Development of a protocol for the risk assessment of complex PFAS contaminations

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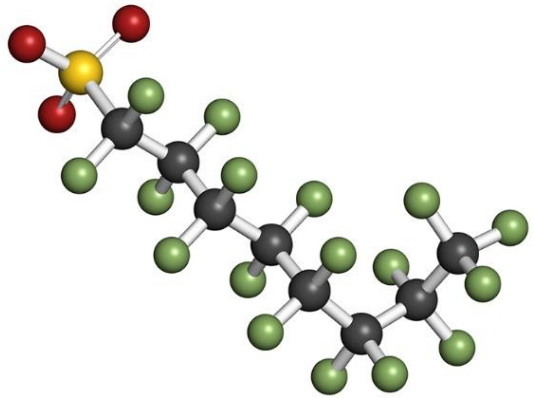
Problem statement

Identification → Assessment → Management
of PFAS contamination in ground and groundwater

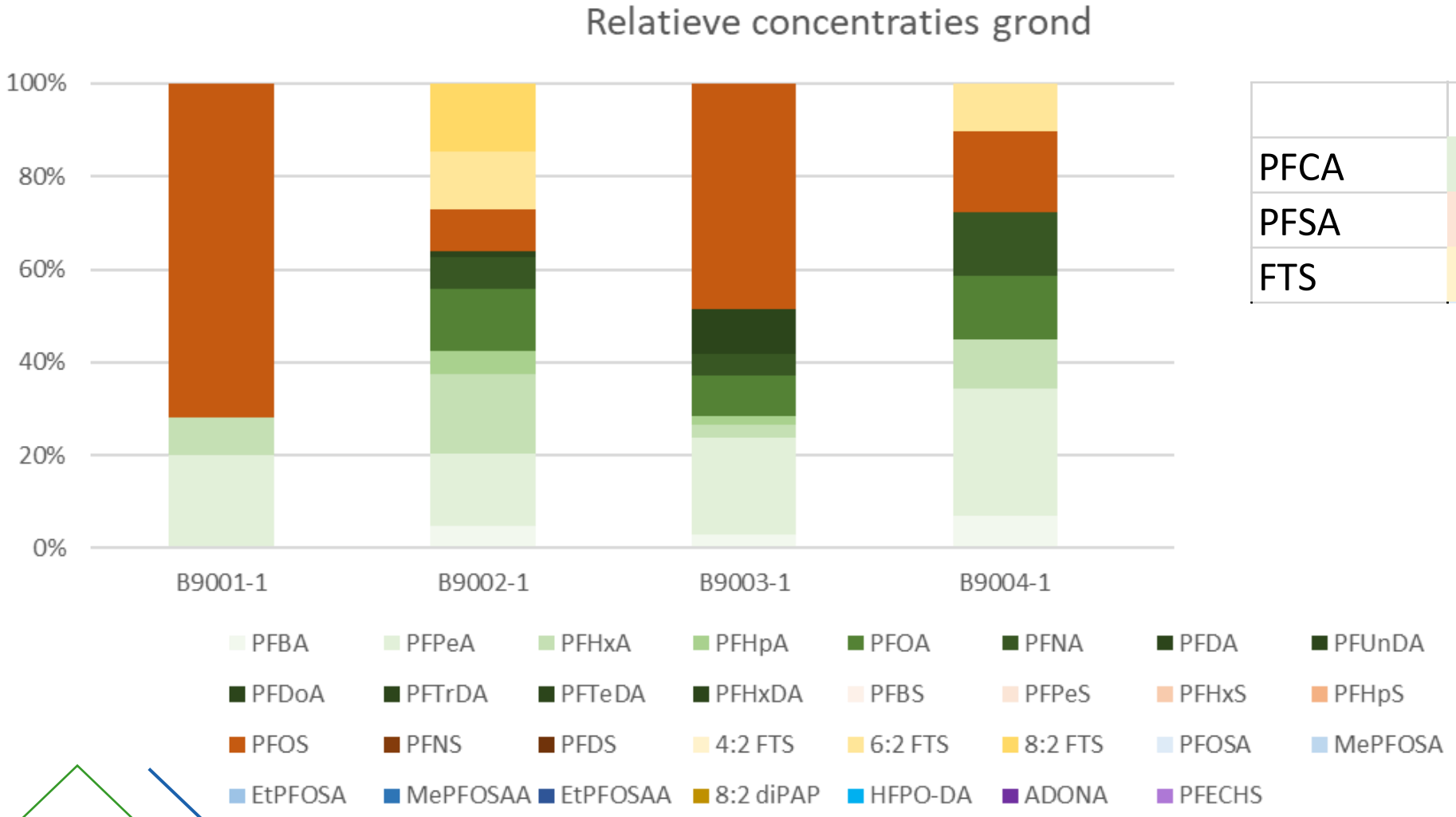
- Inadequate **Identification**
  - Lack of adequate analysis protocols
  - False negative results
- Inadequate **Assessment**
  - No clear risk assessment protocols
  - Norms often arbitrary



Objective

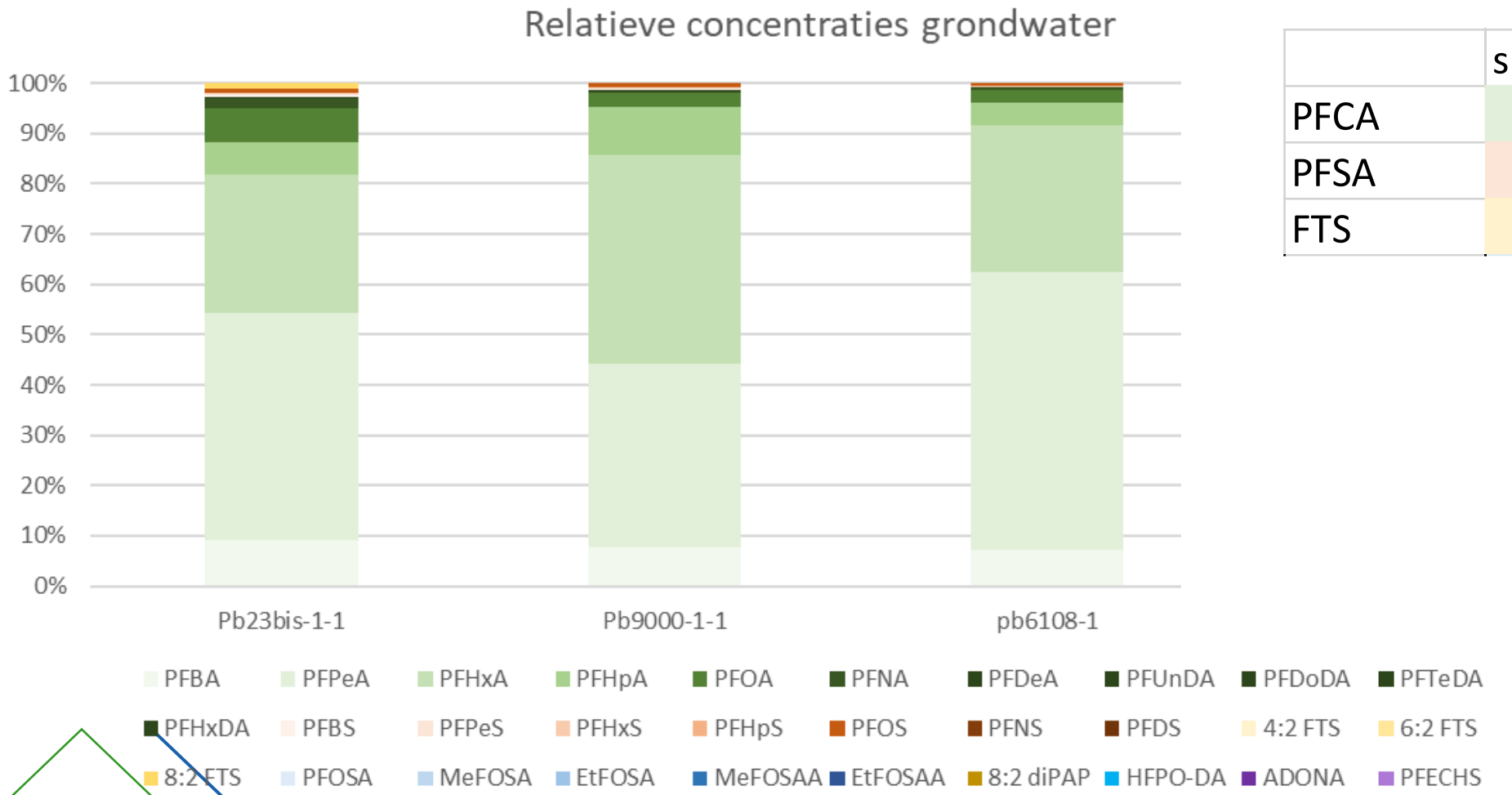
- Development of **quantification protocol** for total PFAS contamination
- Development of **risk evaluation protocol**
  - single components
  - mixtures

Case: foam intervention - soil



	short → long chain
PFCA	
PFSA	
FTS	

Case: foam intervention - groundwater



	short → long chain
PFCA	
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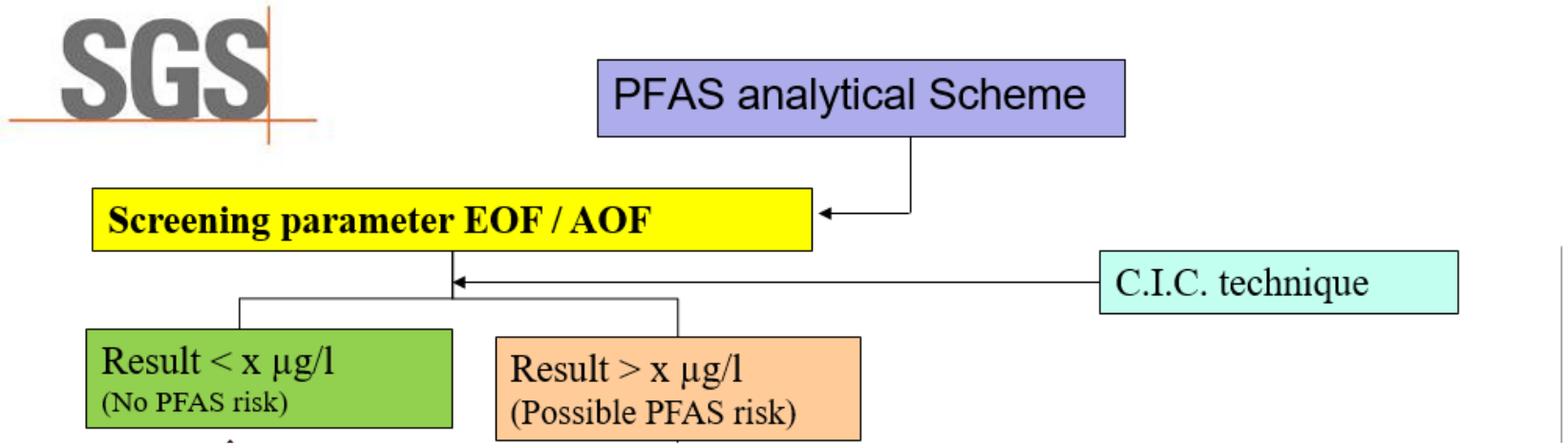
Methods

- Improved quantification via **3 step method**

3 step method



Methods

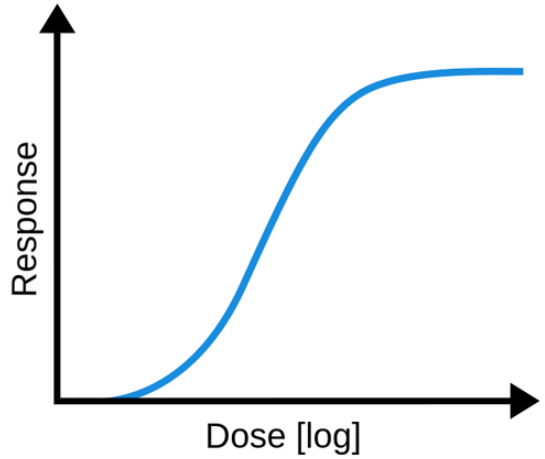
- Improved quantification via **3 step method**
- Improved **risk assessment**:
  - Ecotoxicity tests
    - Single PFAS components
    - Mixtures
  - Bioassay tool

Risk evaluation

- **Ecotox impact** observable on microorganisms?
- Can **lowest effect level** be determined?
- **Influence of mixture** on the ecotox behaviour?

Risk evaluation - Ecotoxicity

- **Organism** selection according to trophic levels
  - Algae (pseudokirchneriella), Daphnia magna, Fish (Danio rerio)
- **Single PFAS** effect assessment
  - Concentration response curve
  - Input for models
- Artificial **PFAS mixture** effect assessment
- Experimental assessment of all mixtures **too costly**



Risk evaluation – bioassay tool

- Bioassay tool development enables **site specific risk assessment**
  - pilot sites
  - replication sites
  - and future commercial use

- Benefits **efficiency** and **price**

Prospects of PFAS assessment

- **3-step method** for total PFAS estimation avoids false negative results
- **Bioassay tool** for risk assesment enables site specific decisionmaking on PFAS-contaminated sites
- Driver for EU policies & legislation on PFAS

Take home

- Avoid underestimation of PFAS contamination
  - Who bears the liability?
- Improved contamination assessment through better quantification and risk evaluation

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