JDS4 program preparation

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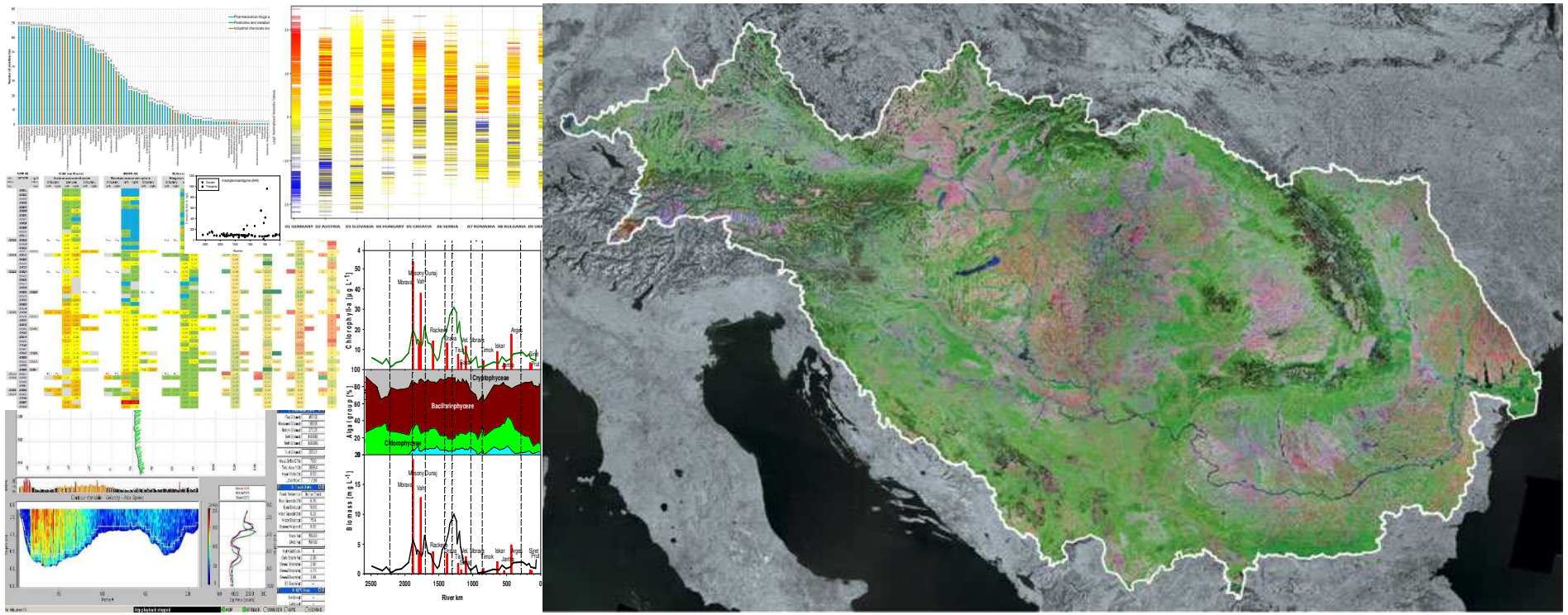
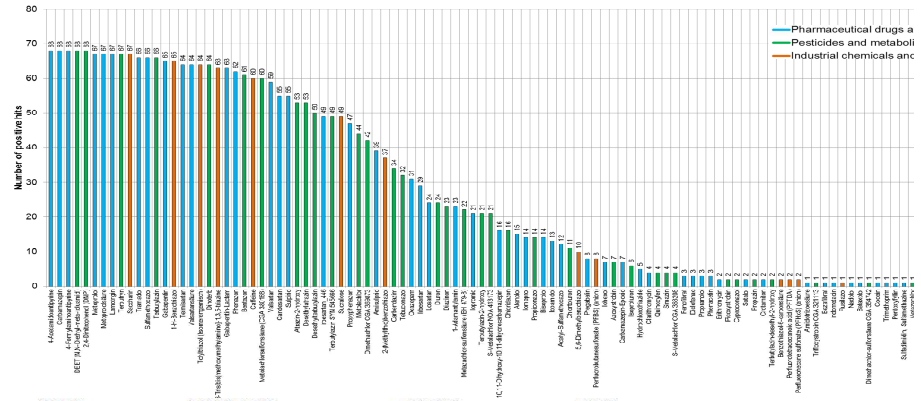


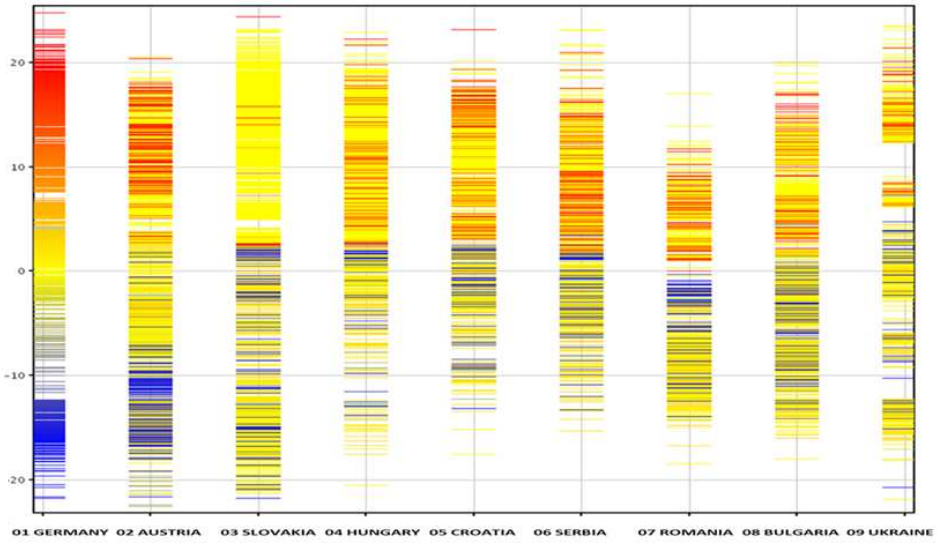
Igor Liska

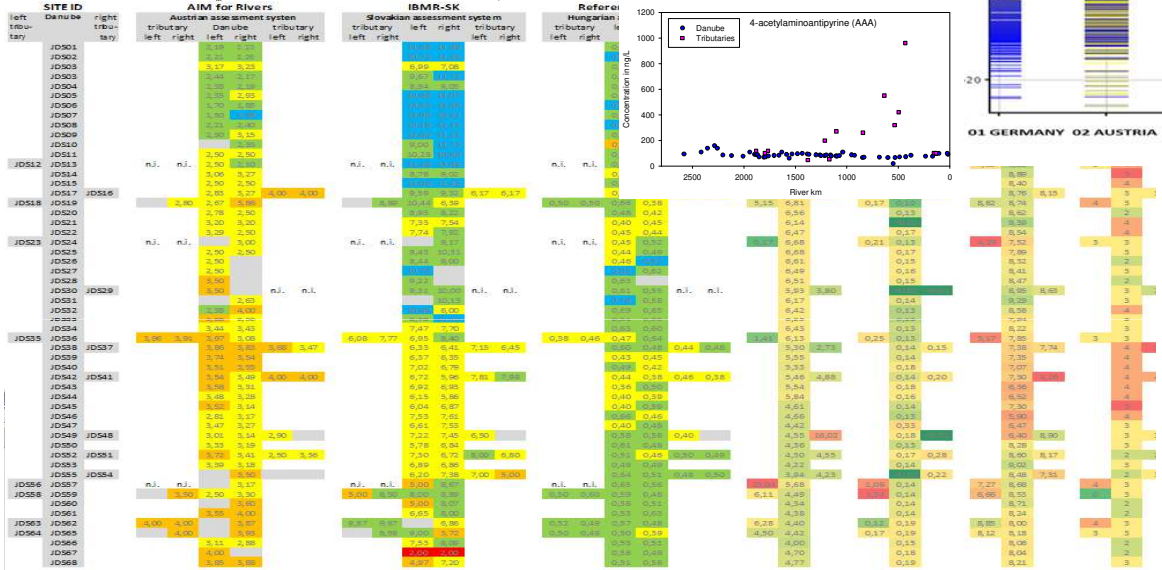
ICPDR


ISTROS

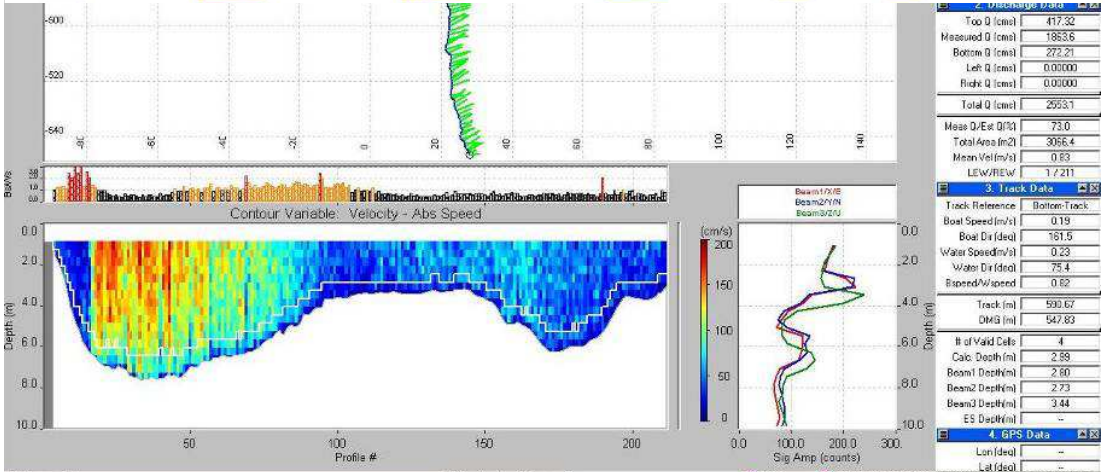

WIEN
Watch your Danube

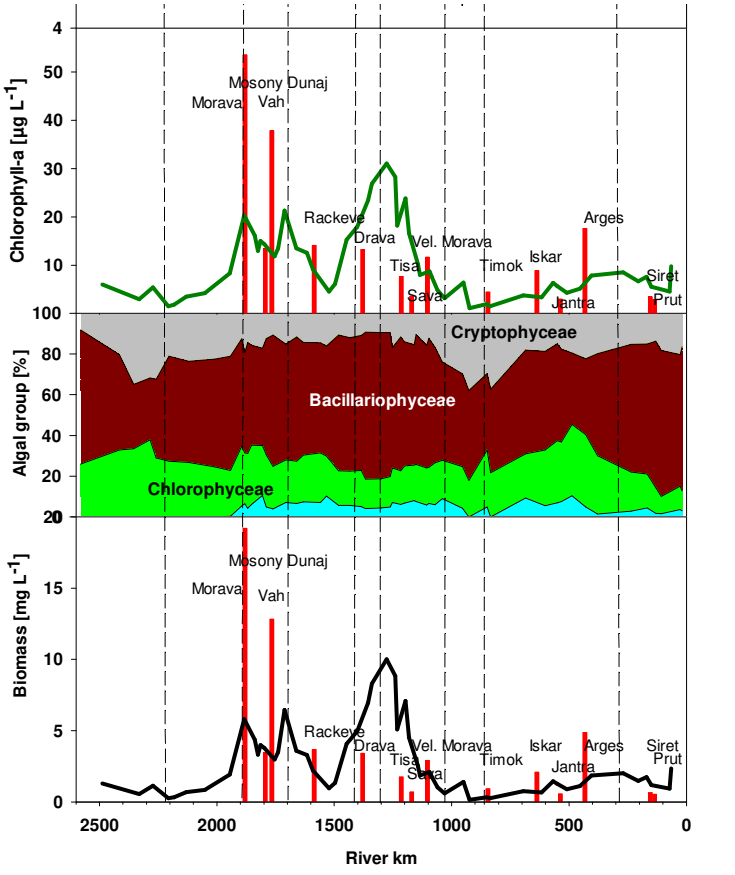

Number of positive hits
Pharmaceutical drugs a
Pesticides and metaboli
Industrial chemicals anc


Log2 Normalized Intensity Values
01 GERMANY
02 AUSTRIA
03 SLOVAKIA
04 HUNGARY
05 CROATIA
06 SERBIA
07 ROMANIA
08 BULGARIA
09 UKRAINE


SITE ID
AIM for Rivers
IBMR-SK
Austrian assessment system
Slovakian assessment system
Danube
tributary
left
right

4-acetylaminoantipyrine (AAA)
Danube
Tributaries
Concentration in ng/L
River km


Contour Variable: Velocity - Abs Speed
Profile #
Depth (m)
Sig Amp (counts)
Track Data
GPS Data


Chlorophyll-a [µg L-1]
Algal group [%]
Biomass [mg L-1]
Cryptophyceae
Bacillariophyceae
Chlorophyceae
Mosony Dunaj
Morava
Vah
Rackeve
Drava
Tisa
Vel. Morava
Sava
Timok
Iskar
Jantra
Arges
Siret
Prut
River km

Danube Declaration 2016

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We, the Ministers, High Officials and the Member of the European Commission, being responsible for the implementation of the Danube River Protection Convention:

appreciate the very valuable scientific results of the third Joint Danube Survey in 2013 as well as its considerable effect on awareness raising for the ICPDR,

request the ICPDR to prepare, based on an evaluation of the previous surveys, a fourth Joint Danube Survev to be held in 2019, and

commit to secure the necessary funding.

JDS4: new concept

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- **JDS123**: Core Team worked, national experts visited;
- **JDS4**: National experts do the job, Core Team develops methodology & advises to ensure coherence of results;
- Strong training & education & harmonization value;
- Pre-survey training workshops to support comparability;
- No need of big ships: Monitoring by local experts will enable survey starting at the same time;
- High spirit of cooperation: All participants actively involved;
- Non-Danube countries can also participate;
- Possible linking of JDS4 to the regular & obligatory national WFD surveillance monitoring;

JDS4
General objectives

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- ✓ Producing comparable & reliable information on selected water quality elements for the whole Danube River including the major tributaries on a short-term basis;
- ✓ Providing an opportunity for harmonization & training in WFD related monitoring;
- ✓ Addressing the information gaps for the 2021 DRBMP update.

JDS4
Added values (1/2)

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- ✓ Independent basin-wide platform for improving national surface water monitoring practices;
- ✓ Practical joint testing and comparison of national methodologies for biological and hydromorphological quality elements leading to their future harmonization;
- ✓ Interactive platform for hands-on training in sampling and assessment of biological quality elements.

JDS4
Added values (2/2)

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- ✓ The only source of data on a number of quality elements (especially on emerging substances) for the whole Danube;
- ✓ Substantial contribution to Danube RBSP prioritization;
- ✓ Knowledge transfer to non-member states.

JDS4 time plan

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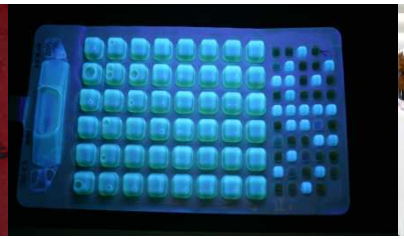
	2016				2017				2018				2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Identification of objectives																				
Selection of parameters																				
Agreement on methodologies																				
Fund raising																				
Core Team selection																				
National teams nomination																				
Harmonizing workshops																				
Administrative set-up																				
Logistical arrangements																				
Sampling																				
Analysis of samples																				
Report writing																				
Report publishing																				




JDS4 sampling sites (04/2018)

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Roles of JDS experts - biology

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	JDS3	JDS4
Core Team member	Carrying out sampling, analysis, data assessment and report writing	Preparing JDS4 methodology, organizing pre-survey training, providing support&guidance to national experts during survey if needed, final verifying analysis of all JDS4 data, data assessment and report writing
National expert	Providing support to Core Team in particular country	Commenting on the JDS4 methodology, participating at the pre-survey training, carrying out JDS4 sampling and analysis in the territory of a particular country

Roles of JDS experts - chemistry

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	JDS3	JDS4
Core Team member	Carrying out sampling (and in specific cases also analysis, assessment and report writing)	No Core Team chemical experts are needed for chemistry
National expert	Providing support to Core Team in a particular country	Carrying out JDS4 sampling & sample preservation (most of the samples for chemical analysis), analysis of basic physico-chemical parameters for samples collected in the territory of a particular country
JDS laboratories (*either providing in-kind contribution or contracted*)	Analyzing all JDS samples for a particular determinand	Analyzing all JDS samples for a particular determinand

Roles of JDS organizers

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	JDS3	JDS4
National Coordinator	Ensuring smooth passage of ships through a particular country, organizing logistical support in that country, organizing national team, cooperating with JDS Technical Coordinator	Organizing, managing and providing logistical support to national experts (no methodological guidance – this is the competence of national experts) so that these can carry out the necessary sampling during the survey. Cooperating with JDS Technical Coordinator on survey logistics (materials delivery, sample transport, etc.)
JDS Technical Coordinator	Planning the survey, purchasing the necessary materials, pre-arranging the survey logistics in cooperation with the JDS3 National Coordinators, providing support to survey ships and the JDS Core Team, organizing transport of samples to laboratories, coordinating the laboratory services and collecting the data	Planning the survey, purchasing the necessary materials, pre-arranging the survey logistics in cooperation with the JDS4 National Coordinators, providing support to the JDS Core Team, organizing special surveys, organizing transport of samples to laboratories, coordinating the laboratory services and collecting the data

Roles of Heads of Delegations

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	JDS3	JDS4
HoD	*Financing & in-kind contributions to JDS budget;* *Nominating Core Team candidates & JDS National Coordinators;* *Approving key documents (planning, final reports) and taking key decisions;* Ensuring a smooth passage of sampling fleet through the territory of its country;	*Financing & in-kind contributions to JDS budget;* *Nominating Core Team candidates & JDS National Coordinators;* *Approving key documents (planning, final reports) and taking key decisions;* Political & financial back-up to the JDS4 National Coordinator so that he/she can provide organizational, managerial and logistical support to national experts necessary for carrying out the agreed sample collection during JDS4.

JDS4 special monitoring

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- For special monitoring activities it is foreseen that a small team of Core Team Experts will travel along all sampling sites to accomplish specific sampling which cannot be performed by national teams. Foreseen activities:
  - ✓ Microbiology
  - ✓ Effect based tools/large volume sampling/passive sampling
  - ✓ eDNA
  - ✓ WWTPs monitoring
- Special monitoring activities will be organized by the JDS4 Technical Coordinator (cooperation with National Coordinators & teams necessary)

JDS4 logistics: Core Team

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JDS 4 Core Team leader for biology	Momir Paunovic
Fish expert	Vinzenz Bammer (supported by Predrag Simonovic as lower Danube expert)
Macrozoobenthos expert	Miroslav Očadlík
Phytobenthos expert	Slovakia will cover this BQE, Jarmila Makovinska being the contact person
Phytoplankton expert	Igor Stankovic
Macrophytes expert	Kateřina Bubíková
IAS expert	Béla Csányi
eDNA	Jonas Astrin and Alexander Weigand
Microbiology	Alexander Kirschner

JDS4 logistics: National Coordinators

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Country	National Coordinator	Deputy National Coordinator
Germany	Manfred Sengl Benno Kügel	
Austria	Karin Deutsch	Helena Mühlmann
Czech Republic	Ivana Beděrková	
Slovakia	Emília Mišíková Elexová	Soňa Ščerbáková
Hungary	Tünde Andrea Zagyva György Istvan Tóth	
Croatia	Drazenka Stipanicev	
Serbia	Marta Mihailović	
Romania	Monica Mainerici	Florentina Soare
Bulgaria	Mina Assenova Valeriya Gyosheva	
Ukraine	Iurii Nabyvanets	Sergiy Afanasiev
Moldova	Gabriel Gilca	Natalia Zgircu

JDS4 logistics

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- ✓ National teams for BQE nominated by countries;
- ✓ No Core team for chemistry – Manfred Sengl is leading chemical experts;
- ✓ **Official JDS4 start: 29 June 2019** (sampling in all countries at the same time, but certain flexibility is possible);
- ✓ Special surveys carried out separately;
- ✓ First draft proposal of JDS4 standard sites on the Danube and the tributaries (>50 sites so far);

Hydromorphology

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- ✓ Still under discussion by the HYMO TG;
- ✓ Update of JDS3 hydromorphological assessments of the predefined 10 km segments with regard to alterations (deteriorations, improvements) of
  - ✓ channel,
  - ✓ banks,
  - ✓ floodplain conditions.
- ✓ Data collection/assessment will be performed by national investigations (desk work)

Biology

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- ✓ **Macrophytes** monitored only at sites the countries consider as relevant for macrophyte analysis;
- ✓ **All** 2019 **phytoplankton** data for JDS4 standard sites (if available) will be collected by countries;
- ✓ **Phytobenthos**: diatoms at all JDS4 standard sites;
- ✓ **Macrozoobenthos & fish** will be analyzed by national methods & JDS4 reference method;
- ✓ **IAS** (monitoring strategy is being prepared)
- ✓ Zooplankton (under discussion)
- ✓ Training BQE workshops in 2018.

Microbiology

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- ✓ **Standard faecal indicators**;
- ✓ Cultivation of selected species relevant for **antibiotic resistence**;
- ✓ **DNA-Filtration for:**
  - ✓ **microbiome analysis**: 16S rDNA targeted: development of the total bacterial community along the Danube; identification of microbial faecal pollution/source tracking
  - ✓ **resistome analysis**: metagenomic approach and qPCR-detection of specific antibiotic resistance factors in the bacterial genomes
  - ✓ **virulence factors**: metagenomic approach and qPCR-detection of selected virulence factors in the bacterial genomes
  - ✓ **microbial source tracking**: qPCR detection of selected host-associated markers (human, ruminant, pig, etc.)
  - ✓ **detection of total faecal pollution**: qPCR for enterococci

Microbiology

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- ✓ **Cell based methods**:
  - ✓ On-line Flow Cytometry (FCM): on-site (camper van) determination of bacterial numbers in an online flow cytometer
  - ✓ Epifluorescence Microscopy (EFM): calibration of FCM data, cell morphotype discrimination, cell volume determination for biomass calculation (VELIMIROV ET AL 2011)
  - ✓ Fluorescence in situ hybridization (FISH): FISH in combination with solid phase cytometry for cell-based determination of faecal indicators (faecal-FISH)
- ✓ **Comprehensive statistical analysis**: linking microbiological data sets among each other .

Hazardous substances: Target analysis

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- ✓ (New) priority substances from the Directive 2013/39/EU;
- ✓ Substances from the newly defined list of the Danube River Basin Specific Pollutants;
- ✓ Substances from the EU Watch List;
- ✓ Other emerging substances of concern in DRB;
- ✓ Substances have been selected by the JDS4 Chemistry Core Group

(New) priority substances from the Directive 2013/39/EU

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Alachlor (W)	Atrazine (W)
Brominated diphenylethers (F)	Chlorfenvinphos (W)
Chlorpyrifos (Chlorpyrifos-ethyl) (W)	Di(2-ethylhexyl)phthalate (DEHP) (W)
Diuron (W)	Fluoranthene (M)
Isoproturon (W)	Mercury and its compounds (F)
Benzo(a)pyrene (M)	Tributyltin compounds (W)
Simazine (W)	Trifluralin (W)
Dicofol (W,F)	Perfluorooctane sulfonic acid and its derivatives (PFOS) (F)
Quinoxyfen (W)	Dioxins and dioxin-like compounds (F)
Aclonifen (W)	Bifenox (W)
Cybutryne (W)	Cypermethrin (W)
Dichlorvos (W)	Hexabromocyclododecanes (HBCDD) (F)
Heptachlor and heptachlor epoxide (F)	Terbutryn (W)

Danube River Basin Specific Pollutants

solutions

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Category 1 and 2 substances SOLUTIONS/NORMAN Prioritisation Framework – analysis in water (prioritisation still ongoing)	
Chloroxuron	Tebuconazole
Caffeine	Bisphenol A
Bromacil	Amoxicillin
Diazinon	Chlorothalonil
Carbamazepine	Dicamba
Metolachlor	Dimethenamid
Metazachlor	2-Phenylphenol
Terbuthylazine	Fipronil
Desethylterbutylazin	Ibuprofen
Linuron	

Substances from the EU Watch List & other emerging substances

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EU Watch list: Analysis in water	
Diclofenac	Estrone (E1)
17-Beta-estradiol (E2)	17-Alpha-ethinylestradiol (EE2)
Clarithromycin	Imidacloprid
Azithromycin	(Amoxicillin) 
Ciprofloxazin	Metaflumizone

Other emerging substances: Analysis in water	
Illicit drugs	Organophosphorous compounds (OPC)
Pharmaceuticals	

Hazardous substances: Target analysis

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- ✓ Majority covered by in-kind contributions;
- ✓ Not covered: tributyltin compounds, cypermethrin and dichlorvos in water; dioxins & dioxin-like compounds, brominated diphenylethers, heptachlor & heptachlorepoxid and hexabromocyclododecanes in fish;
- ✓ Additional substances offered: 1,4-dioxan, OCPs, organophosphate compounds;
- ✓ In-kind analysis of illicit drugs welcomed.

Organics – new techniques

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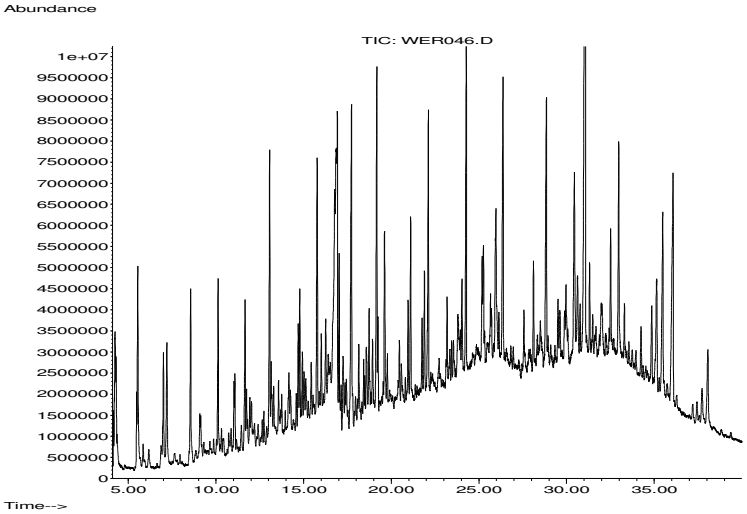
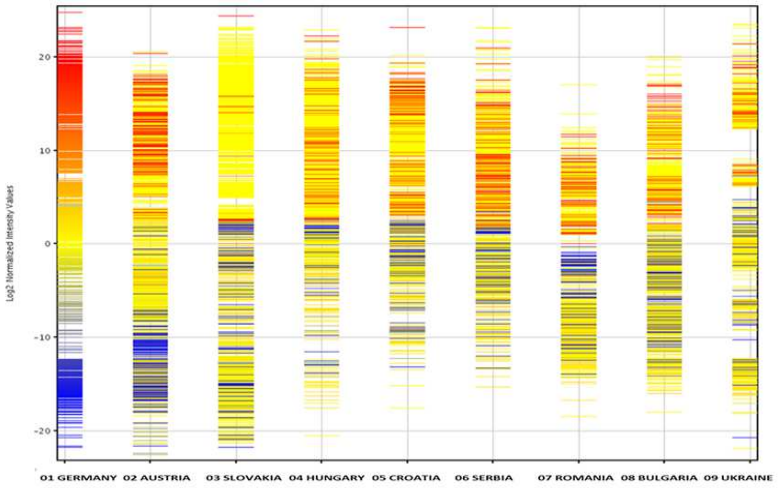
- ✓ Effect-based tools;
- ✓ Non-target screening & digital freezing;
- ✓ Passive sampling;
- ✓ Analysis of current and new approaches for chemical monitoring.





Riverine litter: JDS4

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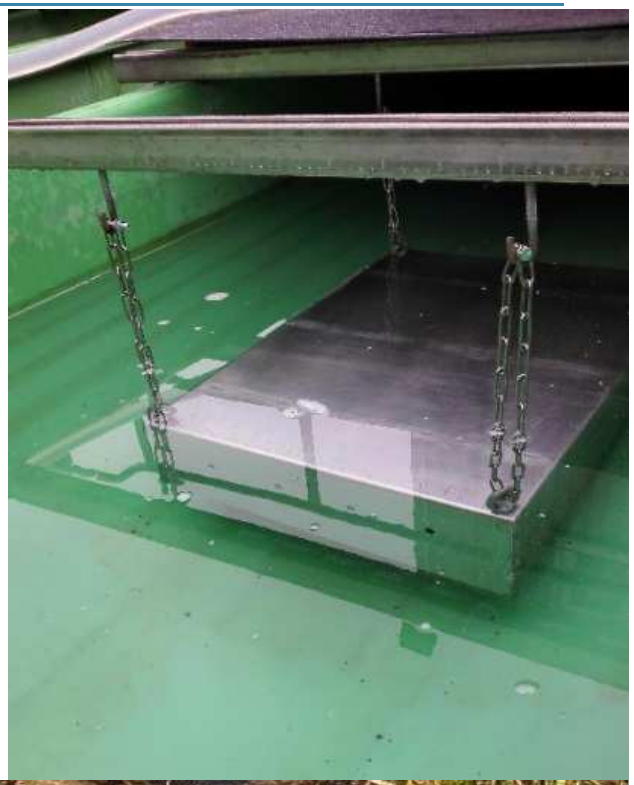
- ICPDR enquiry about the monitoring of plastic particles in DRB indicates absence of information in most Danube countries;
- JDS4 has an ambition to produce an information baseline on the occurrence of plastic particles for the whole Danube;
- German UBA will organise a monitoring exercise, provide sampling device and training; BAM will analyse samples.



(e)DNA Monitoring JDS4: Plans for JDS4 (*as of April 2018*)

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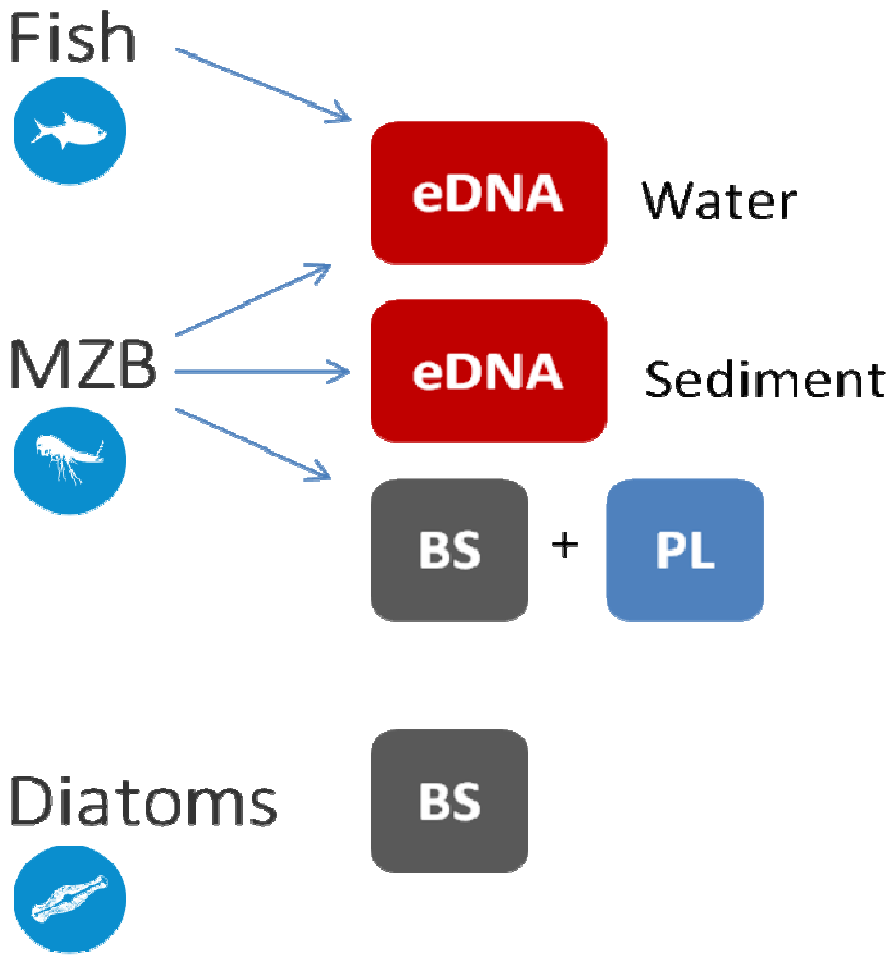

environmental DNA

eDNA

preservation liquid

PL

bulk sample

BS

Other contributions

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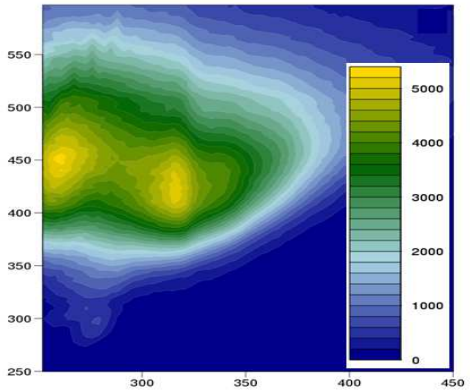
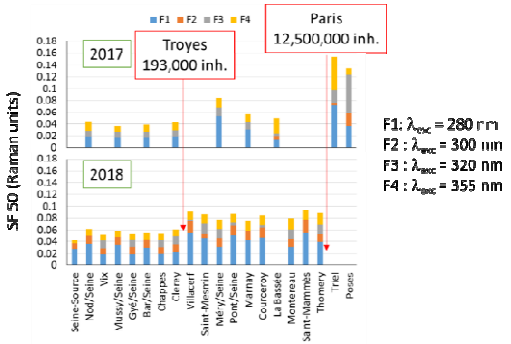
- ✓ TU Wien: Fluorescence spectroscopy (*Excitation Emission Matrix for the identification of different organic pollution emissions*);
- ✓ NORMAN/CNRS: Dissolved organic matter in relation with anthropic pressure (*statistical analysis of the possible correlations between optical parameters, classical pollution parameters, REE profiles and DOM molecular composition*).





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Thank you for your attention!

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icpdr@unvienna.org