Bavarian Environment Agency

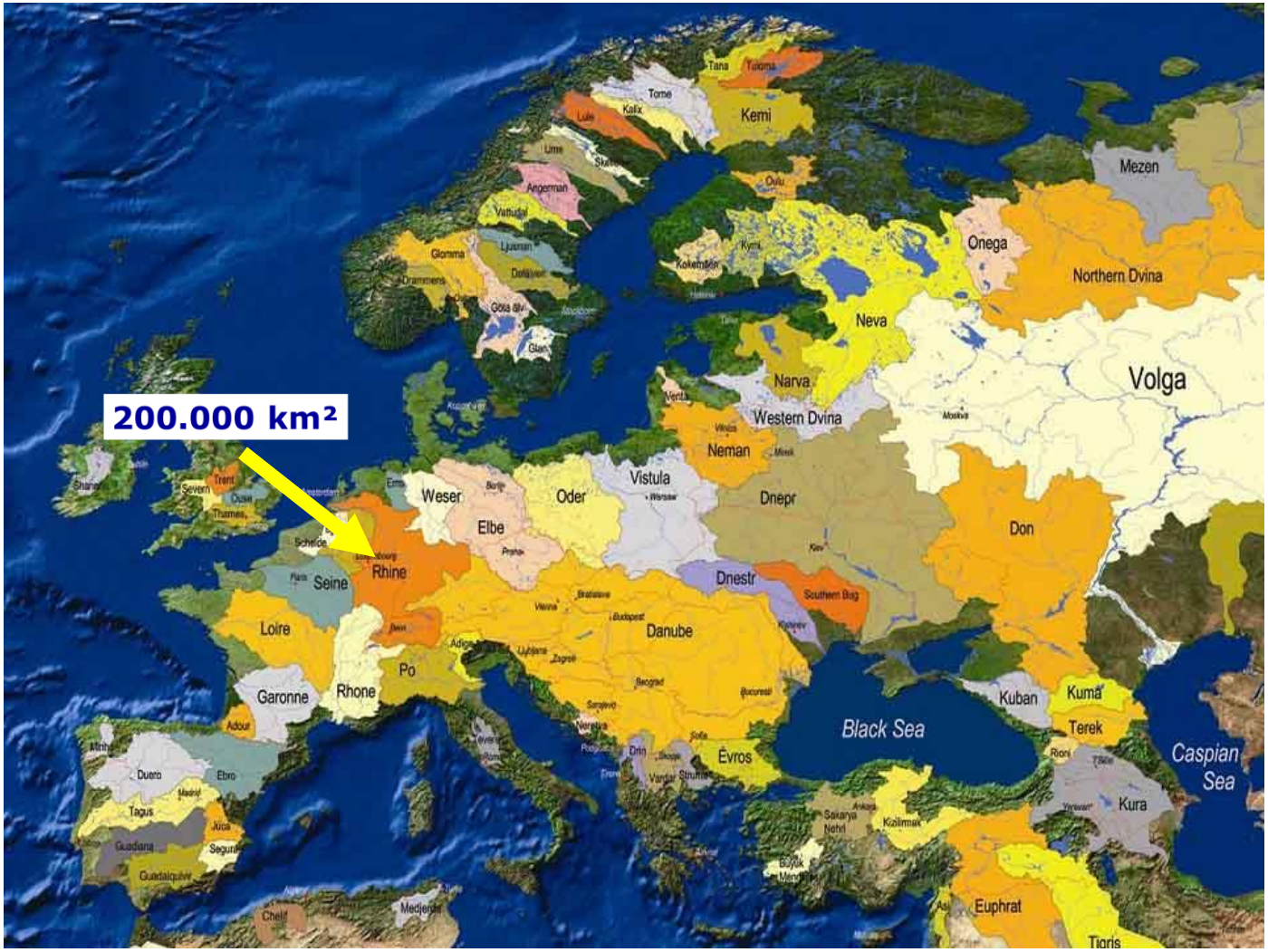
Cooperation at the river basin level – the ICPR expert group on NTS

Dr. Uwe Kunkel

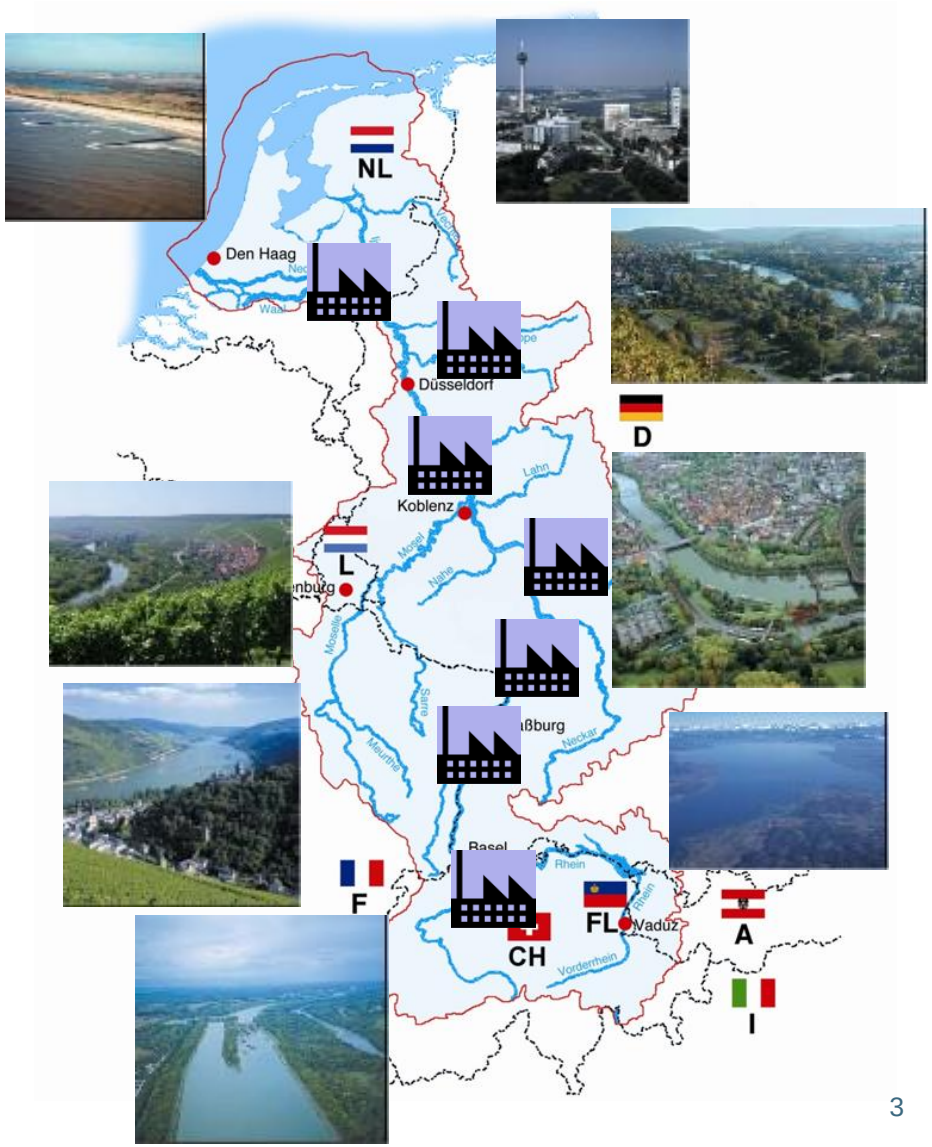
Bavarian Environment Agency

on behalf of ICPR EG SANA

River Rhine: a European river



Rhine basin facts



Main stream length: 1233 km

60 million inhabitants in 9 countries

Drinking water supply for 30 million people

Europe's most important navigation route (825 km)

The International Commission of the Protection of the Rhine (ICPR)

- **founded in 1950**
- **Members** (~200 people)

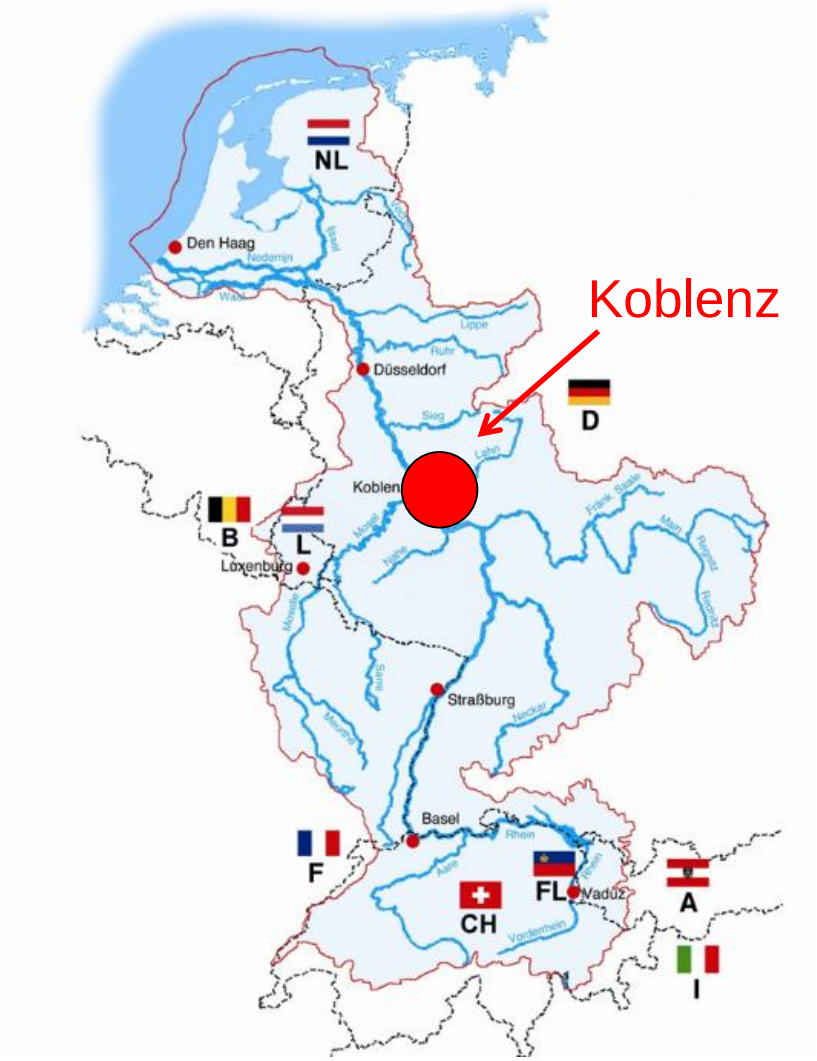
Switzerland, France, Germany, Luxemburg, the Netherlands, European Union

- **Observers**

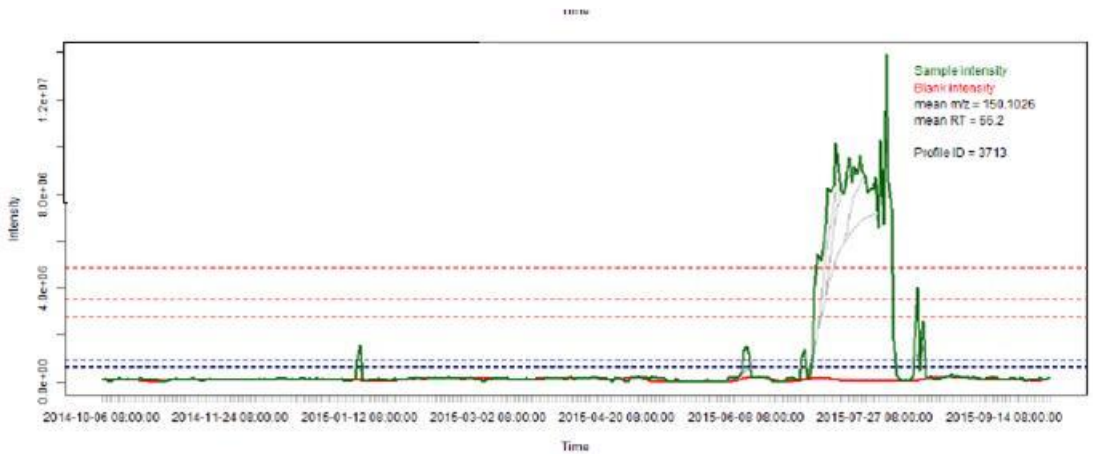
States: Austria, Liechtenstein, Belgium/Wallonia, Italy

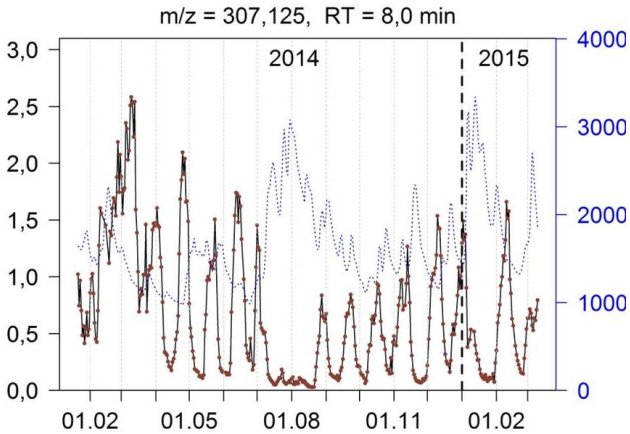
Intergovernmental Organisations: River Commissions ...

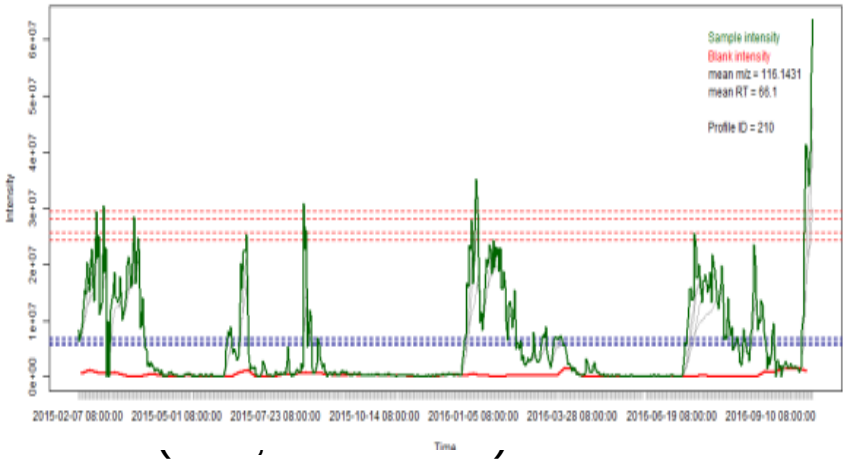
Non-Governmental Organisations (20)



Chemical monitoring within the ICPR







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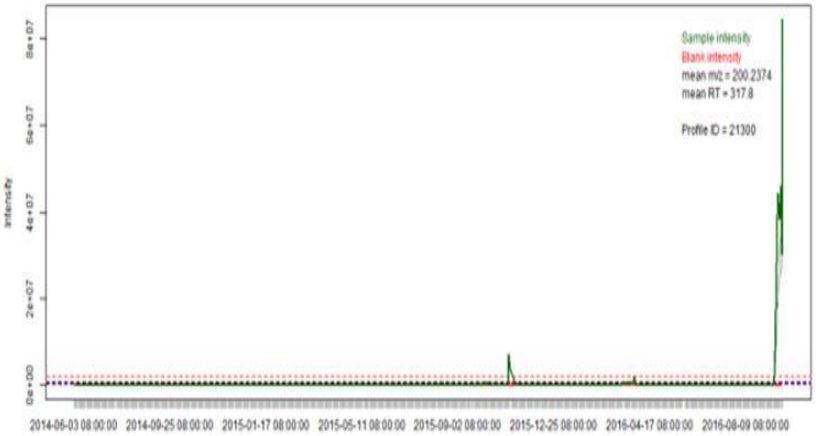


- **Foundation of current SANA group in 2015**

Members of the expert group „Special Analytics“ (SANA)

Experts on non-target analysis from different organizations

- research institutions
- national authorities
- federal authorities
- water suppliers

and different countries

A, CH, D, NL, LUX, F

Chairs:
Steffen Ruppe (AUE), Uwe Kunkel (LfU Bavaria)

Tasks of the EG SANA

- Defining requirements for a transnational river monitoring and real-time alert system
  - Benefits of harmonized analytical methods?
  - Templates for efficient data and information exchange across states
  - Automated and uniform data evaluation workflows based on raw data
- Comparison of LC-HRMS/MS data of different laboratories
  - How similar are results when we harmonize the analytical methods as far as possible?
  - Are there systematic differences in the results of data derived from different types of mass spectrometers? What are consequences of these deviations?
- Detection of unknown/ so far not prioritized substances in the Rhine catchment

Non-target trial – Approach and data processing

Common sample (Rhine water)

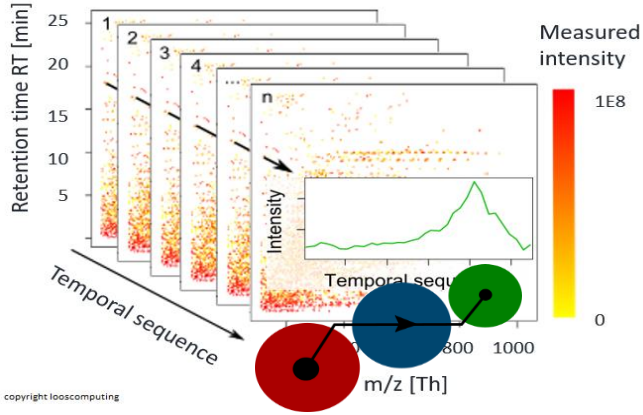
Standardized analytical conditions

Conversion to mzxML-Format

Processing with *enviMass*

Comparison of the datasets

enviMass



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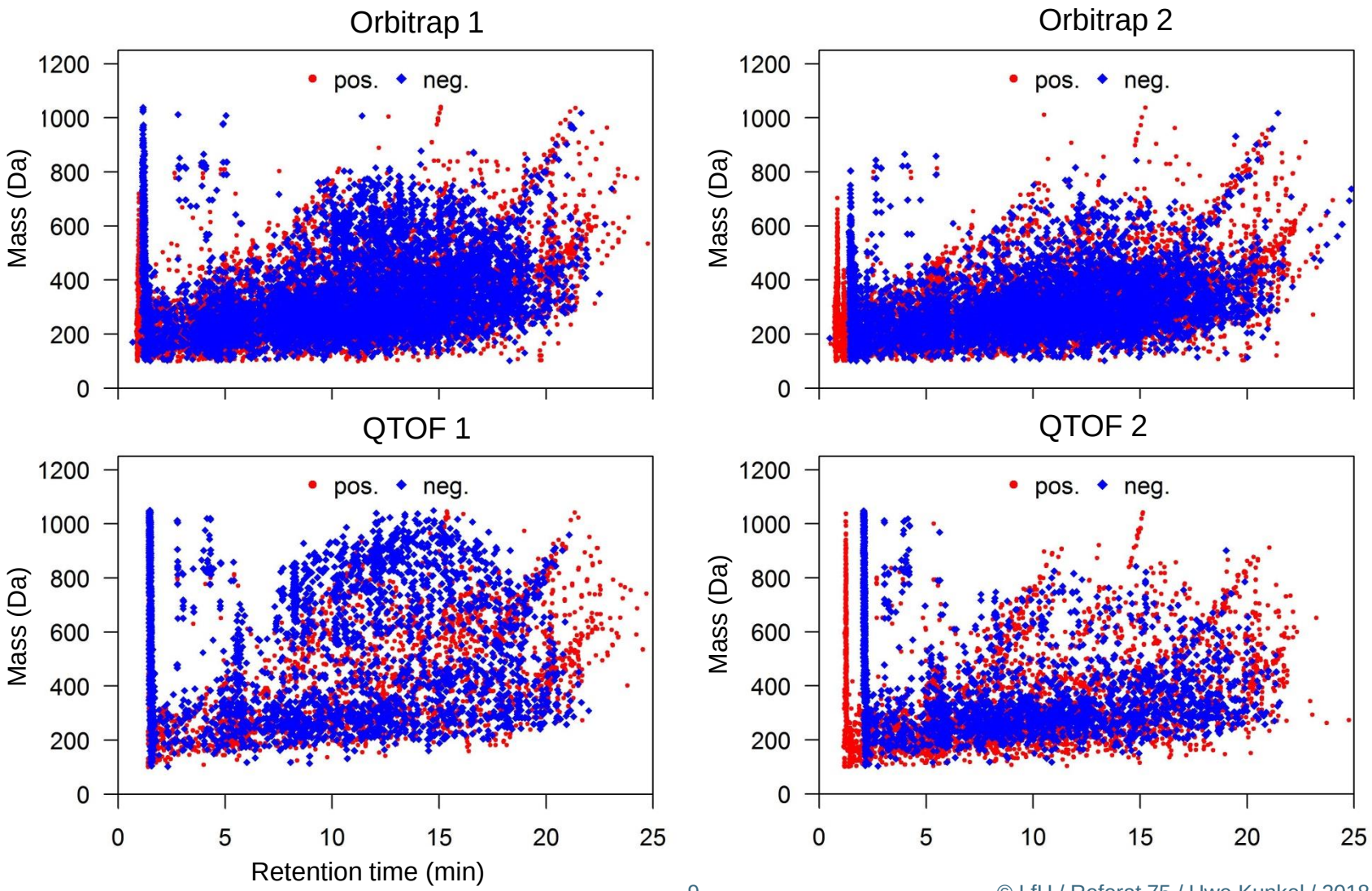
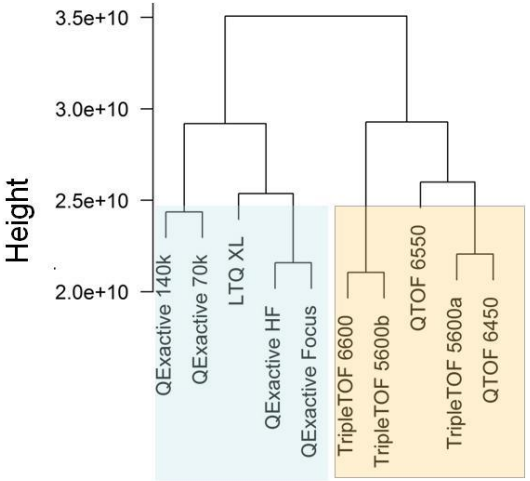
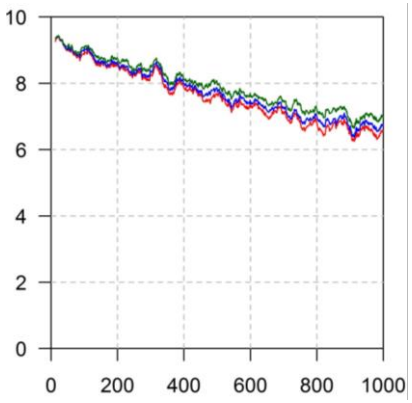
Non-target trial – Results: Raw data



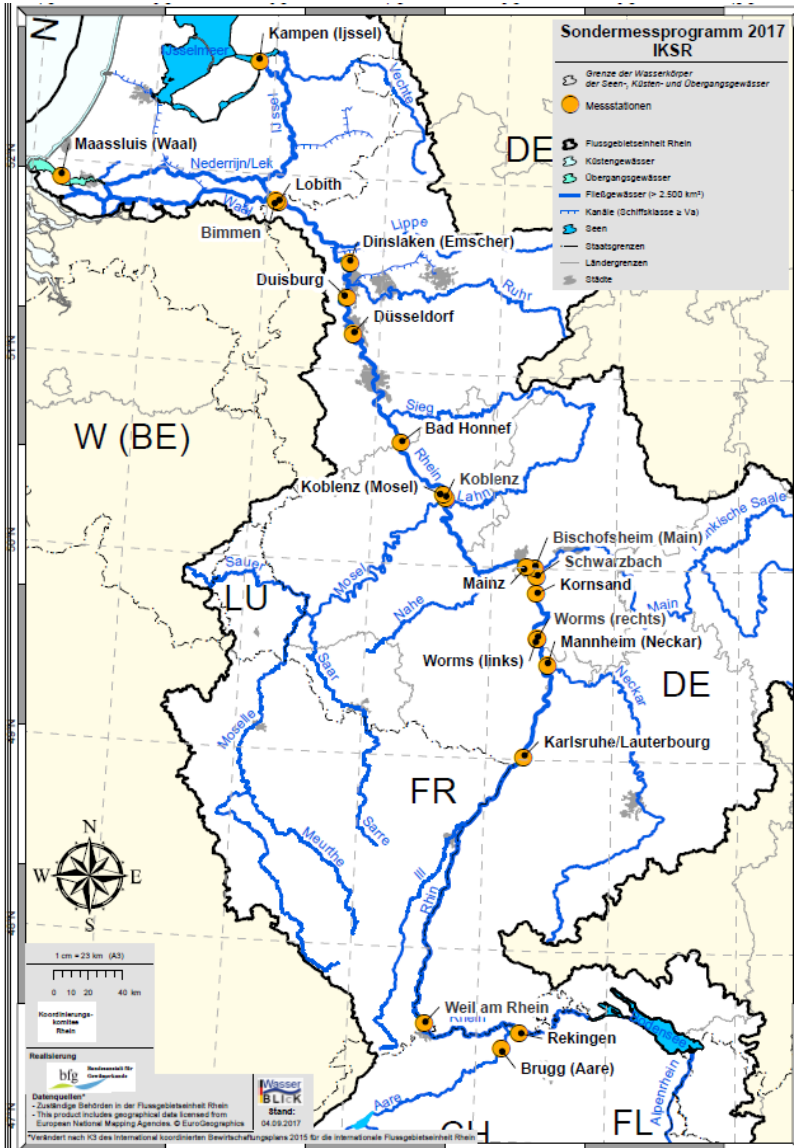
Non-target trial – Summary



- Most intense signals of one institute are also detected in other institutions
- Small but systematic differences between the different type of mass spectrometers
- Further optimization of LC-HRMS data processing parameters scheduled
- Results are basis for the implementation of common workflow for data of different mass spectrometers for a river-basin wide “real-time” river monitoring



Special monitoring campaign 2017

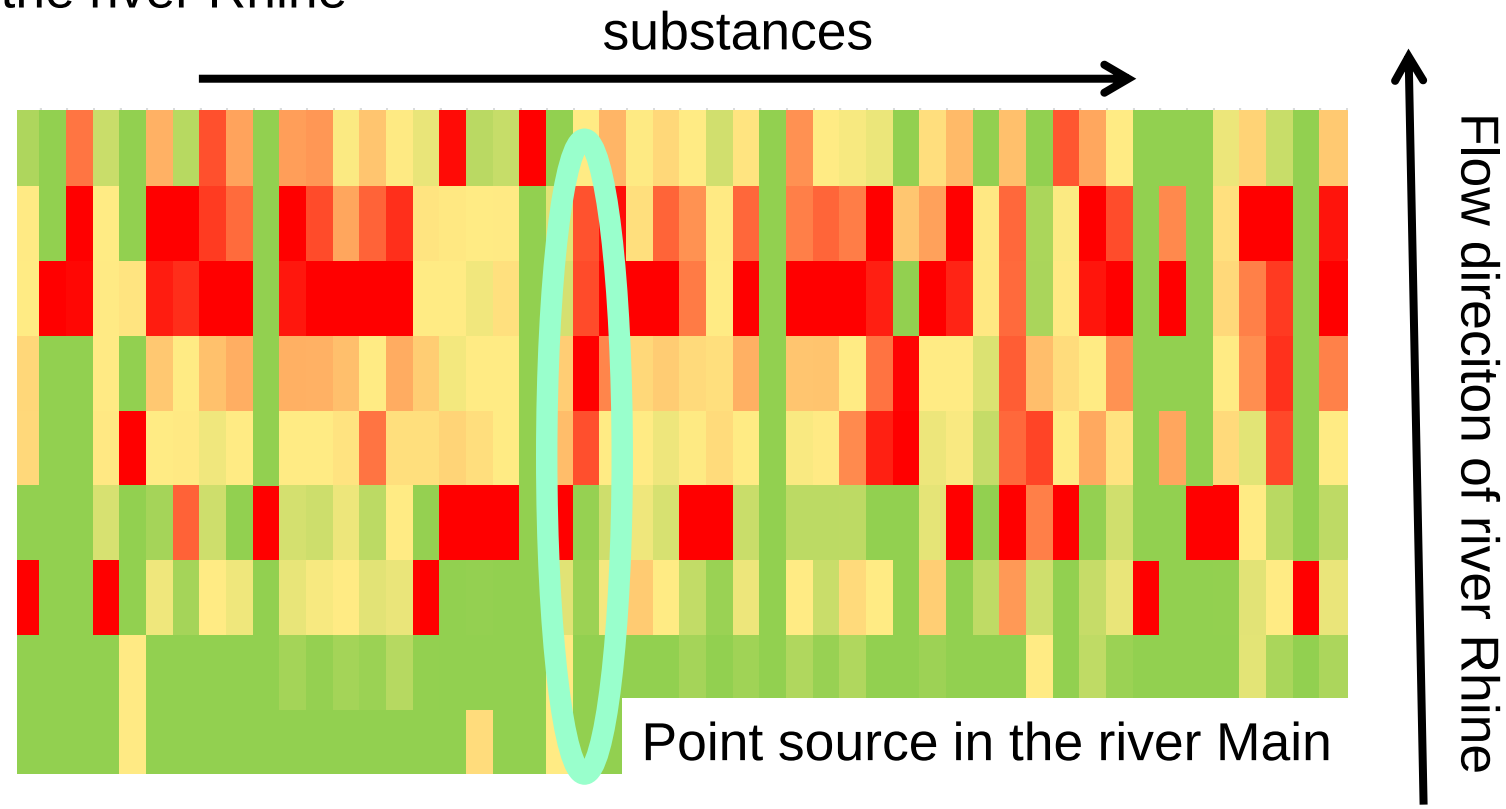


- 4 sampling campaigns (March to September 2017)
- 7 day composite samples
- **Target analysis** for 88 compounds that are not routinely measured in the Rhine catchment (16 stations)
- **Non-target analysis** (21 stations) with two different methods
  - 2 master thesis at BfG and EAWAG/AUE Basel-Stadt

Thanks to the BfG in Koblenz for organizing the sample shipment!

Special monitoring campaign 2017

Focussing on unknown compounds with point sources that are emitted along the river Rhine



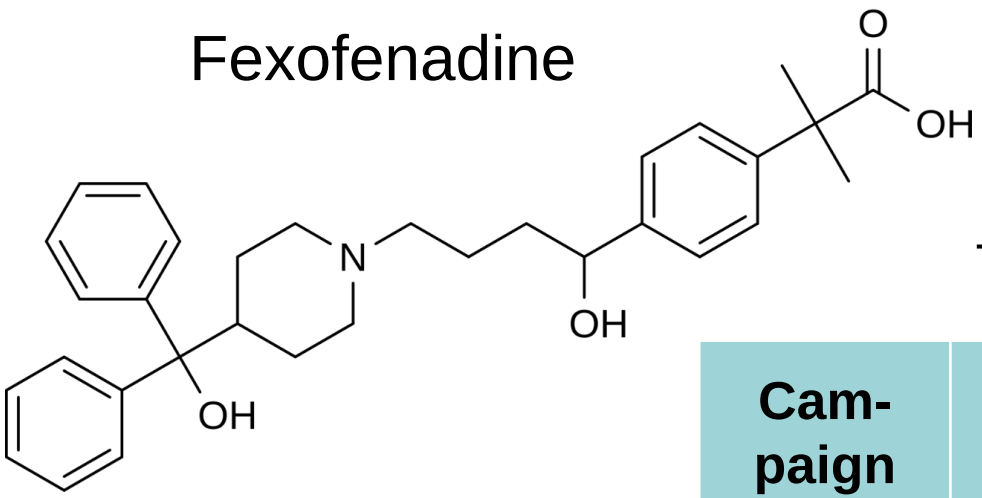
high concentrations

low concentrations

Special monitoring campaign 2017

Example: Substance primarly discharged by a source in the river Main

Fexofenadine



Antihistamine drug used in the treatment of allergy symptoms

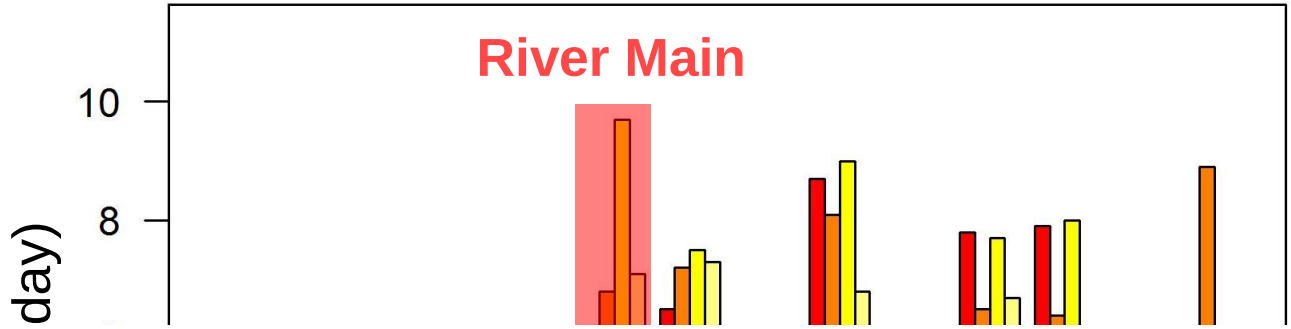
Transfer to target analysis (BfG)

Cam-paign	Rhine before Main (ng/L)	Main (ng/L)
1	< 5	480
2	16	510
3	17	840
4	10	610

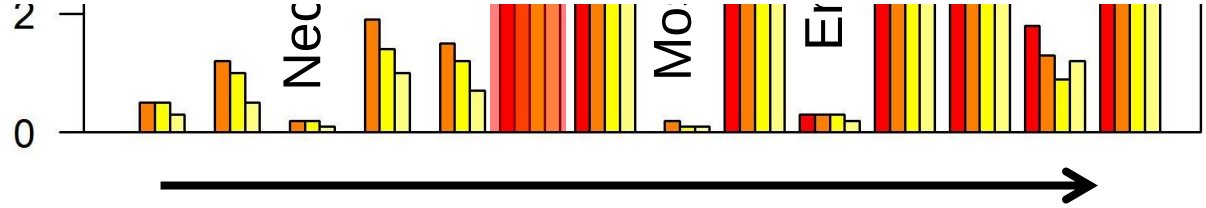
Special monitoring campaign 2017

Example: Substance primarly discharged by a source in the river Main

Fexofenadine



- Reporting of data to responsible authorities in Germany
- Discussion of potential mitigation measures



Flow direciton of river Rhine

Summary

- Harmonized methods as basis for an efficient and quick information exchange focused on leakages and unintentional discharges
- Identification of previously not recognized organic micropollutants in the Rhine catchment
- Identification no absolutely prerequisite for detection of emission sources and potential mitigation actions
- Setup of boundary conditions for a future real-time river-basin wide monitoring program and alarm concept for organic pollutants

Acknowledgements

- **NORMAN network for invitation**
- **IPCR and all members of EG SANA for valuable contributions**

Departement für Wirtschaft, Soziales und Umwelt des Kantons Basel-Stadt
Amt für Umwelt und Energie

bfg Bundesanstalt für Gewässerkunde

AGENCE DE L'EAU RHIN•MEUSE
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

brgm

TZW Technologiezentrum Wasser

LUBW

LANUV Kompetenz für ein lebenswertes Land

eawag aquatic research

umweltbundesamt

Zweckverband Landeswasserversorgung

Rijkswaterstaat
Ministry of Infrastructure and the Environment