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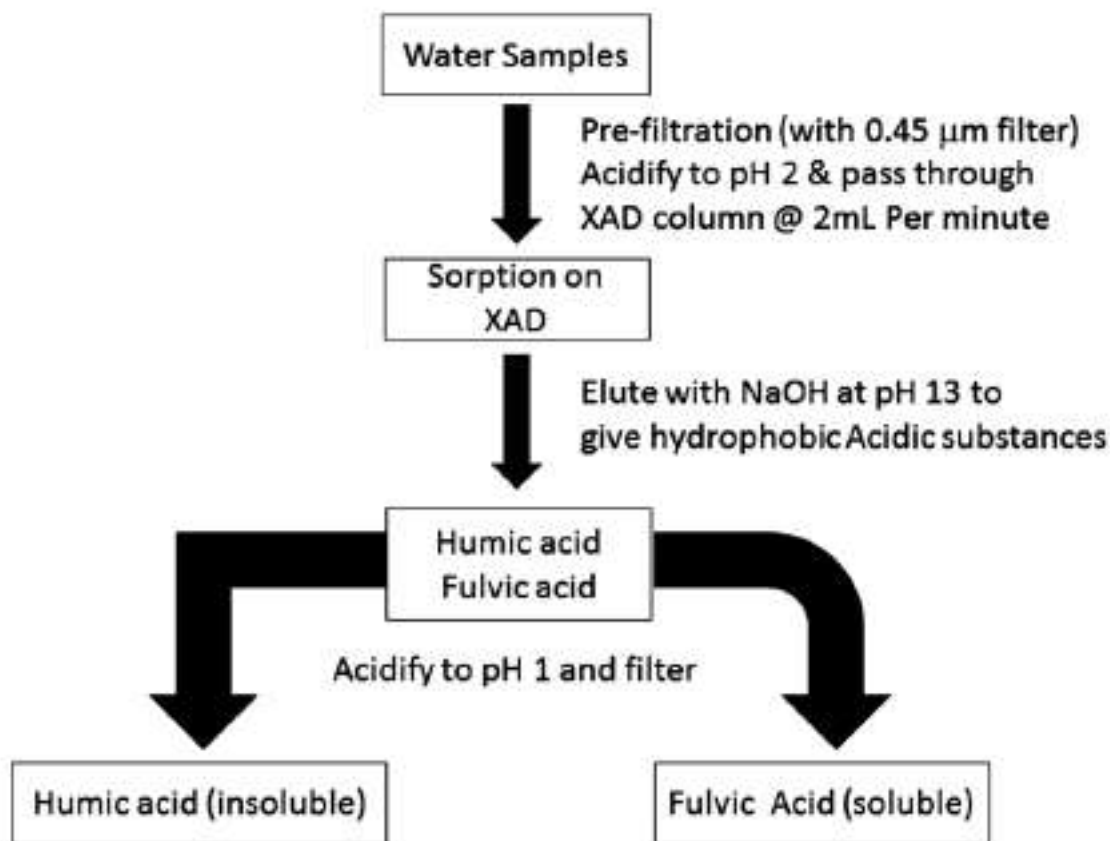
Nature and reactivity of Dissolved Organic Matter from the Rio Negro

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General Context

Do the operationally defined Humic Substances represent a native state of Natural Organic Matter (NOM/DOM) ?



General Context

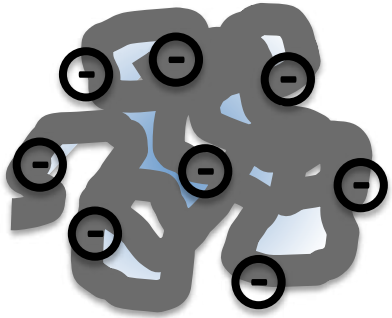
Do the operationally defined Humic Substances represent a native state of Natural Organic Matter (NOM/DOM) ?

Two opposing camps:

(1) HS are laboratory artefacts - NOM is a continuum of more or less degraded biopolymers

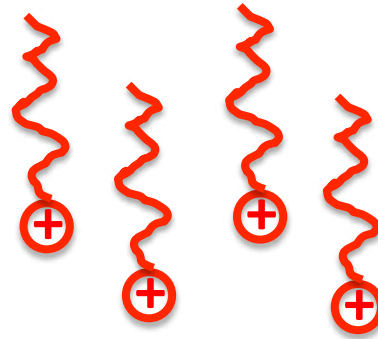
(2) HS are slightly altered versions of NOM but useful as a proxy. HS correspond to supramolecular assemblies of small heterogeneous molecules

How to test these hypotheses experimentally ?



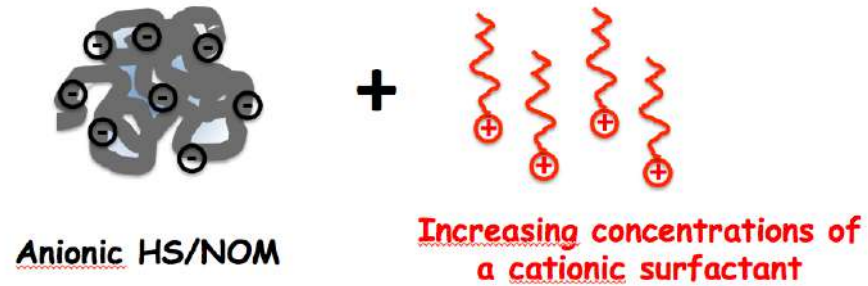
Anionic HS/NOM

+

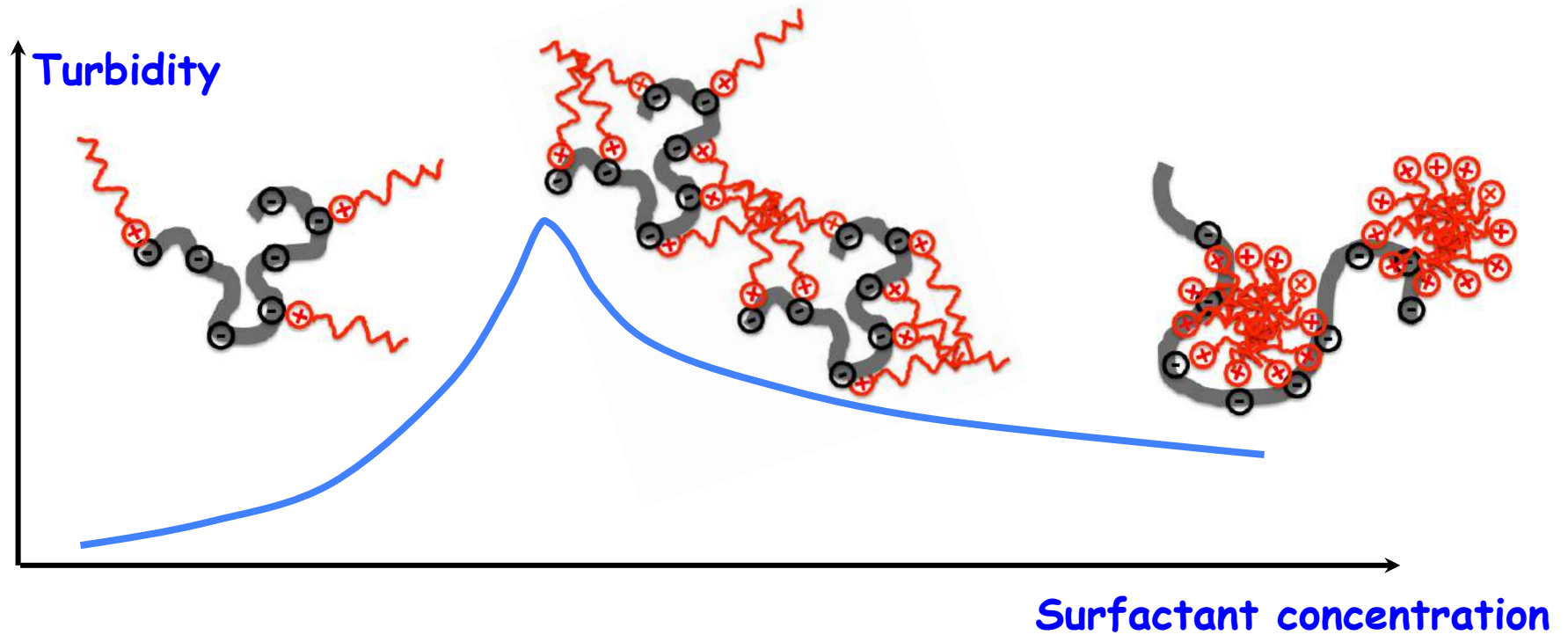


Increasing concentrations of
a cationic surfactant

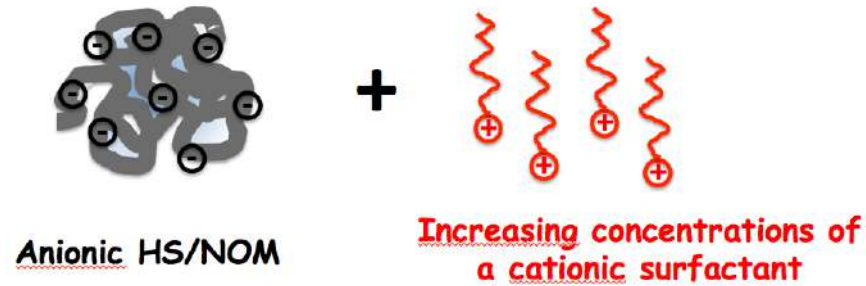
How to test these hypotheses experimentally ?



HS/NOM = degraded biopolymers

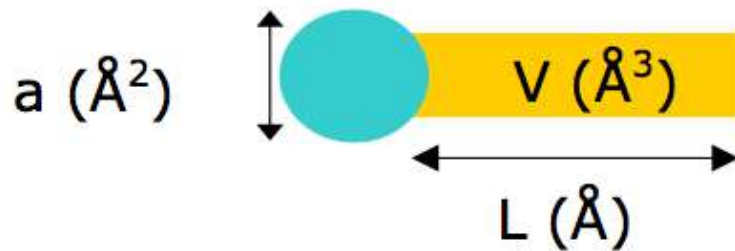


How to test these hypotheses experimentally ?



HS/NOM = Supramolecular assembly

Packing parameter $P = V/aL$



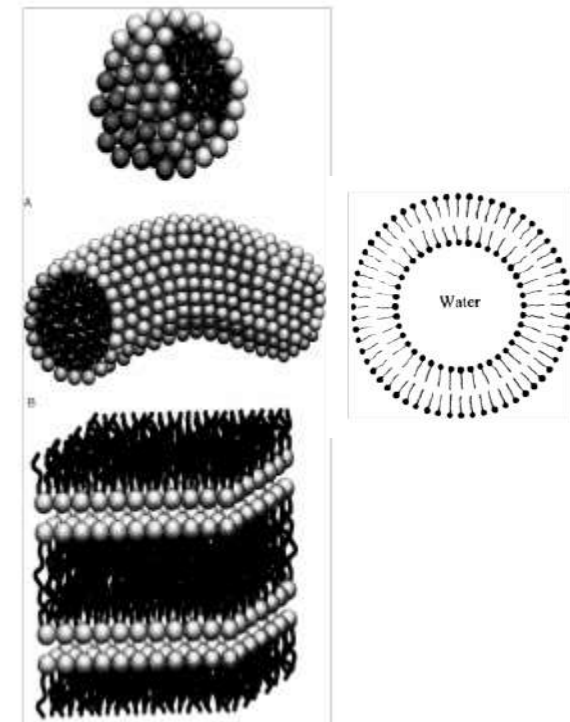
$P < 1/3$



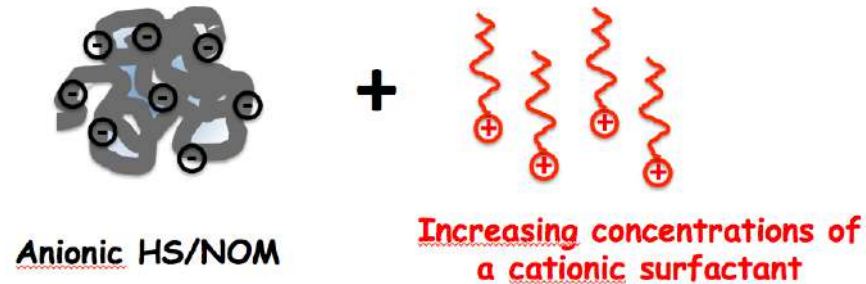
$1/3 \leq P < 1/2$



$P \sim 1$

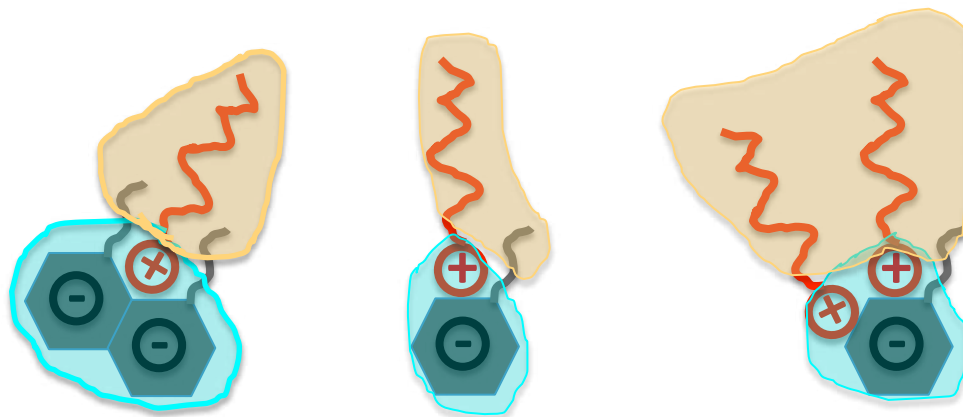


How to test these hypotheses experimentally ?

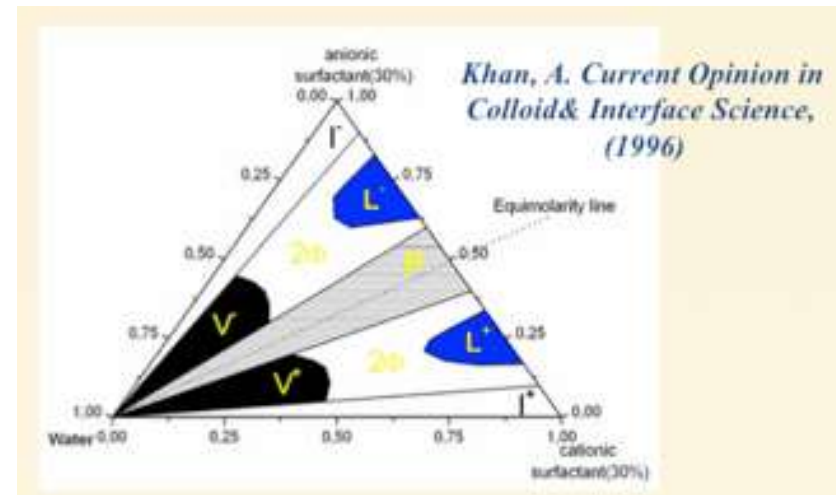


HS/NOM = Supramolecular assembly

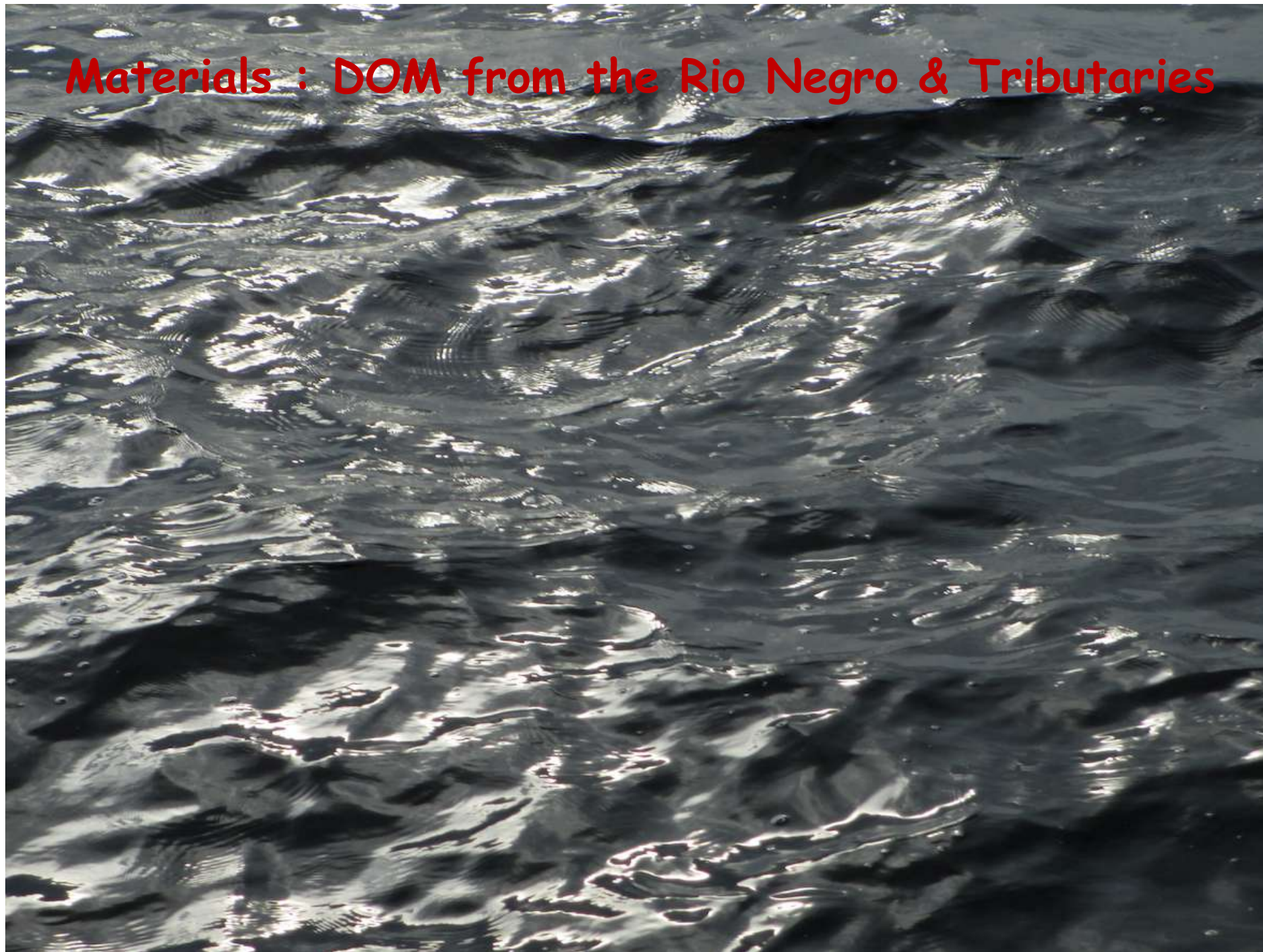
Shape of the building unit



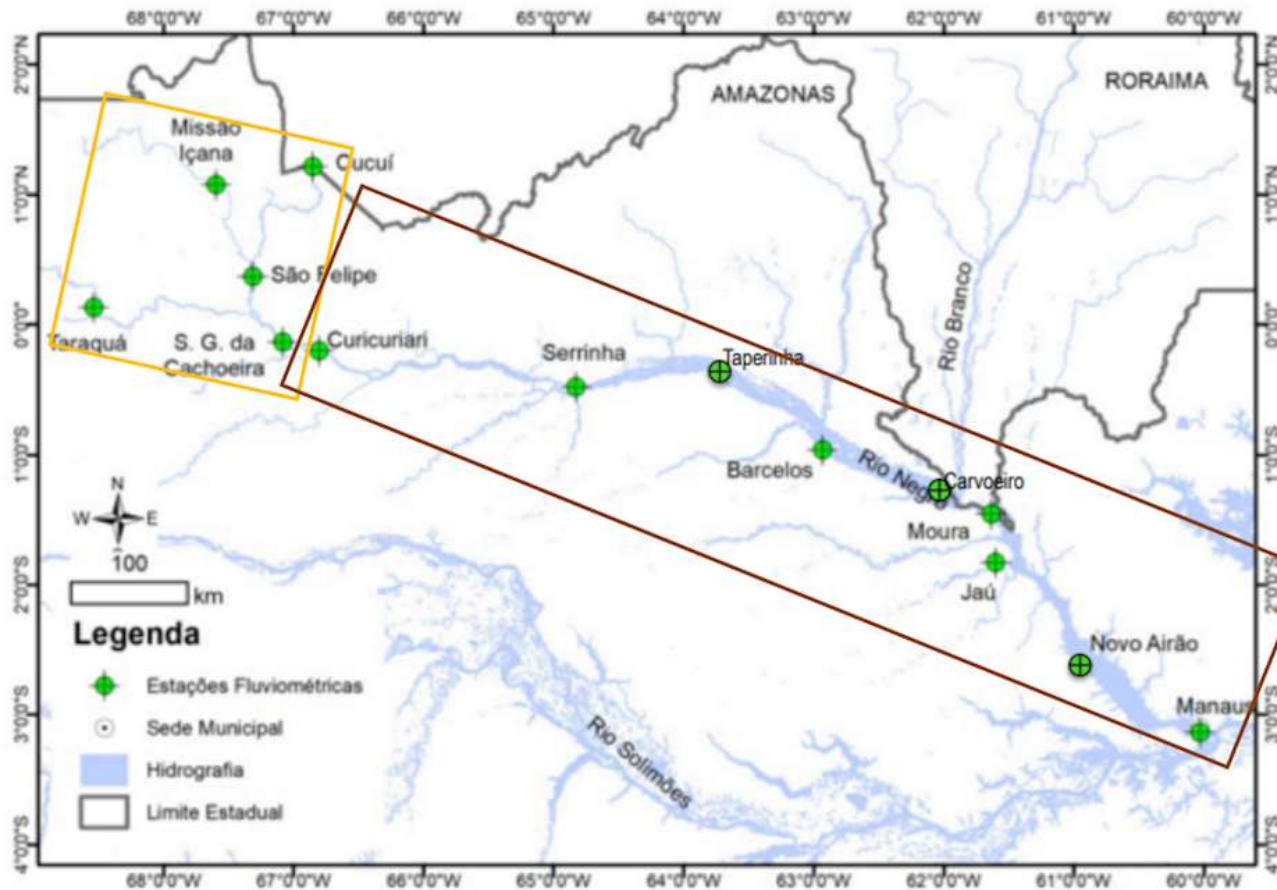
Surfactant concentration



Materials : DOM from the Rio Negro & Tributaries



sampling
period in the
upstream
15 – 23/11



sampling
period in the
downstream
24/11 a 3/12

Materials : DOM from the Rio Negro watershed

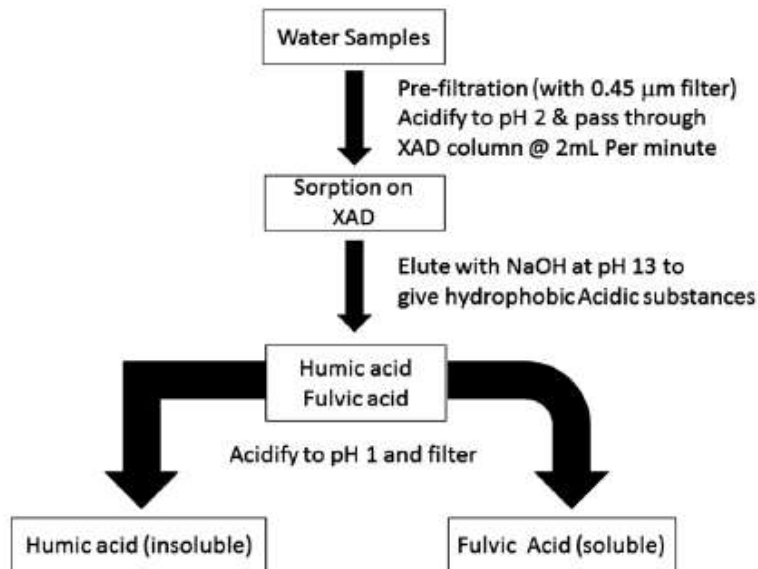
18 sampling sites - filtration at 0.2 μm

DOC, EEM fluorescence spectroscopy, UV-visible spectroscopy,

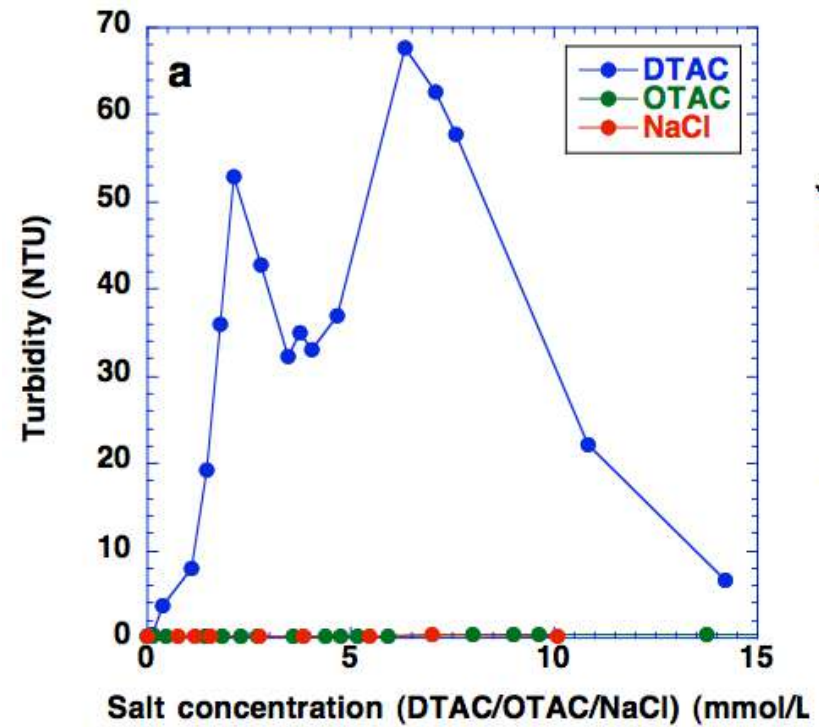
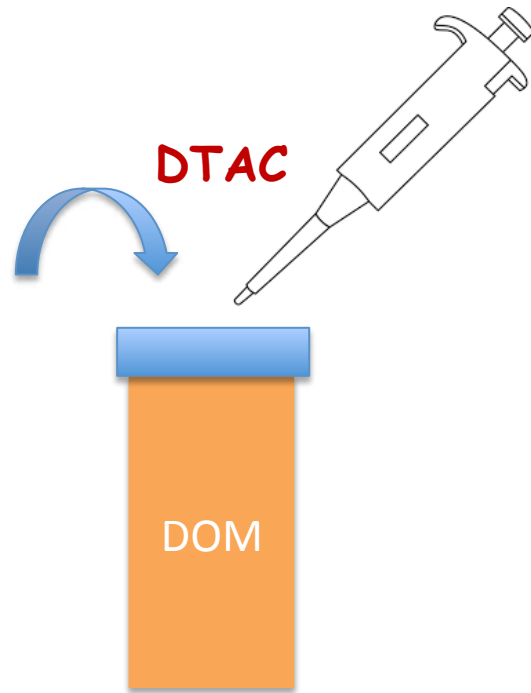
Cationic surfactant = Dodecyltrimethylammonium chloride or DTAC



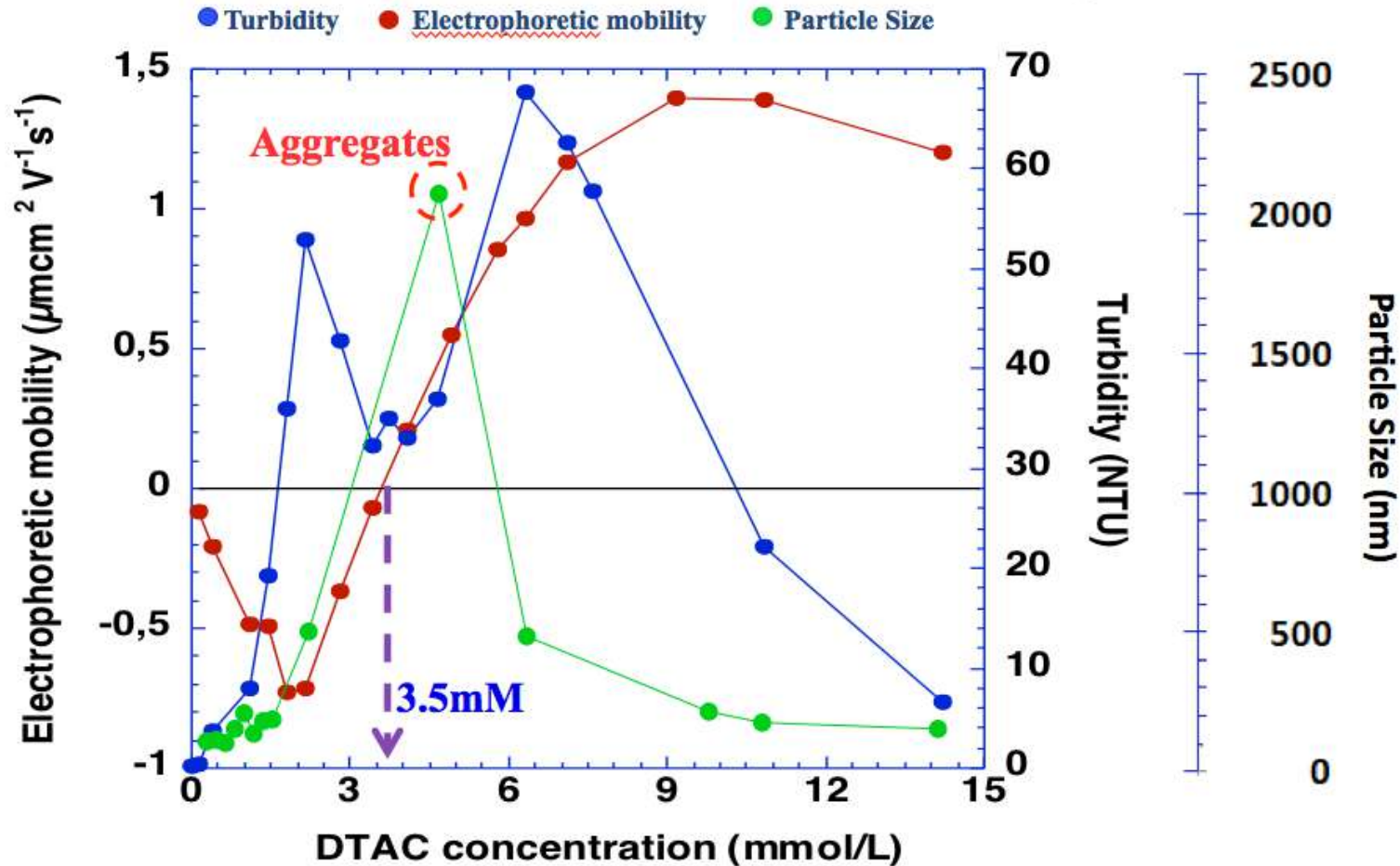
2 IHSS references : Suwannee River Fulvic Acid and Humic Acid



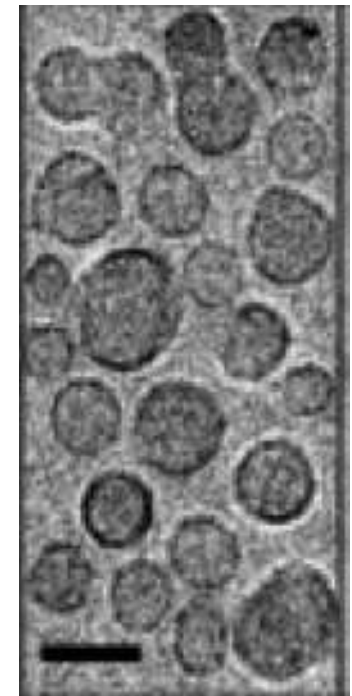
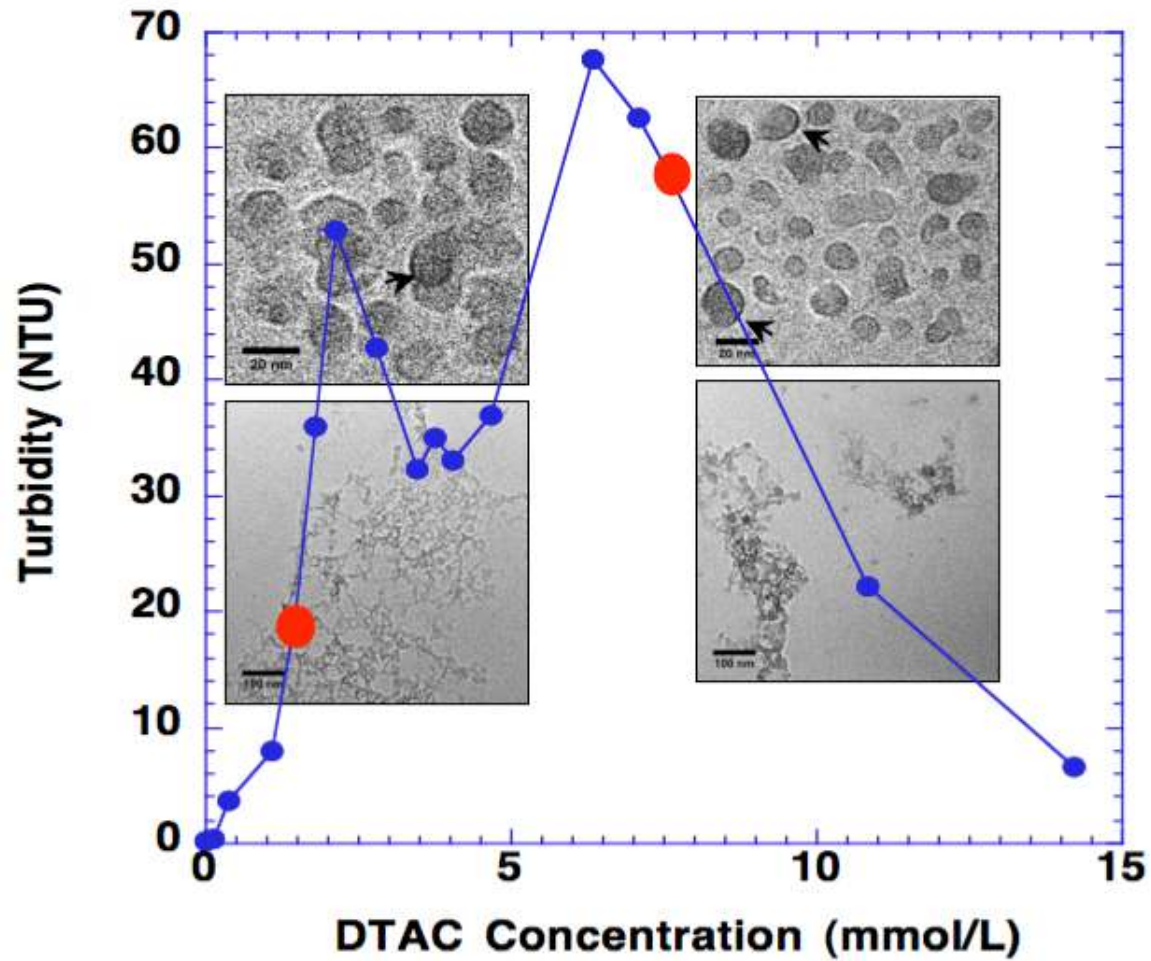
SRFA probed with DTAC - Turbidity curve



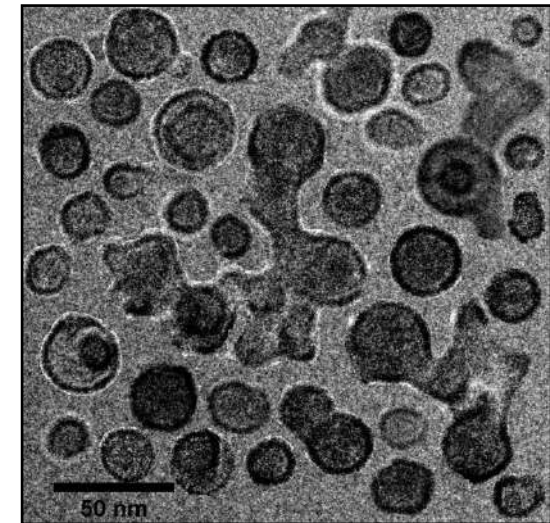
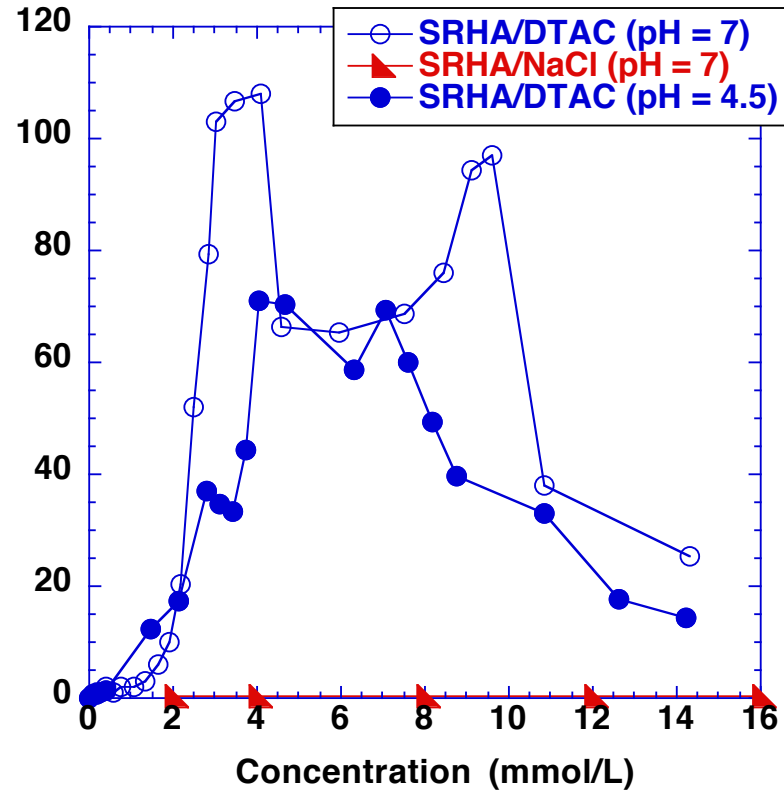
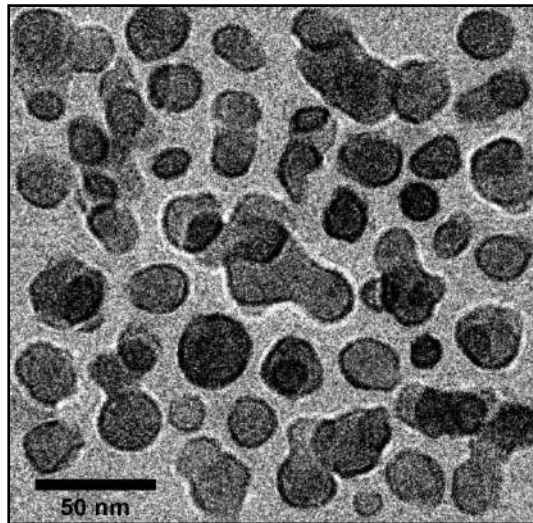
SRFA/DTAC - Electrophoretic mobility curve



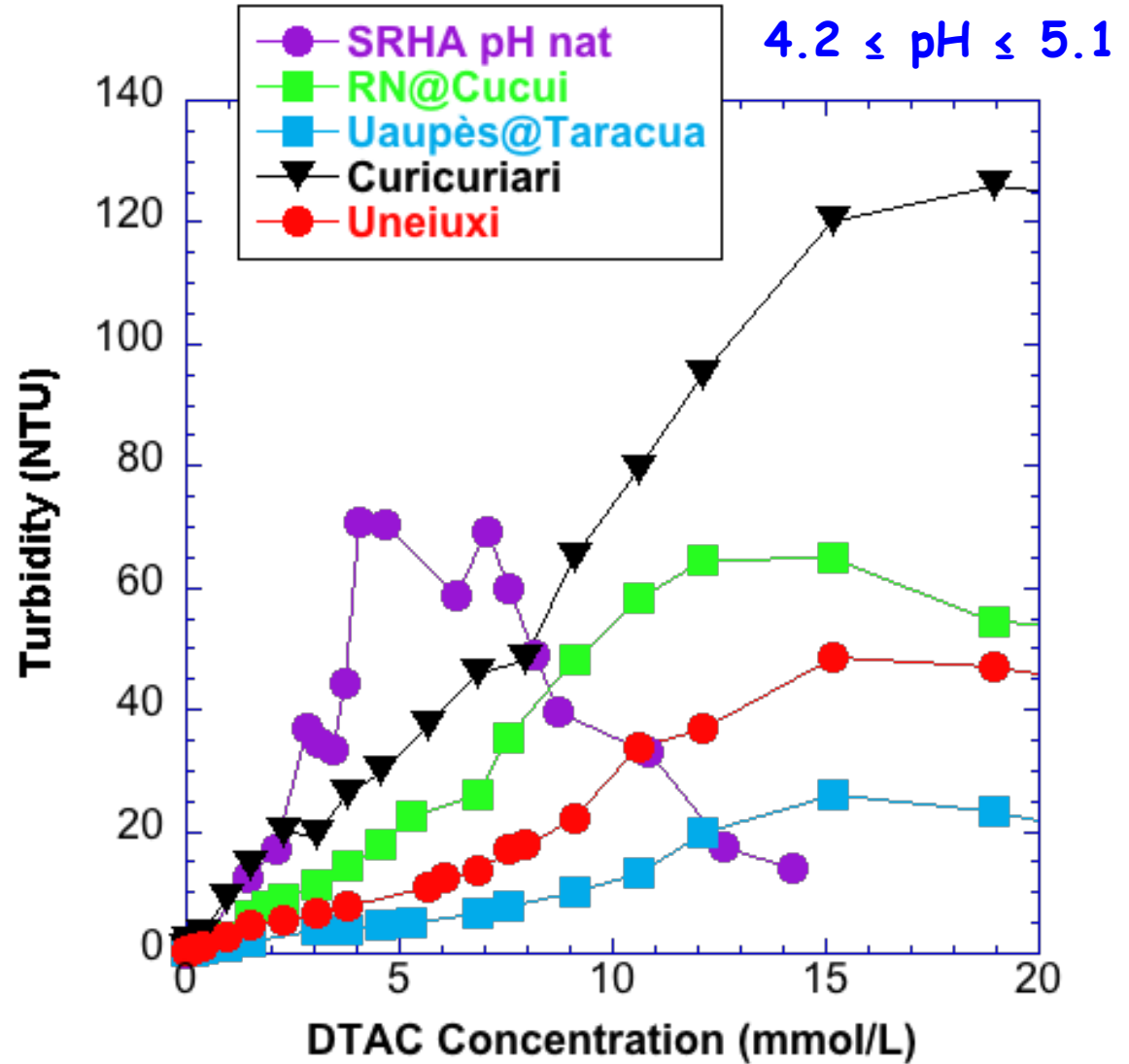
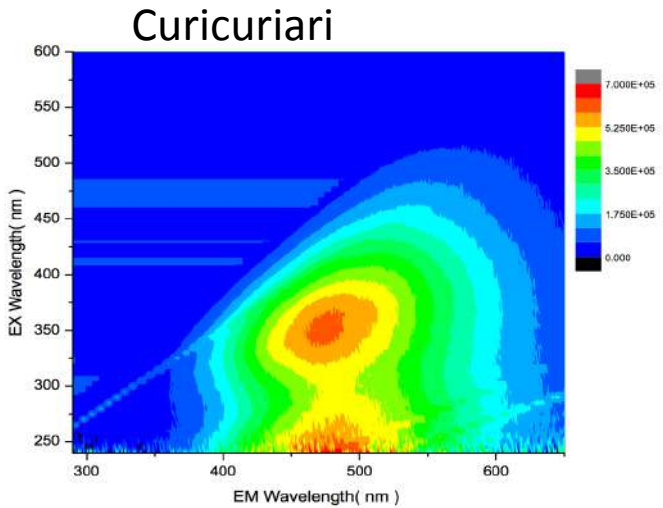
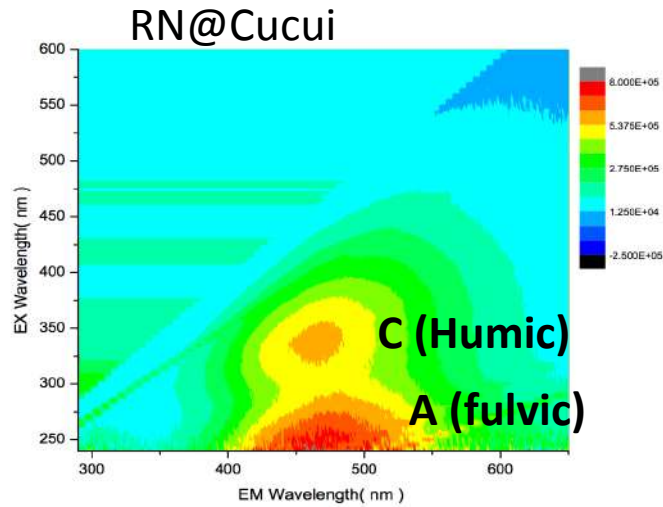
SRFA/DTAC - CryoTEM observations



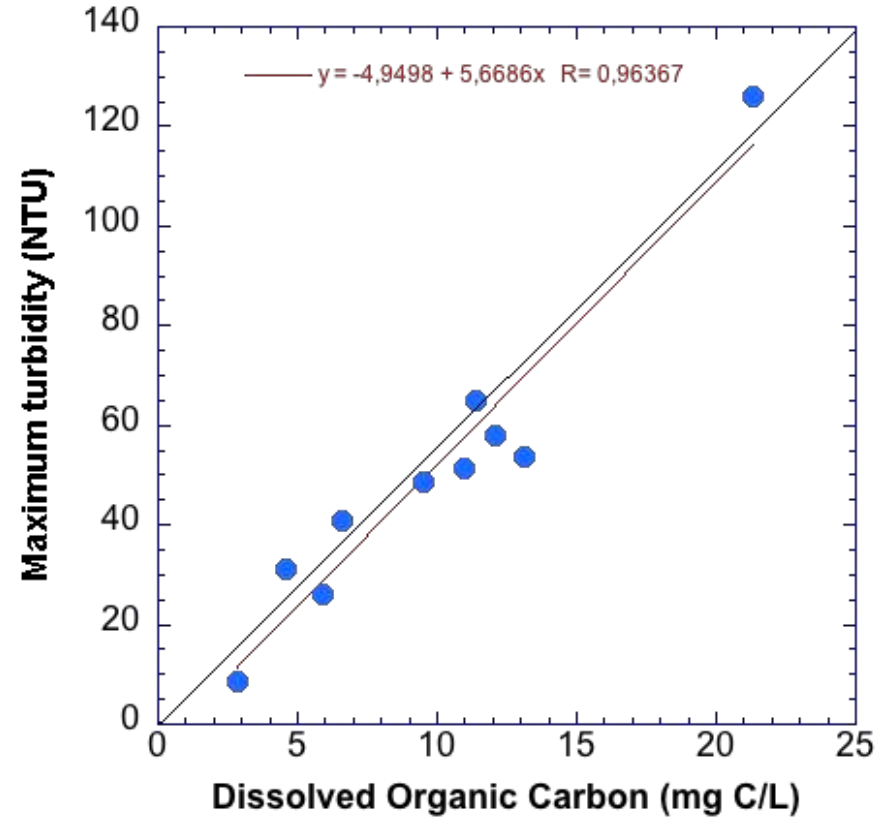
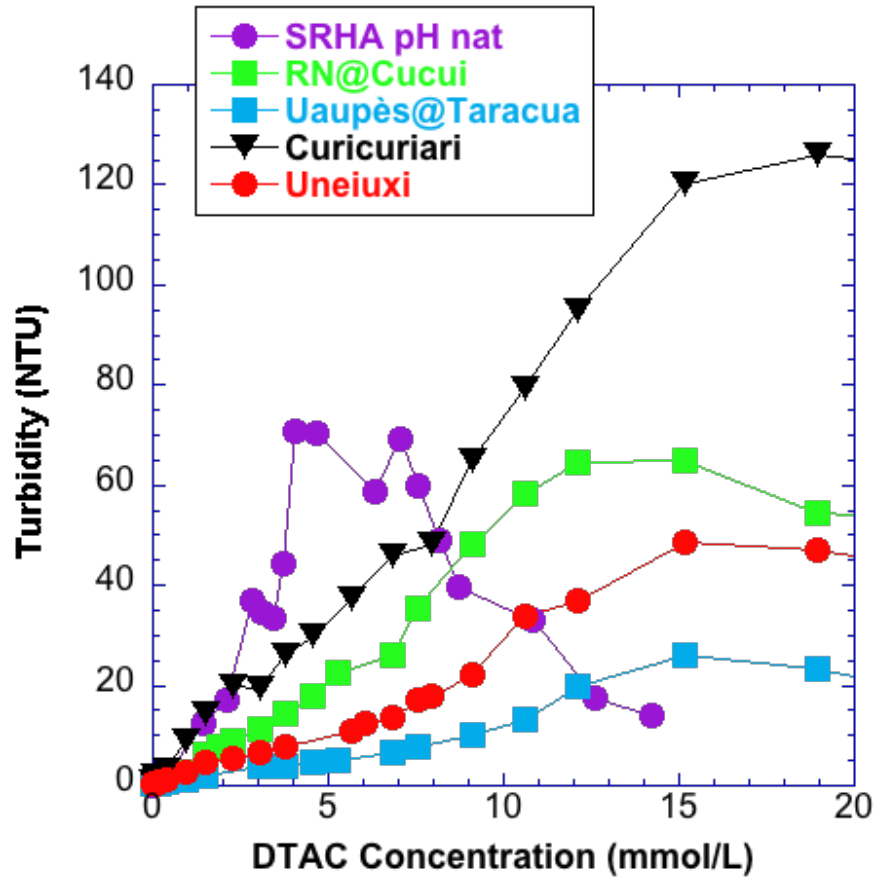
SRHA probed with DTAC - Turbidity curve



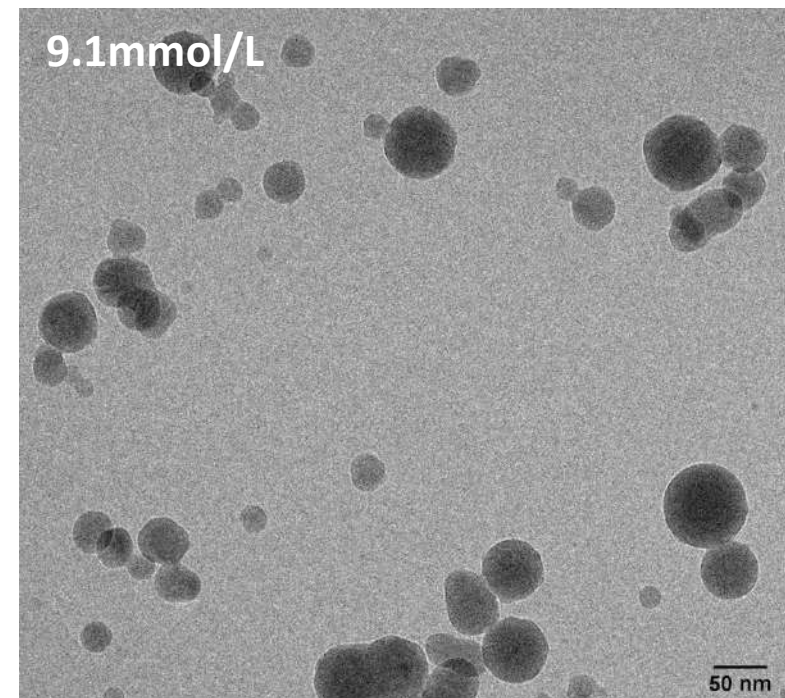
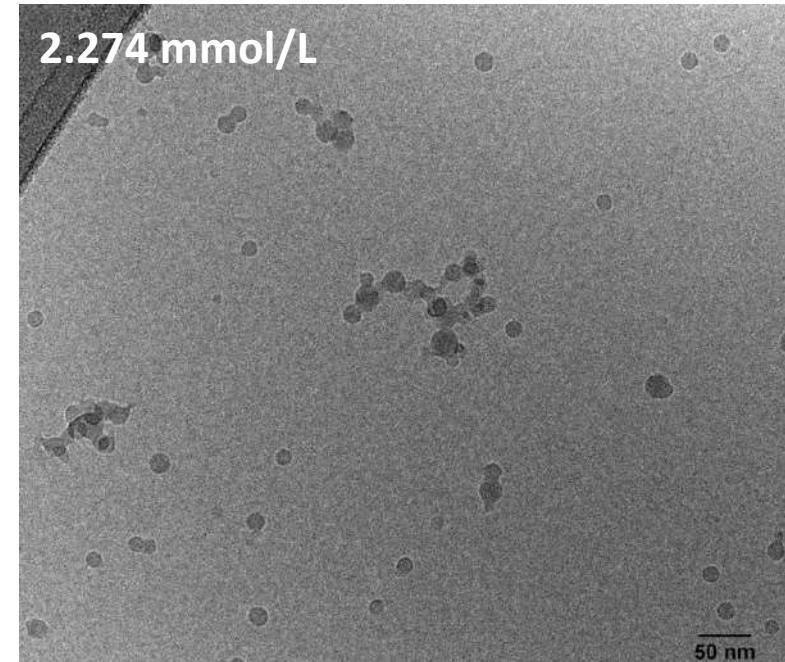
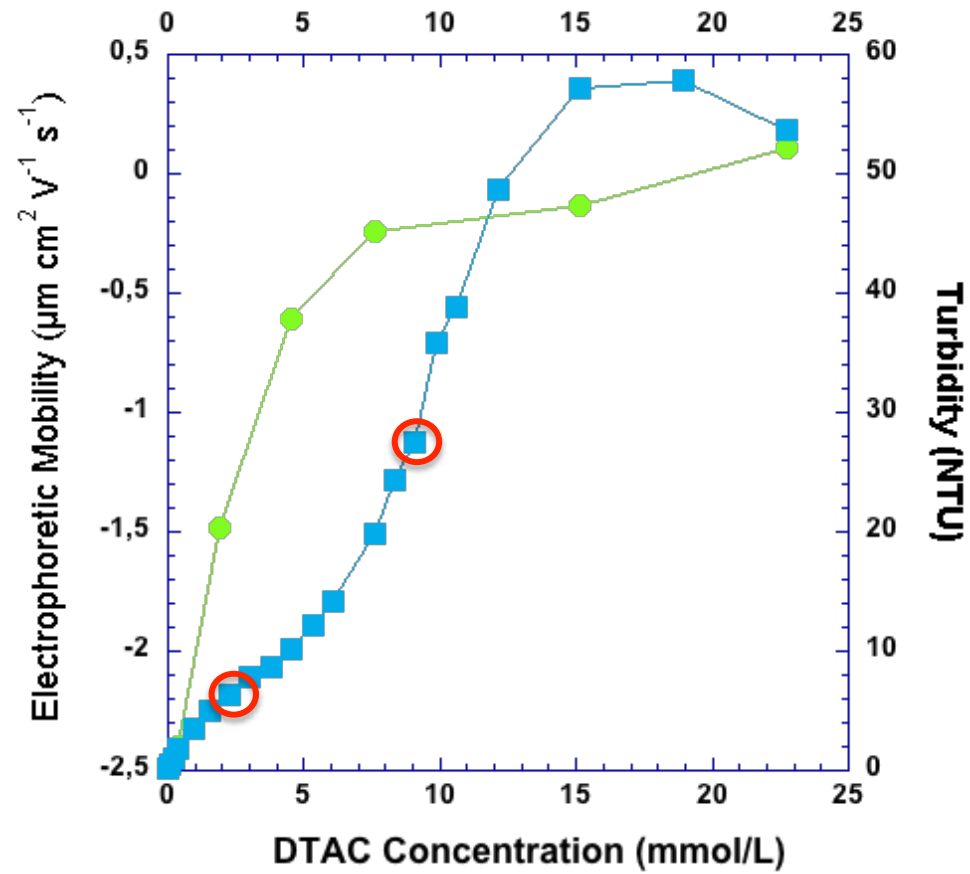
Rio Negro DOM probed with DTAC - Turbidity curve



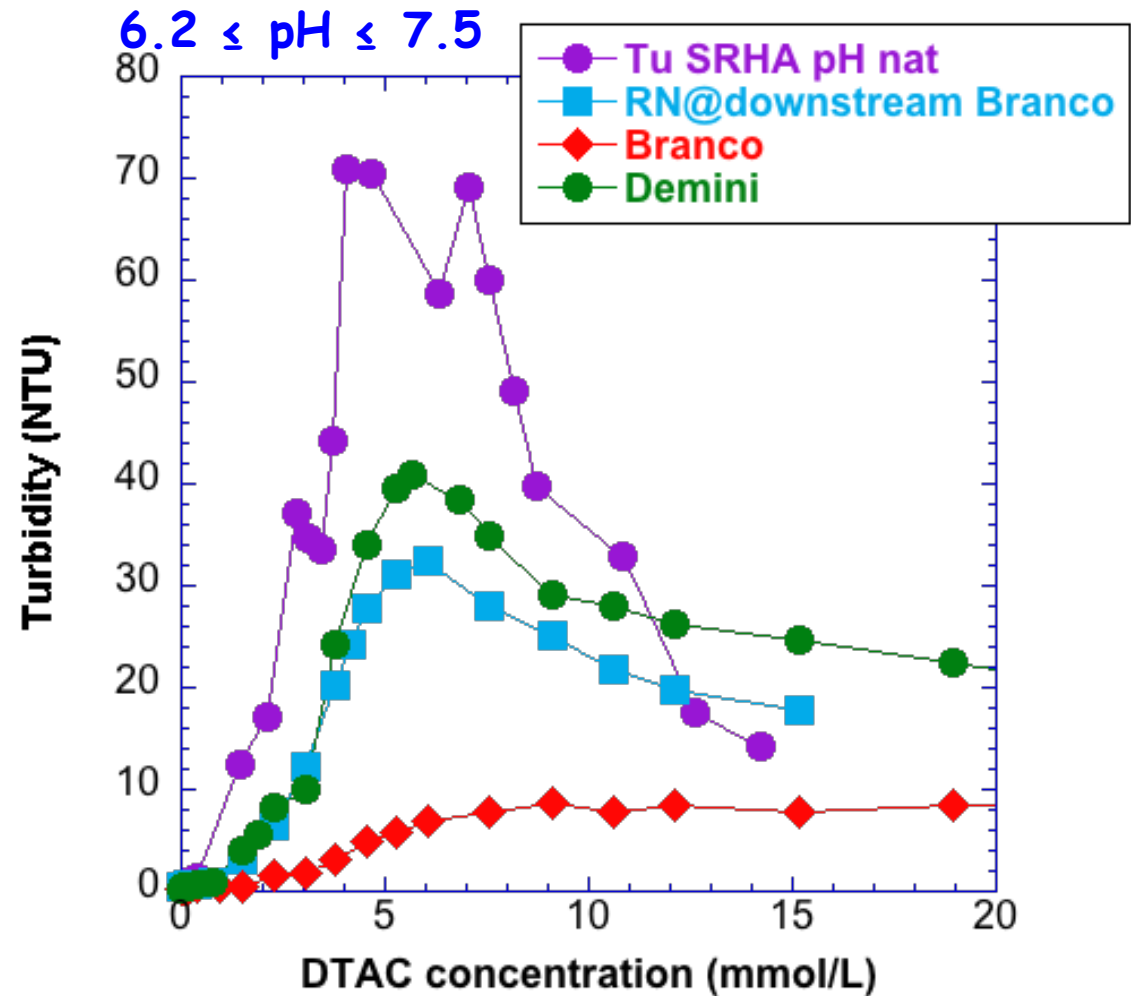
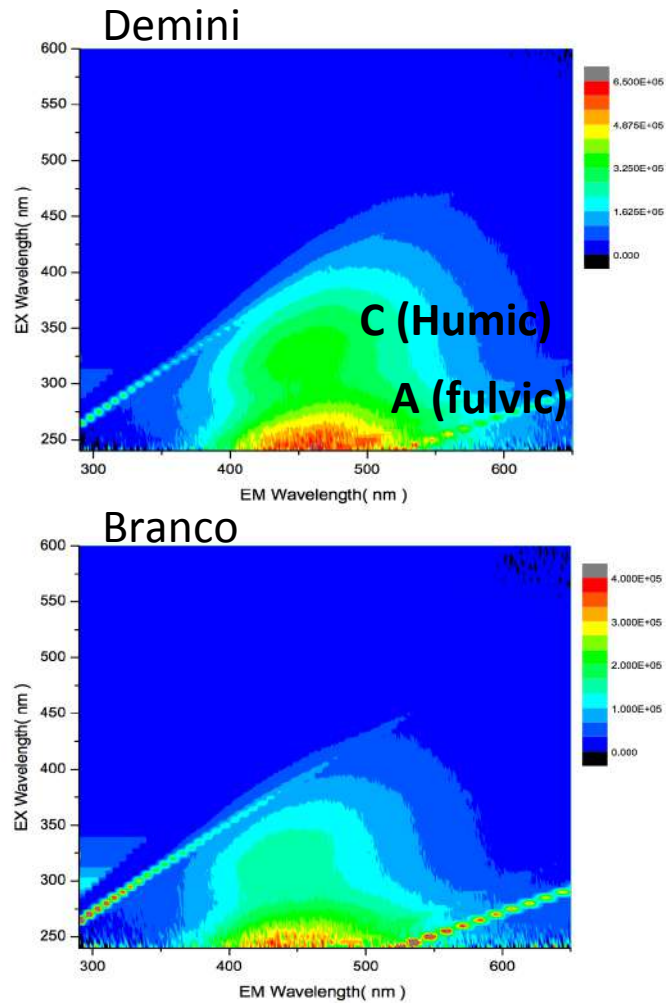
Rio Negro DOM probed with DTAC - Turbidity curve



RN @ Sao Gabriel



Tributaries with a higher pH - Turbidity curve



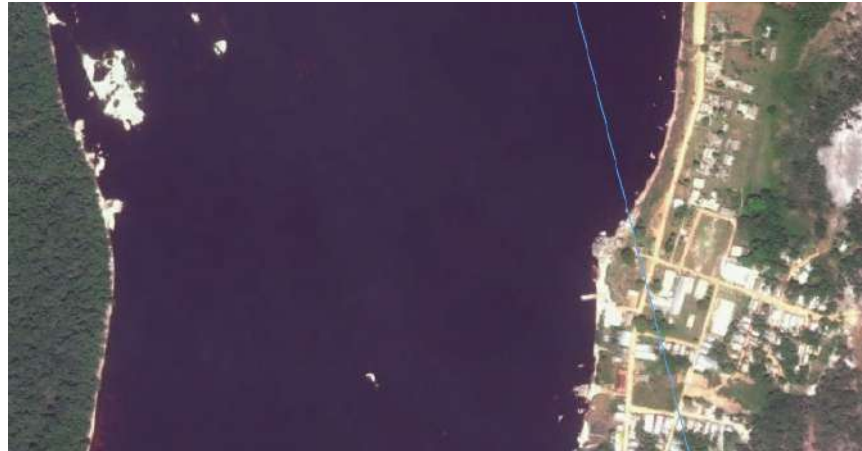
Concluding remarks

- Extracted humic matter exhibits a supramolecular behavior and the building components are of molecular size
- No conclusion about the organization of DOM from Rio Negro
- Perspective: Fractionation of DOM before interaction with DTAC
- Application of IHSS procedure to RN DOM

Suwannee River



Rio Negro @ Cucui



What is the best reference for aquatic humic extract ?

*Special thanks to Agencia National de Aguas
and Crew of YANE JOSE IV*

Thank you for your attention !

