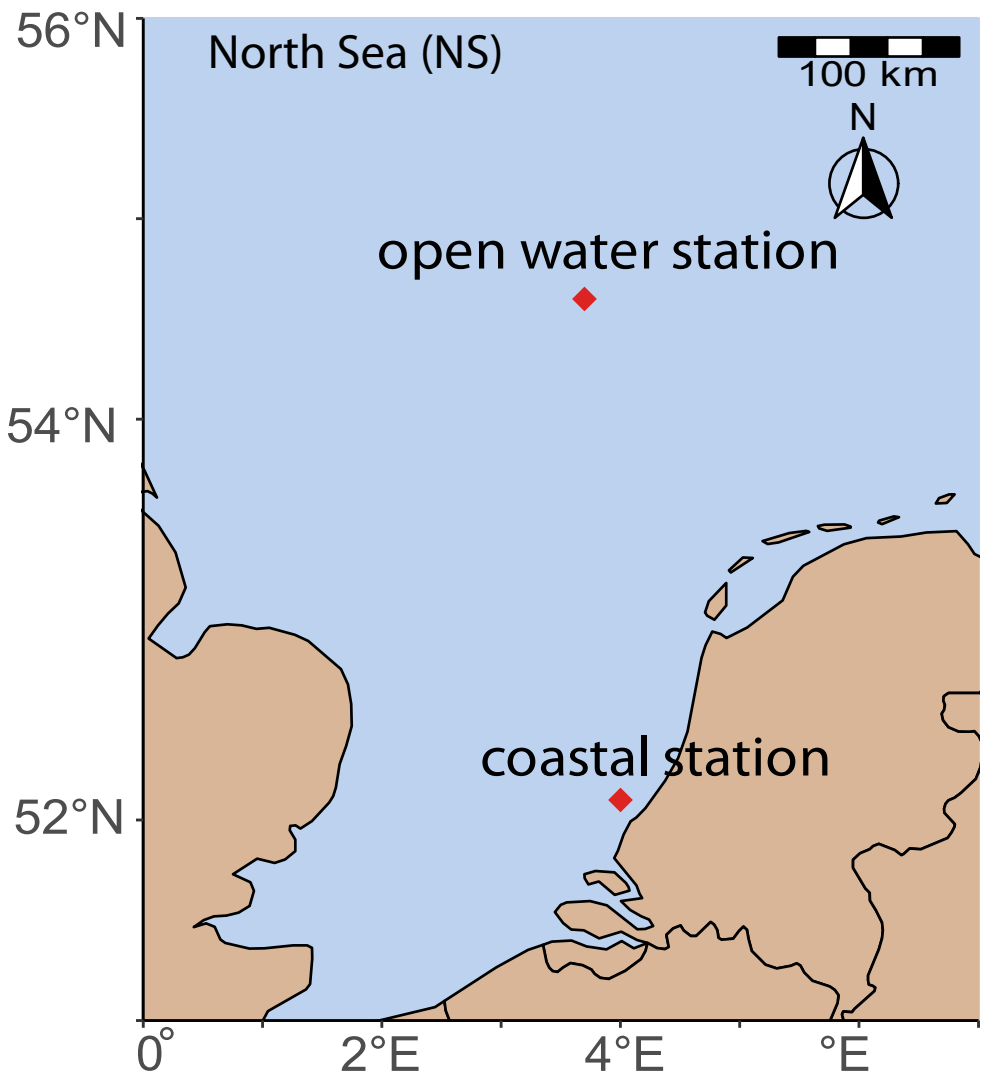
Background

Several million tons of plastic enter the ocean each year.

The interactions between marine plastic debris and environmental microorganisms is not well constrained.

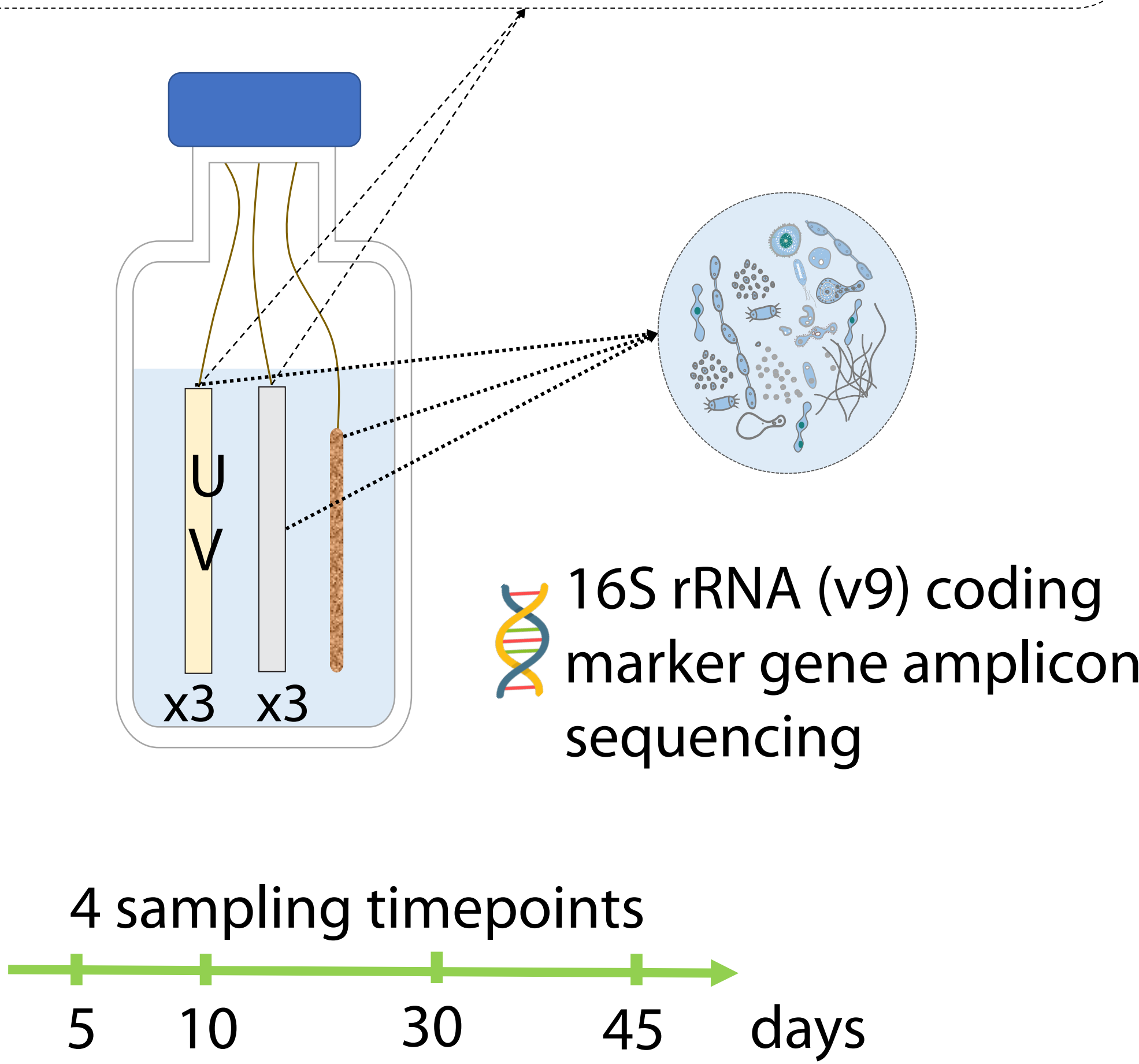
Methods

Water sampling sites for ex-situ incubations



4 plastic polymers: PE, PS, PET and Nylon-6

UV weathering ~ 125 days of UV irradiance at the sea surface in temperate regions



Conclusions

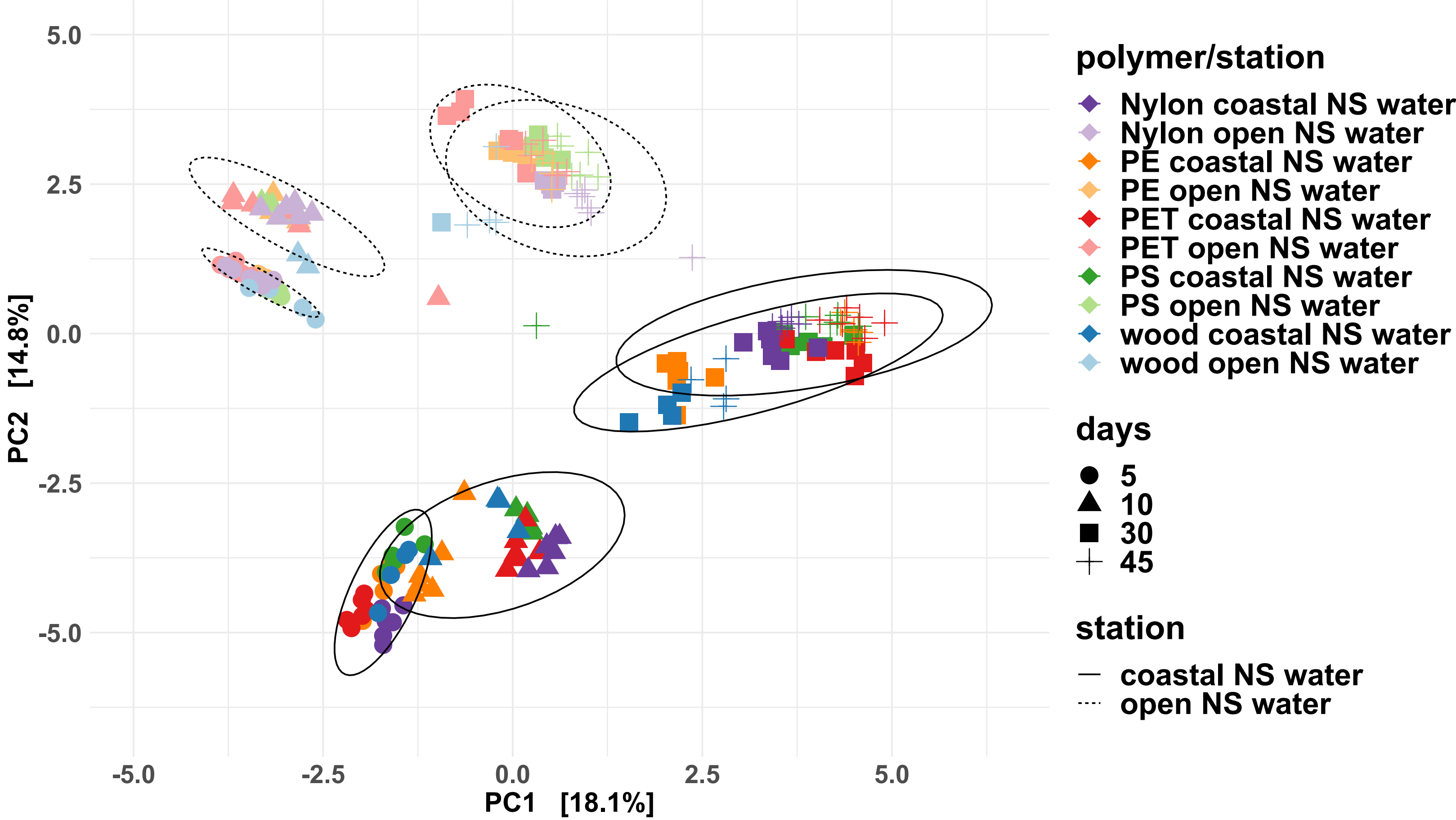
- **Location, time** and **polymer type** influence microbes' attachment on plastics in marine environments unlike UV weathering
- Genera encompassing **hydrocarbon degrading and/or plastic degrading** strains were detected

References :

¹ Gambarini, V., Pantos, O., Kingsbury, J. M., Weaver, L., Handley, K. M., and Lear, G. (2022). PlasticDB: a database of microorganisms and proteins linked to plastic biodegradation. *Database* 2022, baac008. doi: [10.1093/database/baac008](https://doi.org/10.1093/database/baac008).

Results

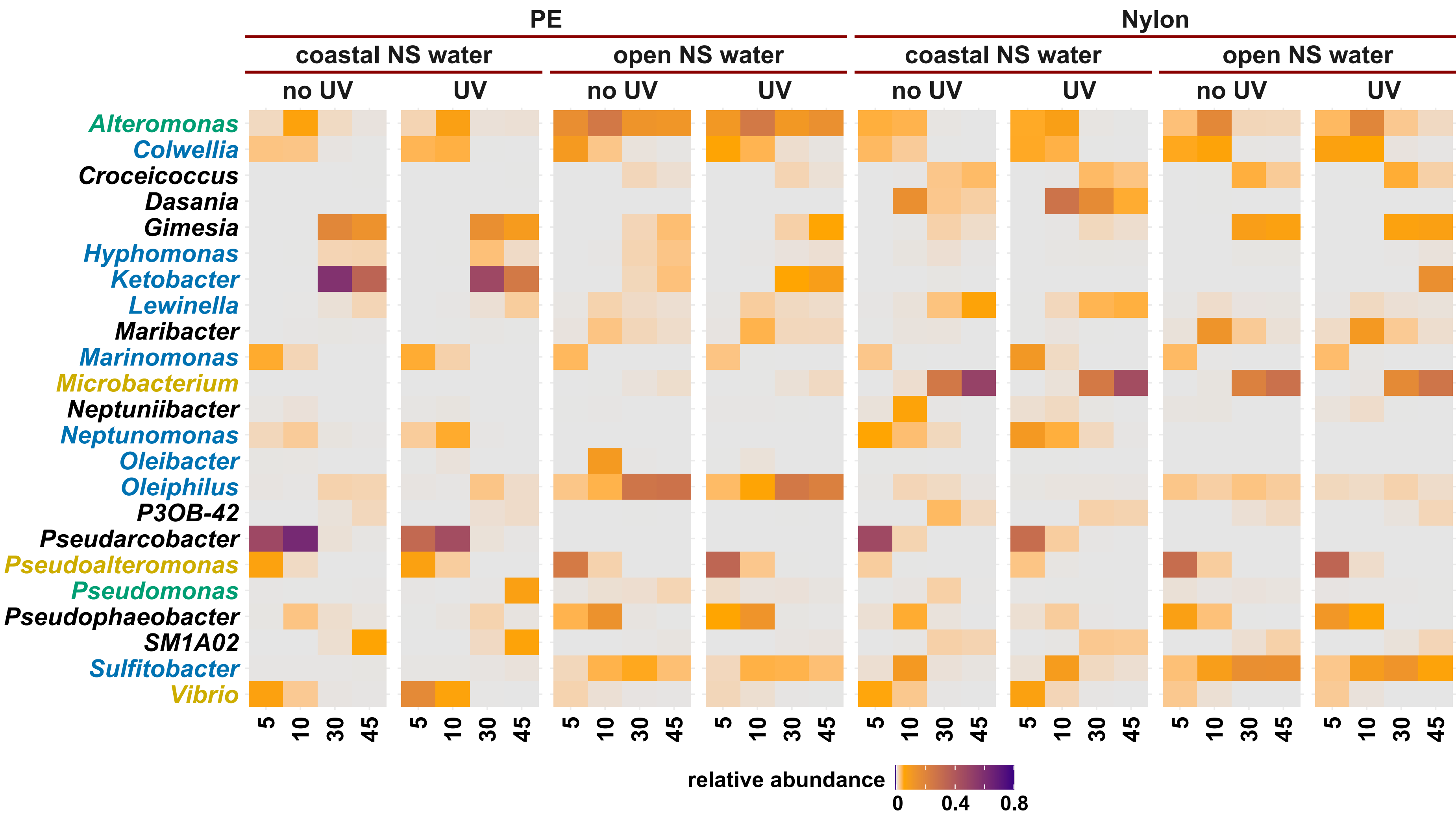
DIFFERENTIATION ACCORDING TO LOCATION AND TIME
PCA - CLR transformed data - Aitchison distance



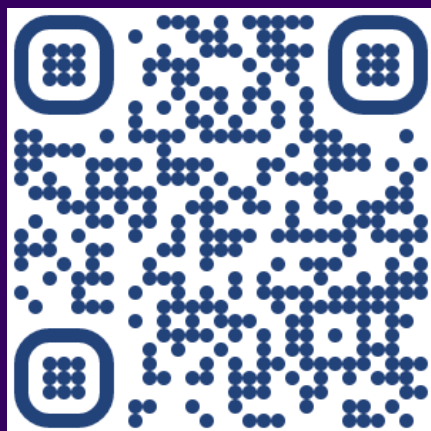
ANOSIM results summary

Variable	R	Significance
Time	0.43	0.001*
Location	0.55	0.001*
Polymer	0.08	0.001*
UV weathering	-0.002	0.548

MOST ABUNDANT GENERA DETECTED THROUGH TIME AND POTENTIAL METABOLIC INTEREST
Genera reported in plastic DB¹ (yellow), genera in curated hydrocarbon degraders database (blue), genera reported in both (green)



emna.zeghal@nioz.nl
@EZeghal
0000-0002-4542-7222



Scan me :)



European Research Council
Established by the European Commission



Royal Netherlands Institute
for Sea Research