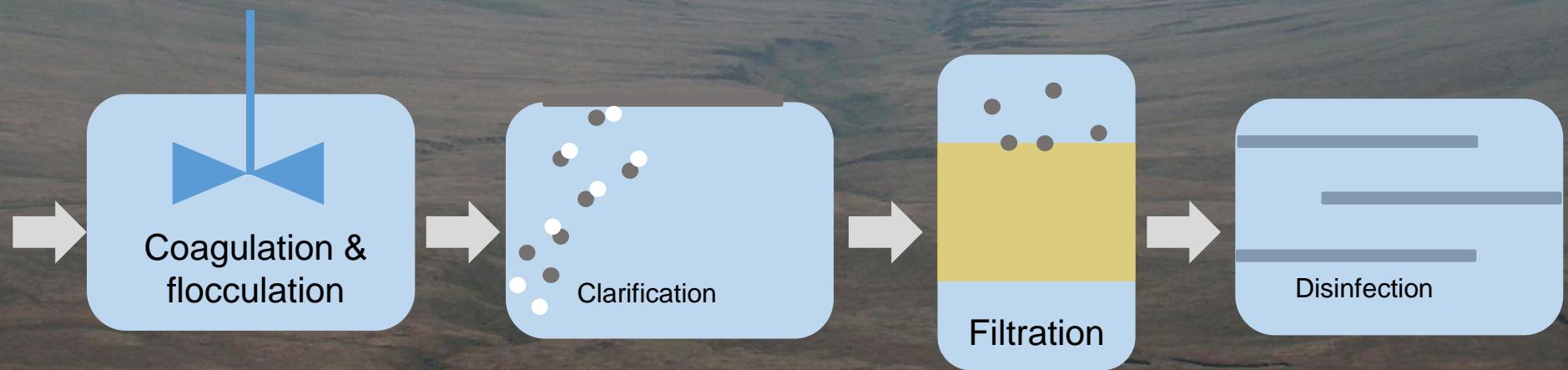




# Why is DOC in water important?

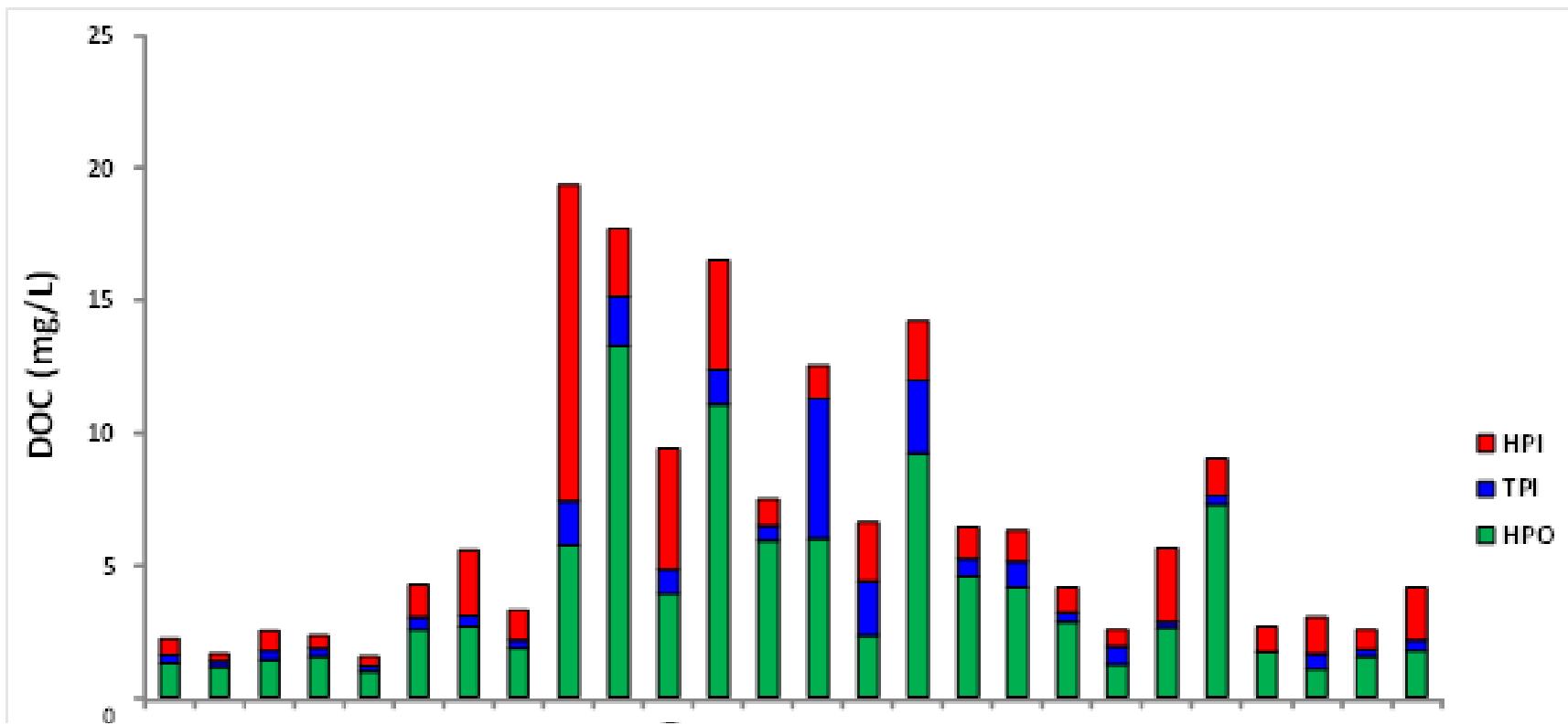
Peter Jarvis

[www.cranfield.ac.uk](http://www.cranfield.ac.uk)

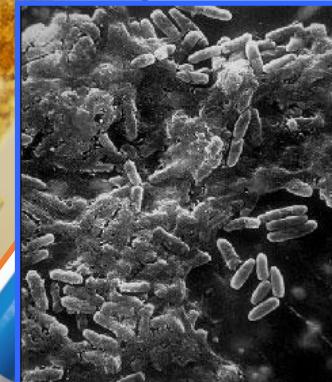
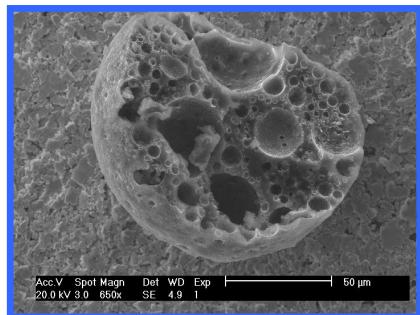
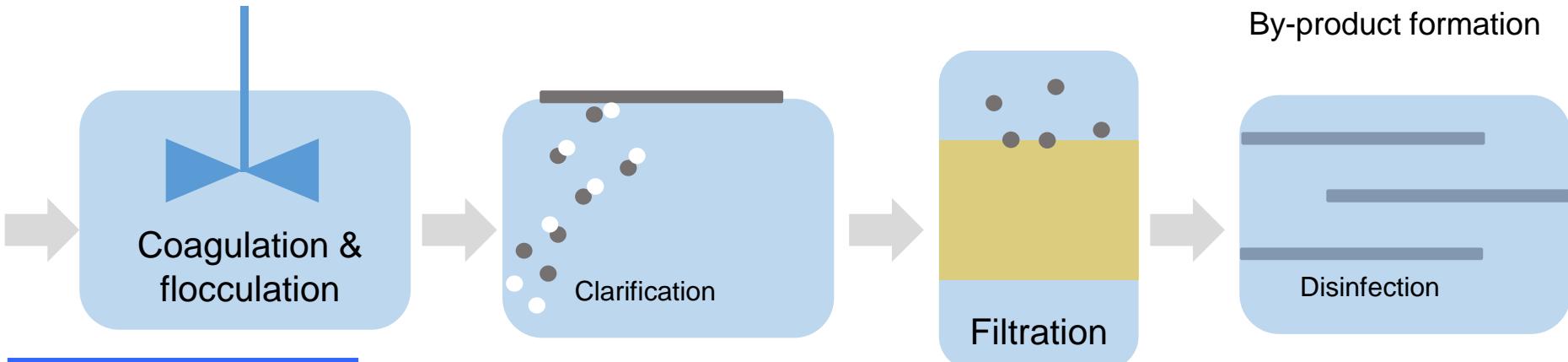




# What is Natural organic matter: NOM?



Complex matrix that varies temporally and spatially



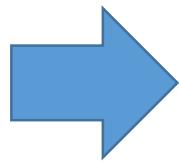
Impact on treatment

Biofilms

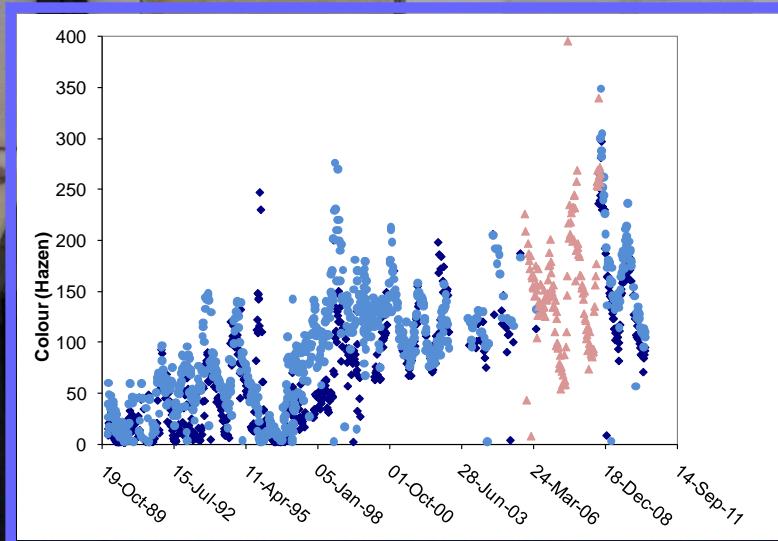
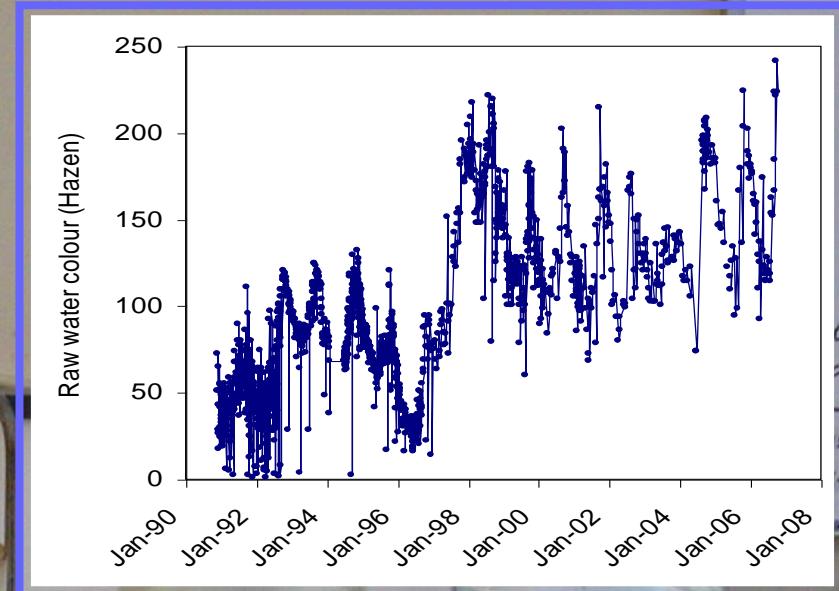
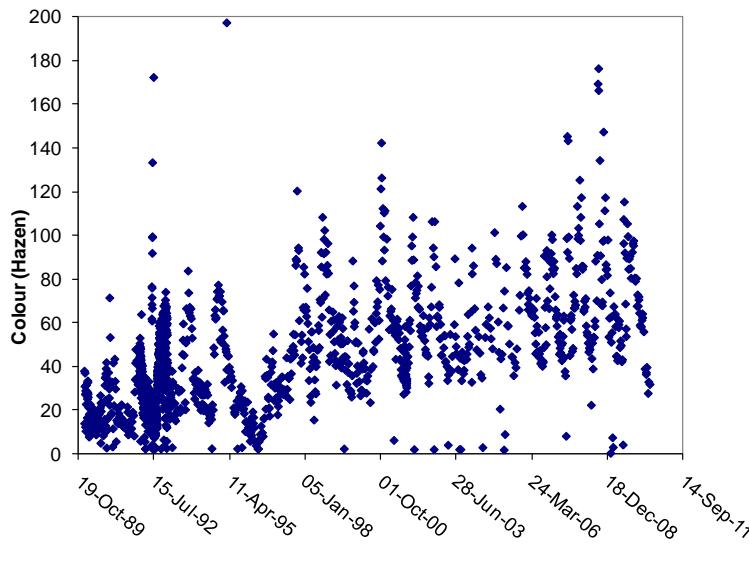




# Water Quality



# What impact has this had on water quality?

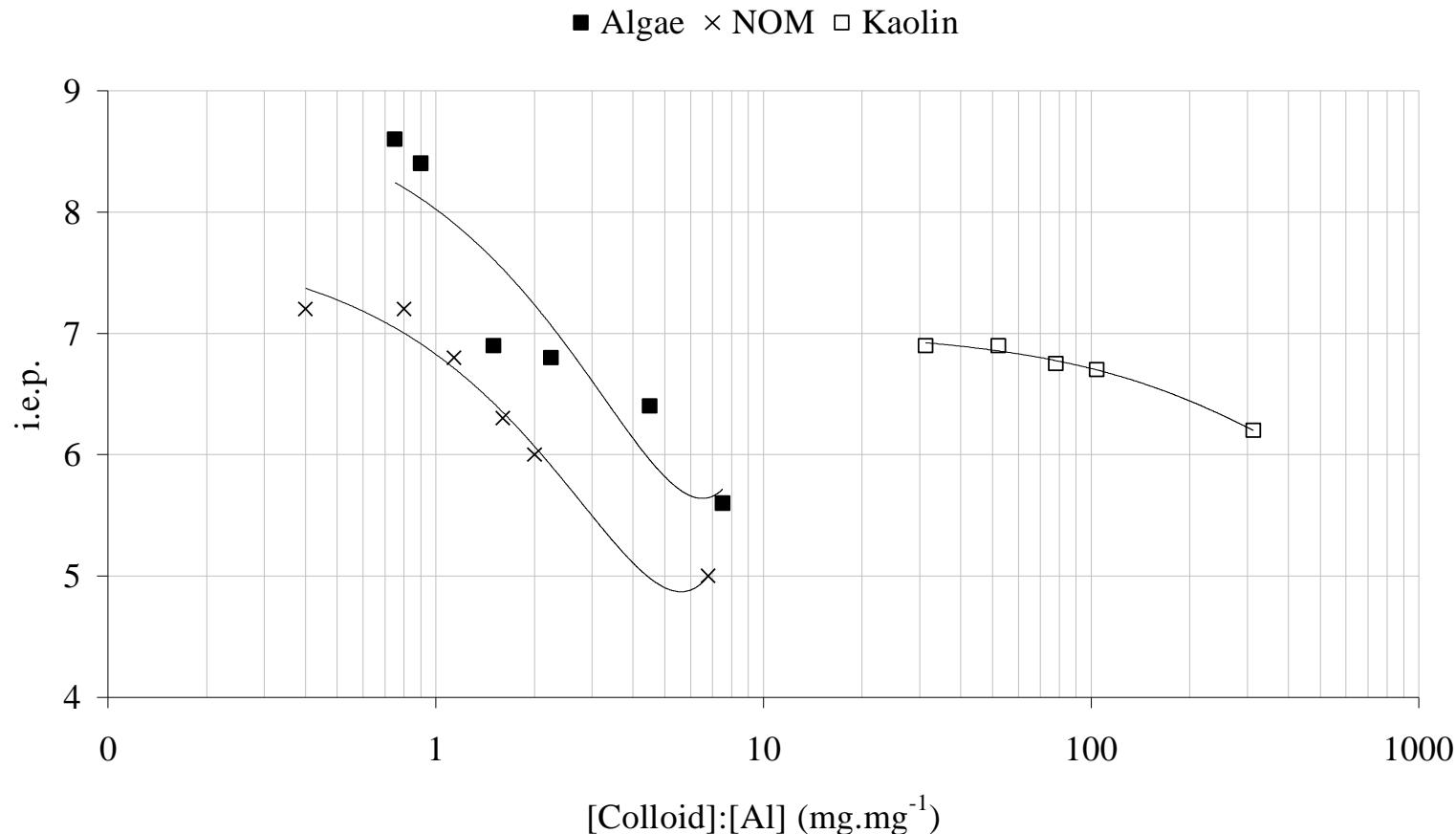


SOLVENT  
OR SAMP  
COPE  
Ria A 09  
SLUDGE

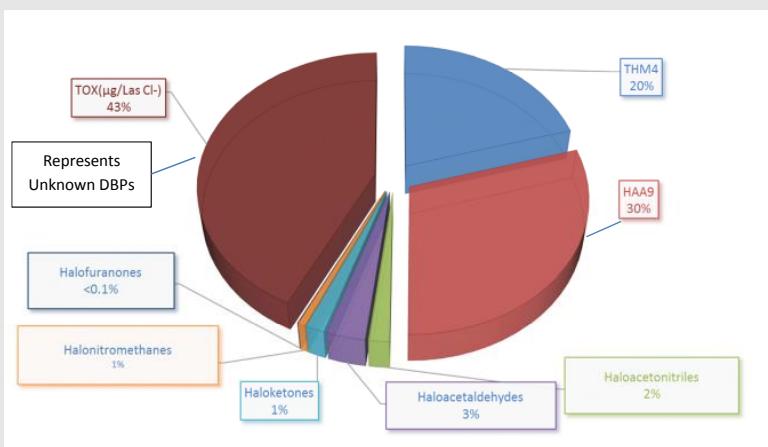


# What impact has this had on water treatment?

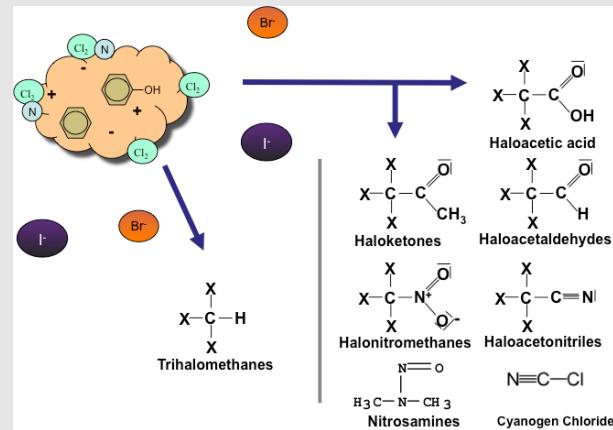
## NOM controls coagulation



# DBPs: risk assessments



Relative importance of DBPs



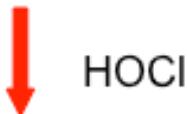
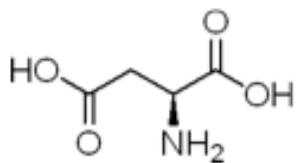
Can THMs be used as a surrogate for all?



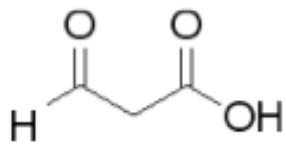
Can we predict DBPs:  
The problem is that NOM can have very different properties

Removal is very similar yet disinfection by-product formation is very different

Aspartic acid



HOCl



β-keto acid compound

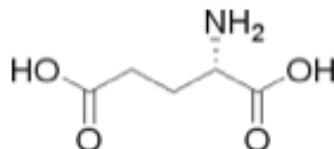


HOCl

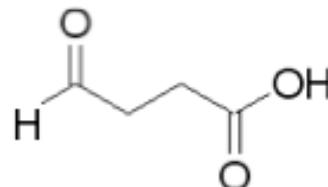
THMFP = 32 µg.mg<sub>DOC</sub><sup>-1</sup>

HAAFP = 464 µg.mg<sub>DOC</sub><sup>-1</sup>

Glutamic acid



HOCl



Not a β-keto acid compound

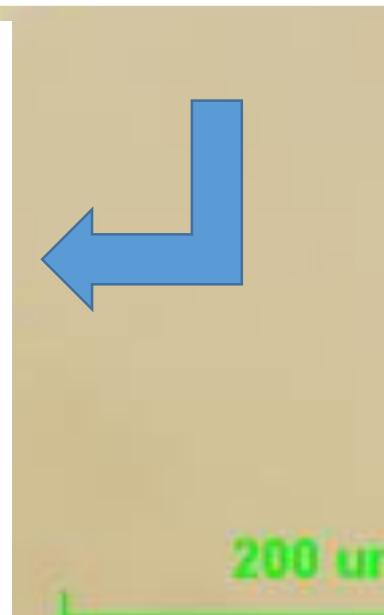
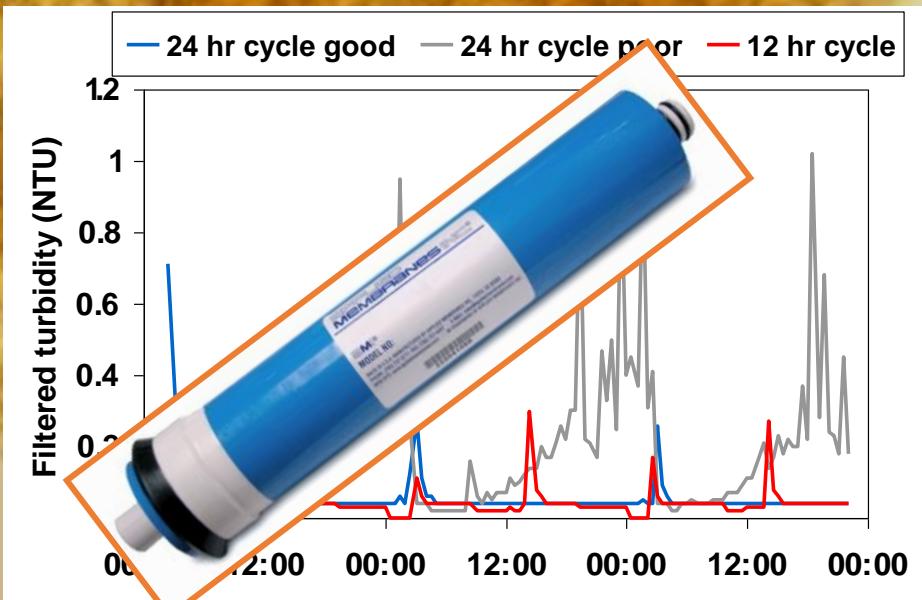
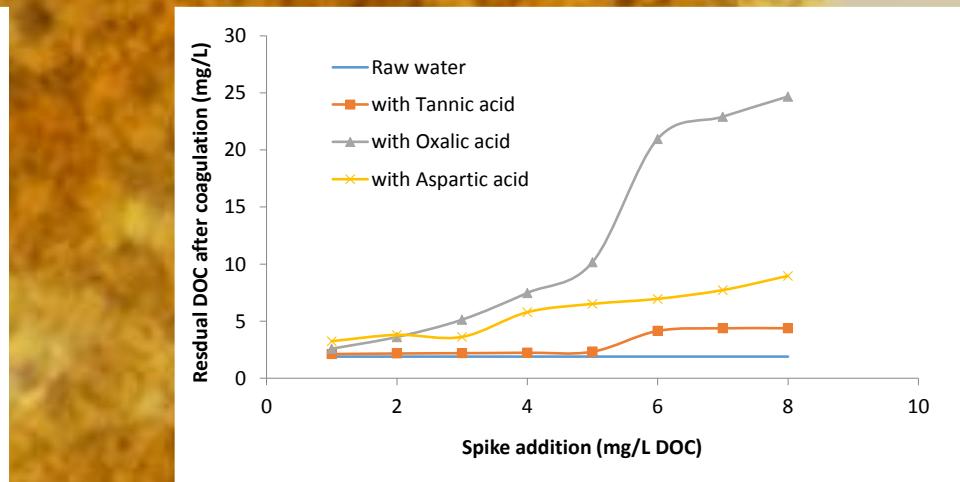
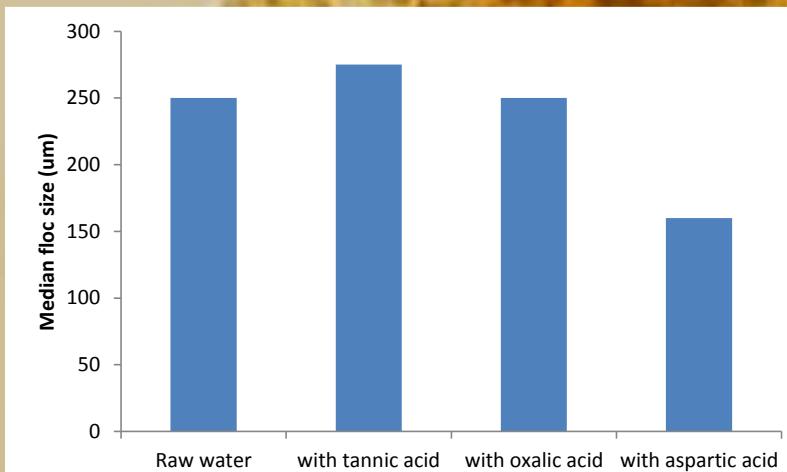


HOCl

THMFP = 3 µg.mg<sub>DOC</sub><sup>-1</sup>

HAAFP = 5 µg.mg<sub>DOC</sub><sup>-1</sup>

# Different NOM molecules impact processes in different ways

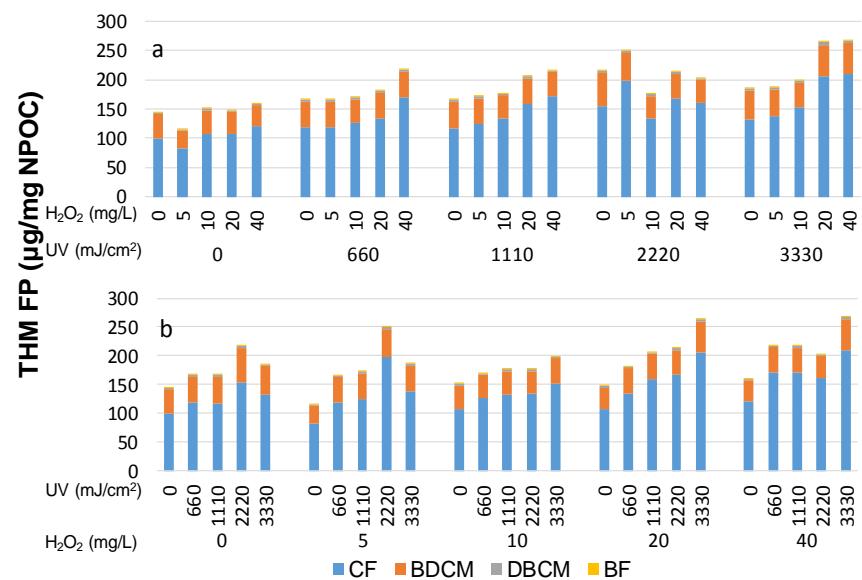
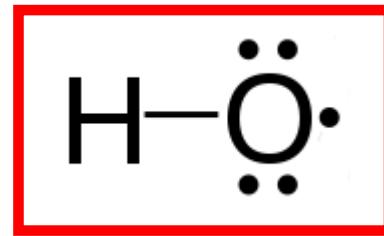
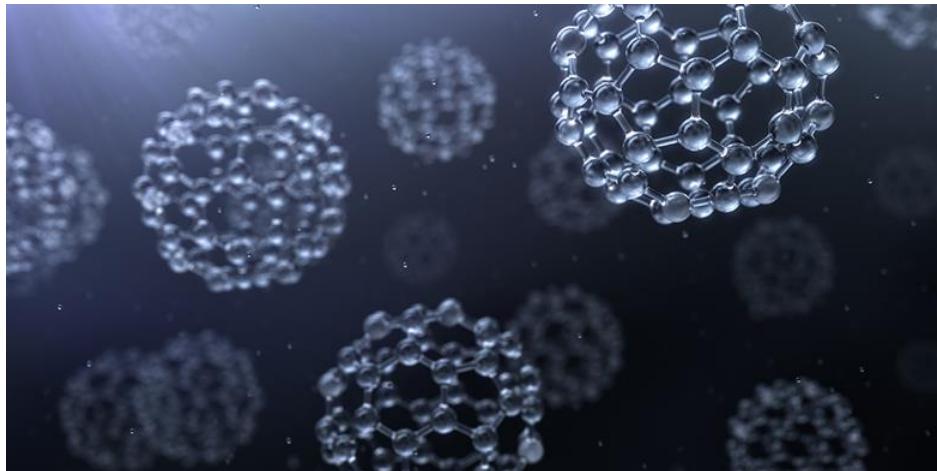




# Influence of NOM on other processes



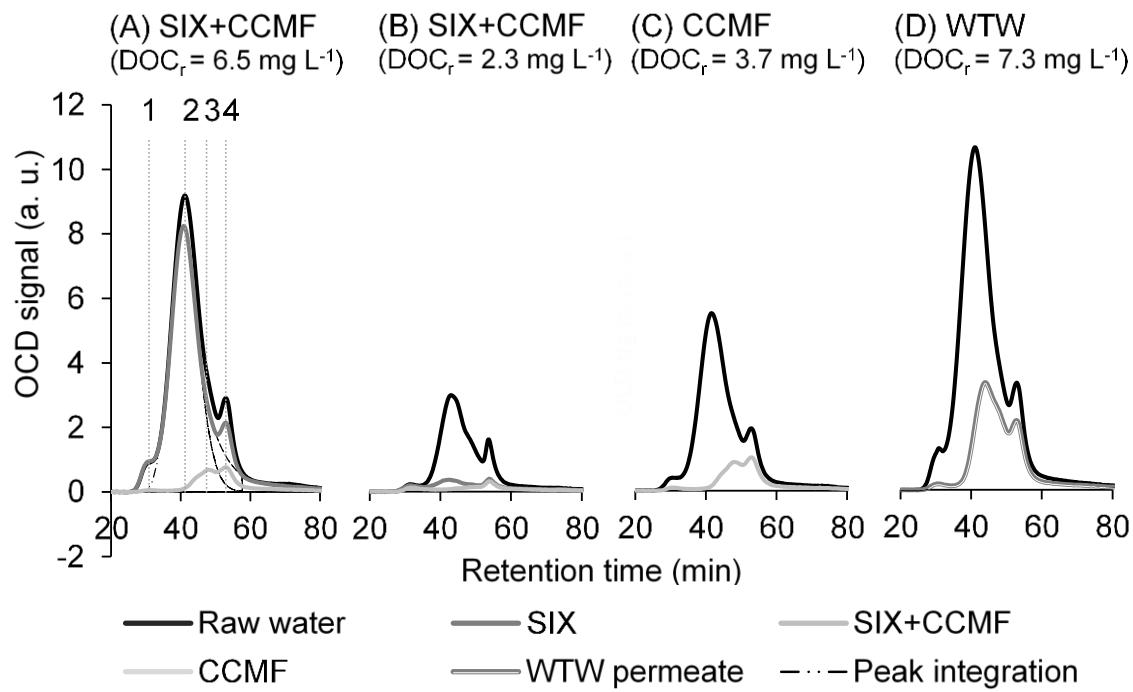
© picture alliance/JOKER/A. Stein





# What can we do?

Know more about what we are treating



Treatment optimisation

Coagulant comparison

New processes

## What can we do?

### Develop rules for good coagulation practice

How much coagulant  
do I need?

- Hydrophobic content
- Charge load

How do I optimise  
the process?

- Zeta potential

How much DOC  
will remain?

What DBPs will  
form?

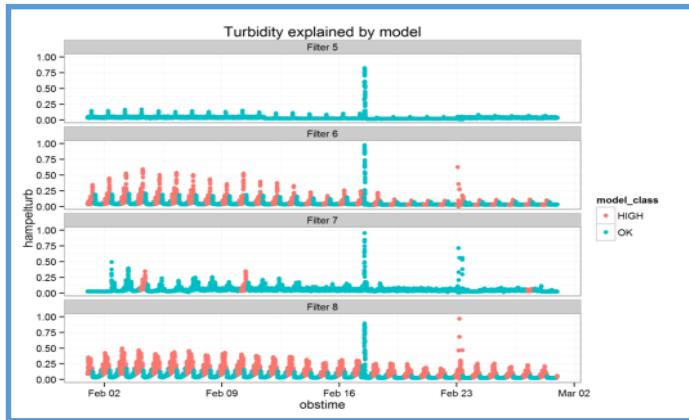
- Hydrophilic content
- No idea!

Be aware that not all NOM can be removed

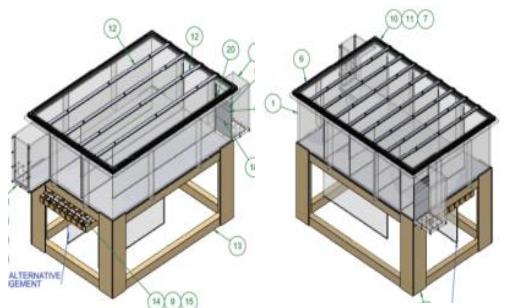


# What else can we do?

## Process optimisation, monitoring & data



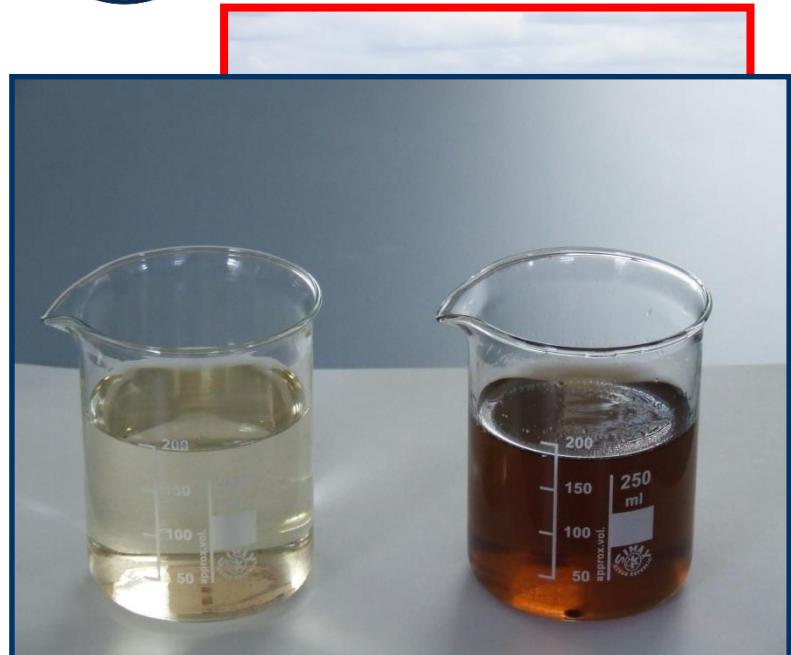
## Alternative processes



## Disinfection

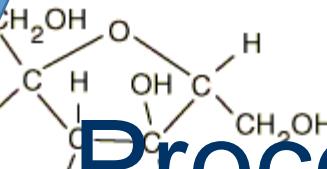


# NOM: The challenges



Rapid, cheap, relevant  
characterisation  
operationally relevant  
catchment management

Optimisation  
Process  
selection



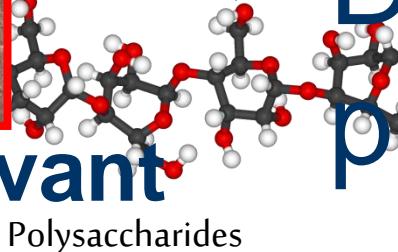
Sugars

Process  
selection

Disinfection by-  
products



Subfraction  
Humic acids



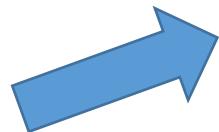
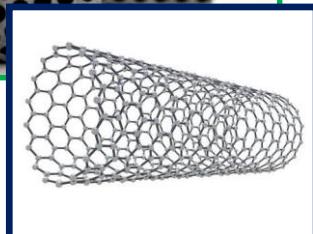
Polysaccharides



Fatty acids



# NOM: The challenges



Low waste

Better water  
quality

Cost effective

Biologically  
stable

New treatment processes

# Acknowledgements

