Norman Cross-working Group activity

Passive sampling

- Work conducted in 2020
- Planned activities for 2021

Cécile Miège and Ian Allan

This presentation

- Update of the work on the ILS
- Presentation of the «PS and biota for chemical monitoring of the WFD»
- JDS4
- Ideas for the JPAs for 2021 (JPA proposals to be prepared)

ILS PS-NTS: Status

Date	Event
Sept 2018	Kick-off/planning meeting in Lyon (Fr)
Jan-May 2019	Final plans, site selection, development of protocols for sampler exposure, equipment preparation, registration of participants
May-July 2019	Sampler exposures, sample preparation and dispatch to participating laboratories
December 2019	Tentative deadline for all results submitted by **28 laboratories**
Jan-Nov 2020	Preliminary data assessment – drafting of data manuscript (lead: **Saer**; more info in the NTS session)

Objectives

Sampling and analysis designed to address:

1. Which chemicals/features are (i) present and removed from source water (river) and (ii) present in drinking water and generated during drinking water treatment?

2. What is the most effective extended suspect screening workflow for the detection of these chemicals in the passive sampling extracts?

3. Can passive sampling combined with NTS be an effective strategy for the water monitoring?

Dynamic passive sampling - Principle

-"Standard" passive sampling

(e.g. With POCIS)

-Deployment with a mooring for periods of 2-3 weeks

-Commonly observed sampling rates for 1 device, R_s of approximately 0.3 L d^{-1}.

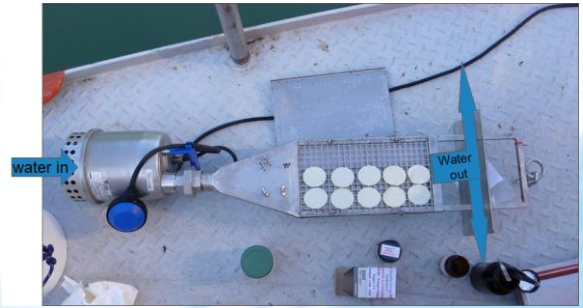
-Total volume of water extracted of 2-5 L

-Dynamic passive sampling*

-Deployment for periods of days

-Sampling rates for 1 disk, R_s of approximately 1-2 L d^{-1}.

-Total volume of water extracted of 4-8 L

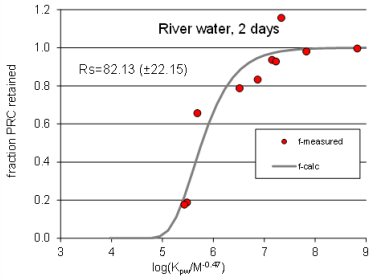


*Vrana, B., Smedes, F., Allan, I., Rusina, T., Okonski, K., Hilscherová, K., Novák, J., Tarábek, P. and Slobodník, J., 2018. Mobile dynamic passive sampling of trace organic compounds: Evaluation of sampler performance in the Danube River. *Science of The Total Environment*, *636*, pp.1597-1607.

Sampling rates and volumes of water extracted

The sampling rates of the horizon HLB samplers $R_{s,HLB}$ were estimated from sampling rates derived for SR samplers ($R_{s,SR}$), using d the surface areas of both samplers A_{HLB}, A_{SR}:

$$R_{S,HLB} = \frac{A_{HLB}}{A_{SR}} R_{S,SR}$$



Vial number	Matrix type	Sampler Exposure time	Silicone sampling rate $R_{S,SR}$ (L/d)	Estimated sampled water volume[a]	Equiv volume of water extracted of the samples (L)
Vial 1	River water	2 days	82	190 L	4.8
Vial 2	River water	4 days	74	346 L	8.7
Vial 3	Drinking water	2 days	71	160 L	4.0
Vial 4	Drinking water	4 days	65	295 L	7.4

Passive sampling in Joint Danube Survey JDS4

Analytical and bioanalytical assessments of organic micropollutants in the Danube River using a combination of passive sampling, bioassays and non-target screening: Demonstrating the NORMAN methodology for monitoring purposes in Joint Danube Survey JDS4

Branislav Vrana, Masaryk university, Centre RECETOX, Czech Republic

Objectives

- Provision of a methodology and setting up **baseline** for representative monitoring of trace organic pollutants in large water bodies, enabling setting up a long-term **trend monitoring** of relevant substances
- Identification of **toxicity drivers** in complex pollutant mixtures present in Danube water
- Identification of bioaccumulative substances based on comparison of chemical mixtures present in passive sampler extracts from **water** and **biota**

Passive sampling in Joint Danube Survey JDS4

10 supersites in the Danube

Deployment: May-August 2019

Stationary deployment

Hydrophobic compounds: silicone sampler

Hydrophilic compounds: AttractSPE™ disks HLB

MUNI | RECETOX

9 out of 10 sites sampled sucessfully

Passive sampler analysis

- Analysis of selected target priority substances; river basin specific pollutants and a wide-scope target analysis
- Analysis of extracts by a battery of bioassays
- NTS of extracts from passive samplers:
- GC-EI-HRMS and GC-APCI-QTOF-MS (hydrophobic compounds) and LC-HRMS (polar compounds) and fish from supersites
- LC-HR-MS and GC-HR-MS of extracts and related fish samples & support at sampling

Expected outcomes

- Monitoring data (absolute or relative concentrations),
- Identification of relevant substances and toxicity profiling in the Danube river, including reporting
- report on the role of passive sampling in the WFD-compliant investigative monitoring and the identification of river basin specific pollutants.

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and many more…

JPA for 2020
NORMAN cross working group activity on passive sampling

Workshop on Passive sampling in support of chemical monitoring in biota for the Water Framework Directive

3rd December 2020 9-13h

Teams event, ~115 registered participants

Background for this workshop

2013 - NORMAN expert group meeting at Masaryk University in Brno, Czech Republic

→ investigated how Environmental Quality Standards (EQS) values relate to results obtained from passive sampling and vice versa

2014 - NORMAN/AQUAREF “Workshop on Passive Sampling techniques for monitoring of contaminants in the aquatic environment” at Irstea, Lyon, France

→ Defined a roadmap of further actions to be fostered by NORMAN

→ Recommendations and concrete actions proposed to enable the future use of passive sampling for regulatory monitoring of contaminants

2016 - NORMAN satellite workshop of the IPSW conference (Prague, Czech Republic)

→ A common data repository for passive sampling and its combination with biota monitoring

PS-Biota studies (from 2019)

	Programme			Type of biota	Type of passive sampler	P
Country	Title and acronym	Start date	End date			
Norway	MILKYS	2012	2016	cod and mussel	silicone rubber	M
Norway	Tilførselsprogrammet	2009	2012	cod	silicone rubber	T
Norway		2015	2016	mussel	silicone rubber	
Czech Republi	GACR fish; Czech Science Foundati	2015	2015	grass carp, common carp,	silicone rubber	(
Slovakia	GACR fish; Czech Science Foundati	2017	2017	asp, perch, european chub	silicone rubber	(
Czech Republi	GACR fish; Czech Science Foundati	2016	2017	European chub, common	silicone rubber	(
Finland	ChemAct	2008	2012	Mussels, benthic inverteb	PE, Silicone rubber	
Finland	ChemAct	2008	2012	Fish, whole food web	PE	
Finland	UuPri	2017	2017	Mussel	silicone rubber	
Finland	LapinKaiku	2018	2018	Aquatic moss	silicone rubber	
Belgium	Evaluation of passive sampling me	2017	2021	European chub, gudgeon,	silicone rubber	E
Belgium	Evaluation of passive sampling me	2017	2021	European chub, gudgeon,	POCIS	E
France	RSP Biote	2018	2020	barble, Chub, bream	DGT, DGT-PFOS. SR	R

Programme for the workshop

9.00 Introduction

9.10 Stefano Polesello (IRSA, IT)

Biomonitoring and WFD: vision and remaining challenges

9.35 Olivier Perceval (OFB/Fr)

WFD and biota monitoring – A French perspective

9.45 Karin Deutsch (Ministry of Life/AT)

WFD and biota monitoring – An Austrian perspective

9.55 Georgia Buchmeier (Bavarian Environment Agency/GE)

WFD and biota monitoring – A German perspective

10.05 Catherine Munschy (Ifremer, FR)

Coastal monitoring with biota

10.15 Discussion

Break

10.45 Foppe Smedes (RECETOX/Cz)

PS in support of fish monitoring – A new approach

11.10 Branislav Vrana (RECETOX/Cz)

Application of the approach in case studies and in Danube survey

11.20 Cecile Miege (INRAE/Fr)

Application of the approach to in case studies in France

11.30 Ian Allan (NIVA/No)

PS and biota monitoring – Data from Norway

11.40 Discussion

13.00 Workshop end

JPA ideas for 2021

- Workshop on PS in support of chemical monitoring of the WFD for substances with EQS_{water}
- Dive into the «PS-NTS ILS data with a focus on PS aspects
- Interlaboratory study on PS for polar substances
- Developing links with other NORMAN groups on EDA, microplastics and water re-use.

Title	Workshop on PS for substances with EQS_{water} in support of chemical monitoring for the WFD
Type of activity	Workshop
Leader	*INRAE*
Background/justification	-Need for inclusion of PS in monitoring programmes -Timely -End of selected large scale national projects (e.g. AQUAREF study in France)
Participants	NIVA, RECETOX, +++
Proposed in-kind contribution	Time for preparation and presentations by participants…
Contribution from NORMAN	2000 euros for consulting services for preparation of online workshop

Title	Dive into “PS-NTS” data with specific focus on PS
Type of activity	Online working meeting and final workshop
Leader	*INRAE*
Background/justification	-Large interlaboratory study on PS-NTS (2019-2020) -Data manuscript but a wealth of information related to the use of PS in NTS: How does PS over increasing exposure time contributes to identify substances removed or generated during drinking water treatment?
Participants	NIVA, RECETOX, +++
Proposed in-kind contribution	Time related to data interpretation
Contribution from NORMAN	???

Title	Interlaboratory study on passive sampling for polar substances
Type of activity	*ILS*
Leader	*RECETOX, NIVA, INRAE*
Background/justification	-Last NORMAN funded ILS was conducted in 2013 -Much development of passive sampling devices for polar substances and/or PFAS in the period 2013-2020 -Build upon study in Brno, organisers to assemble samplers from participants all deployed at a specific site -Alternative, deployment of samplers at multiple sites to investigate ability to rank sites according to contamination levels
Participants	+++
Proposed in-kind contribution	Preparation and running of the ILS
Contribution from NORMAN	10 000 euros

Title	Networking and developing links to other NORMAN groups
Type of activity	*Workshop, meetings*
Leader	*INRAE, NIVA*
Background/justification	-Investigate opportunities to combine PS with EDA in a research and regulatory context – advantages and challenges -Evaluate the possibility to use PS in water re-use context -Initiate discussions on PS and chemical additives within a microplastic context
Participants	+++
Proposed in-kind contribution	Time for meetings and workshop
Contribution from NORMAN	???