MONITOOL

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION

MAIN RESULTS

More info: monitoolproject.eu

BACKGROUND

Passive sampling devices (PSDs), such as DGT (Diffusive Gradients in Thin films), have many advantages compared to conventional monitoring methods. In particular, the labile concentrations determined by PSDs are recognised as a better proxy to the potential bioavailable fraction than total/dissolved concentrations measured by conventional analytical techniques, providing a better scientific basis for risk assessment.

Canary Islands

Sardegna

OBJECTIVE

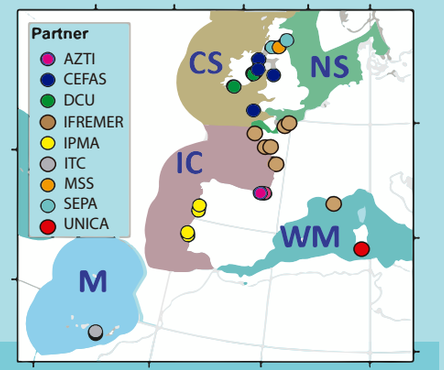
MONITOOL Project aims to provide a robust database of dissolved and labile metal concentrations in transitional and coastal waters for adapting the existing water Environmental Quality Standards (EQS) for passive sampling devices (EQS-DGT) in order to improve and facilitate the chemical status assessment of waters under the WFD (Water Framework Directive).

DCU · Cefas · Ifremer · AZTI · TÉCNICO LISBOA · IPMA · itc

Mediterranean Partner

MONITOOL (July 2017- June 2021), with a total cost of €1,94 million, was co-funded (85%) by Interreg Atlantic Area Transnational Cooperation Programme 2014-2020 (EAPA_565/2016).

Field campaigns and analysis



M: Macaronesia; WM: Western Mediterranean; IC: Bay of Biscay/Iberian Coast; CS: Celtic Sea; NS: Greater North Sea/English Channel

- Common protocols were produced and followed to ensure the comparability and reproducibility of data among Partners´ regardless of the region.
- Over 500 water samples collected and analysed by ICP-MS and voltammetry.
- Approx. 250 DGT deployed, retrieved and analysed by ICP-MS.
- Water physico-chemical parameters recorded.

Database management and correlation studies

Based on these dataset of results, the log-log linear relationships between the dissolved/labile metal concentrations measured in DGTs and in discrete water samples have been investigated.

- The observed relationships were:

R^2:	0.80	0.73	0.62	0.56	0.56	0.44	0.41
Metal	Cd	Mn	Cu	Ni	Pb	Zn	Co
	STRONG			MEDIUM		WEAK	

- DGT sampling/spot sampling ratios were shown to be independent of broad scale environmental variables, such as pH, temperature, salinity, dissolved oxygen, dissolved organic carbon and suspended particulate matter; as well as of sampling season: winter or summer.

EQS adaptation and chemical status

- After a thorough statistical process based on the relationships between labile DGT-sampling metals and spot sampling dissolved metals, it was possible to propose EQS_{DGT} for Cd, Ni and Pb.

Substance	EQS (µg·L⁻¹) Annual Average	EQS_{DGT} (µg·L⁻¹) Proposal 1	EQS_{DGT} (µg·L⁻¹) Proposal 2
Cd	0.2	0.20	0.18
Ni	8.6	4.60	3.08
Pb	1.3	0.23	0.12

Proposal 1: Linear model regression

Proposal 2: Linear model regression minus low Prediction Interval (PI 95%)

- The possibility of predicting the metal concentration in the dissolved fraction from the DGT results and comparing these predicted concentrations to the existing EQSs has also been studied.

Conclusions

- This is the first broad geographical scale study using the DGT technique in different marine regions, covering a variety of environmental conditions across the Atlantic and Mediterranean regions.
- DGTs may improve the quality of the overall assessment in dynamic marine waters to comply with the WFD.
- Allowing a better assessment of the sampling sites (in terms of spatial comparison) and their evolution over time (trend).