CwE Symposium

Interactions between ecology and sediment transport processes

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Deltares
Enabling Delta Life

TU Delft
Technische Universiteit Delft

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- Conceptual picture
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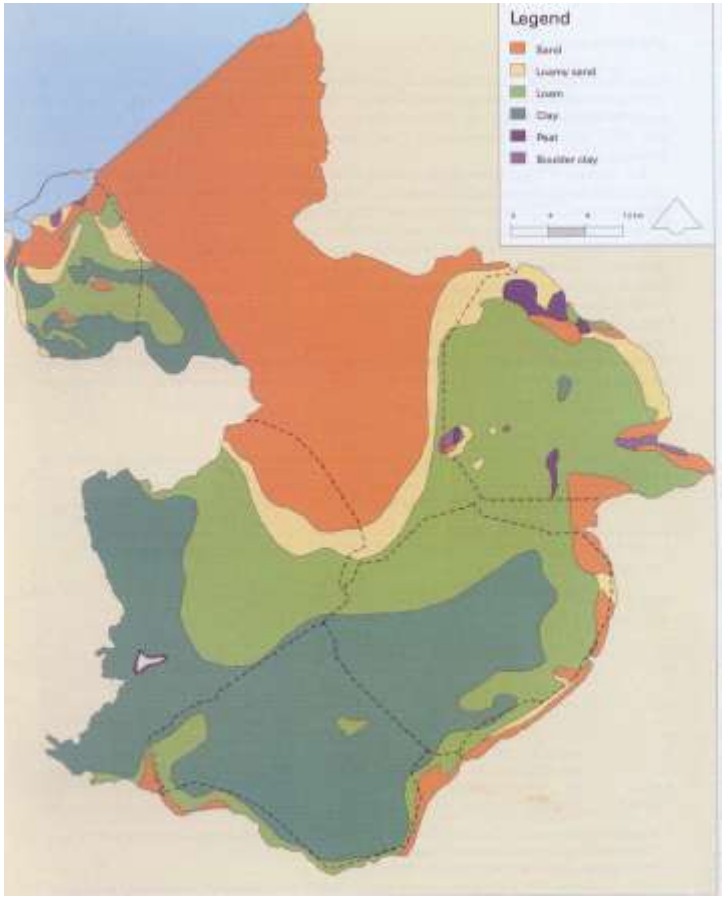
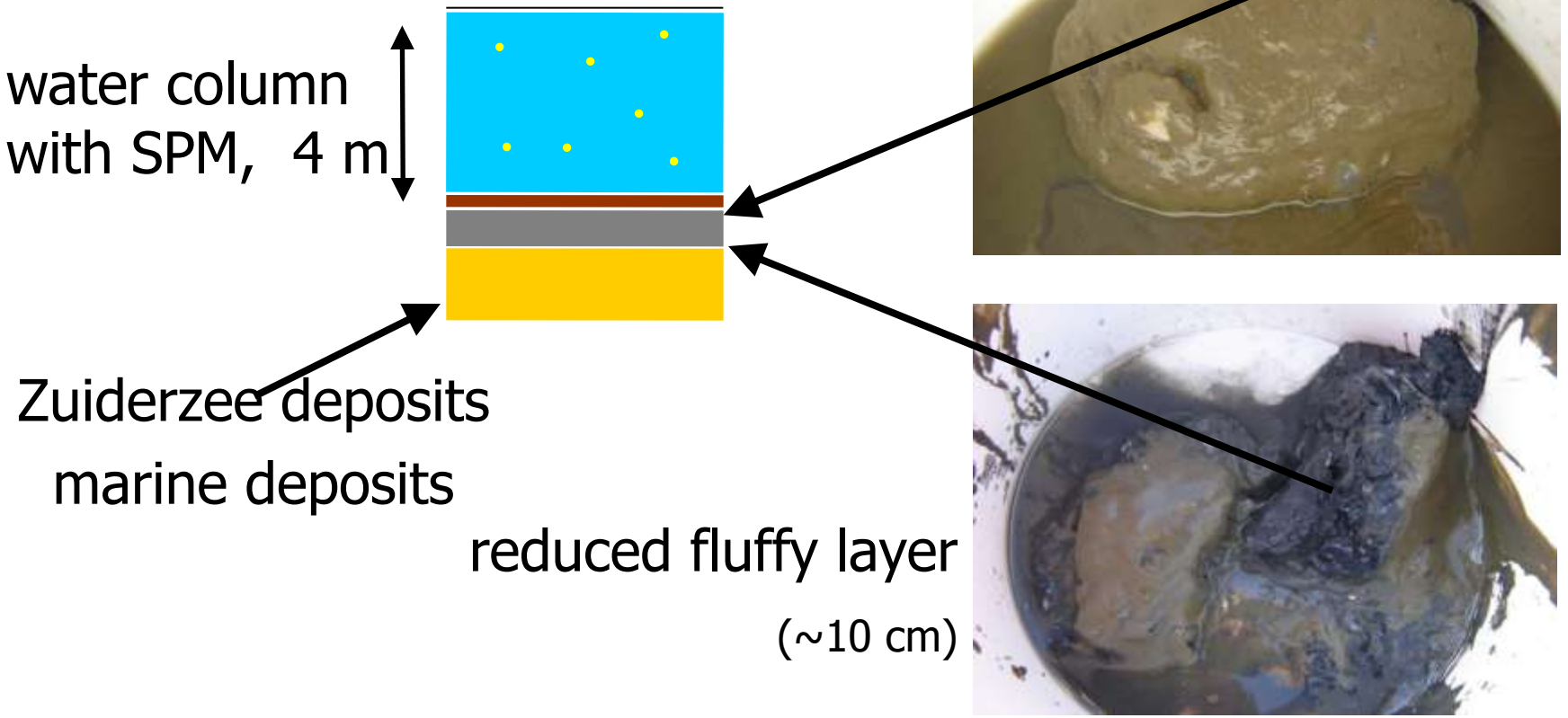
Problem definition



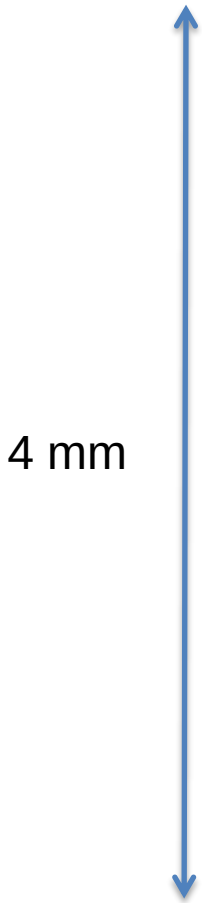
Conceptual picture: bed composition



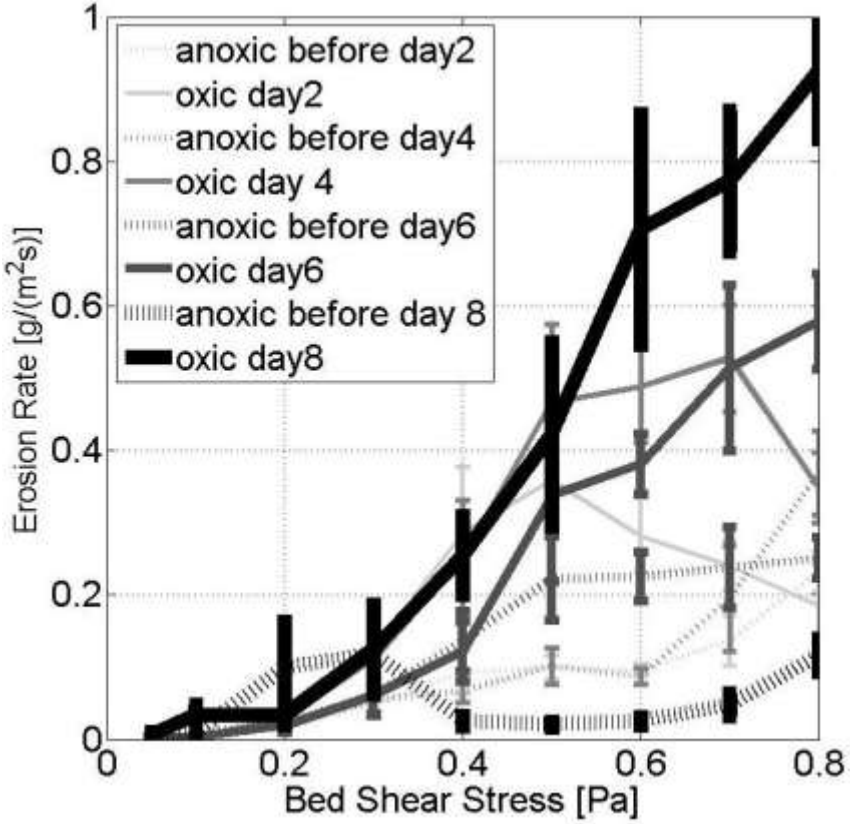
Conceptual picture: sediment dynamics Markermeer

EcoShape

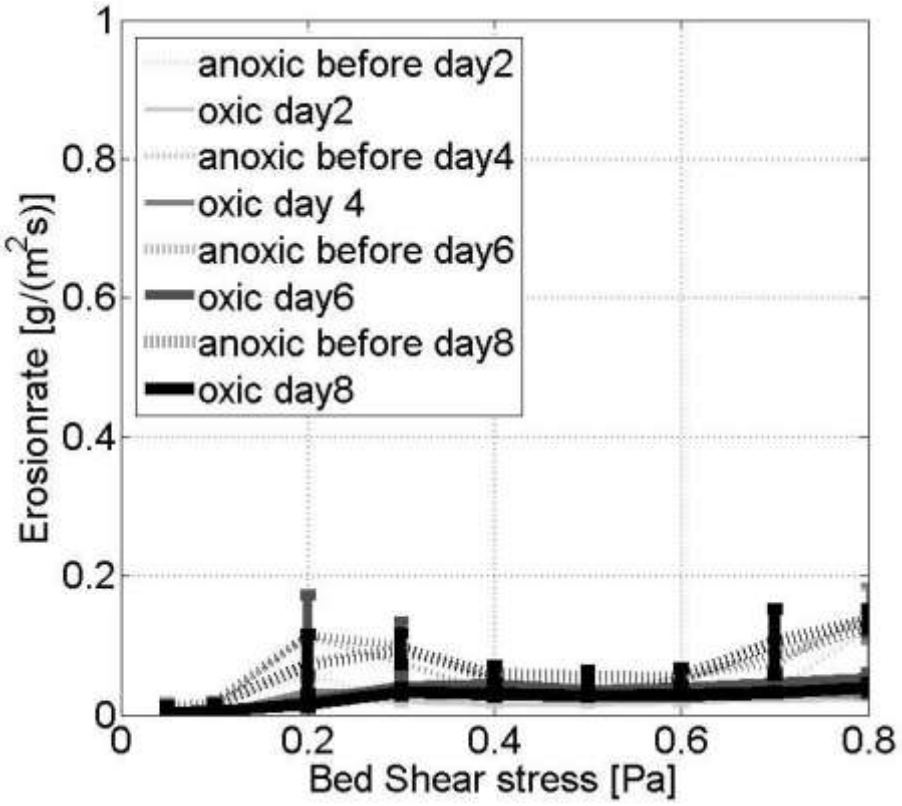
Sources: bioturbation-associated erosion soft anoxic mud



Sources: bioturbation-associated erosion soft anoxic mud

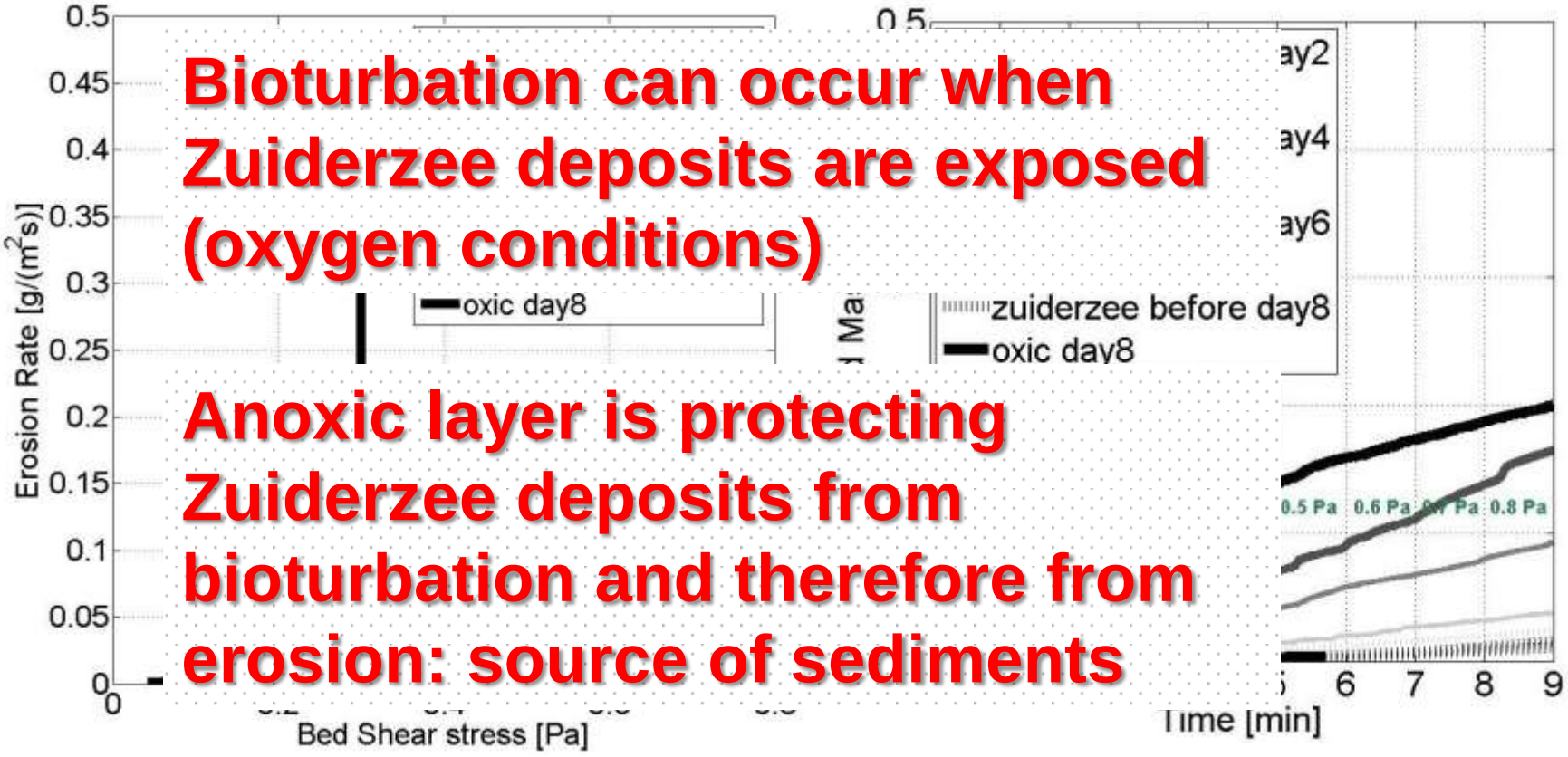


With fauna



Defaunated

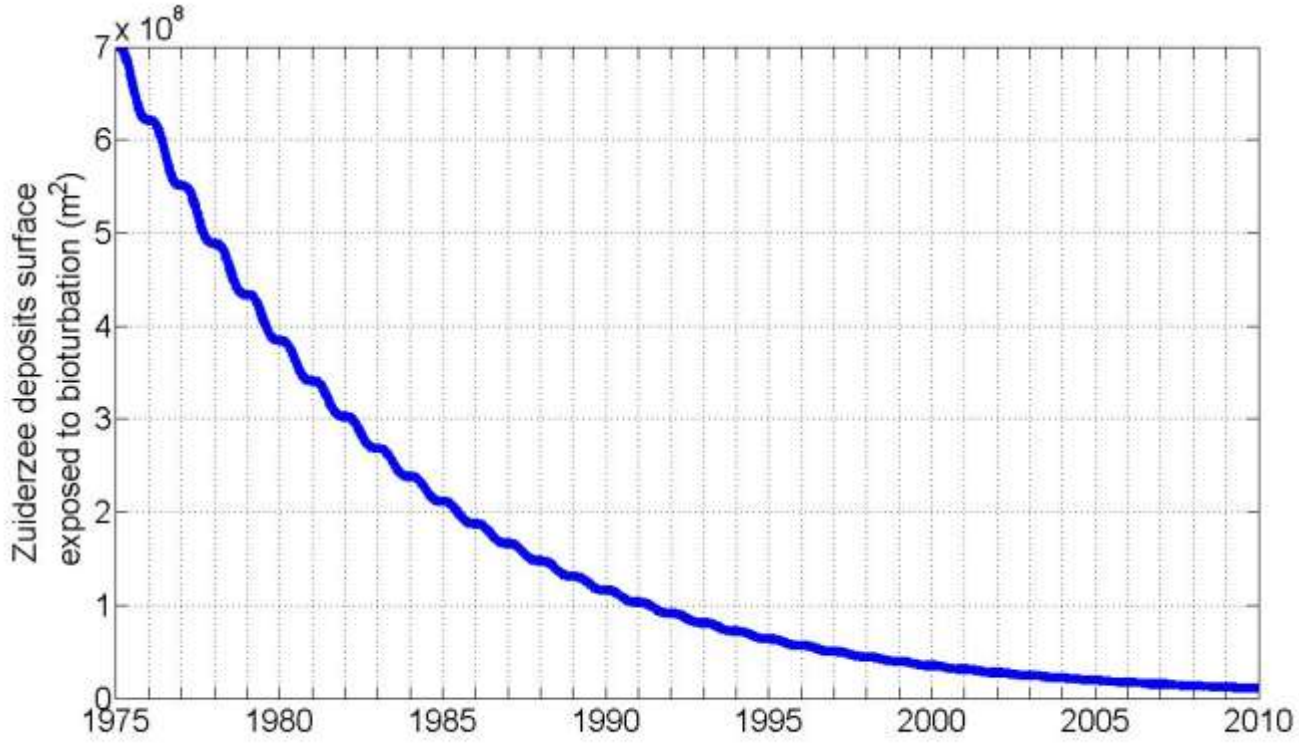
Sources: bioturbation-associated erosion Zuiderzee deposits



Bioturbation can occur when Zuiderzee deposits are exposed (oxygen conditions)

Anoxic layer is protecting Zuiderzee deposits from bioturbation and therefore from erosion: source of sediments

Sources: erosion of Zuiderzee created soft anoxic mud



Flocculation

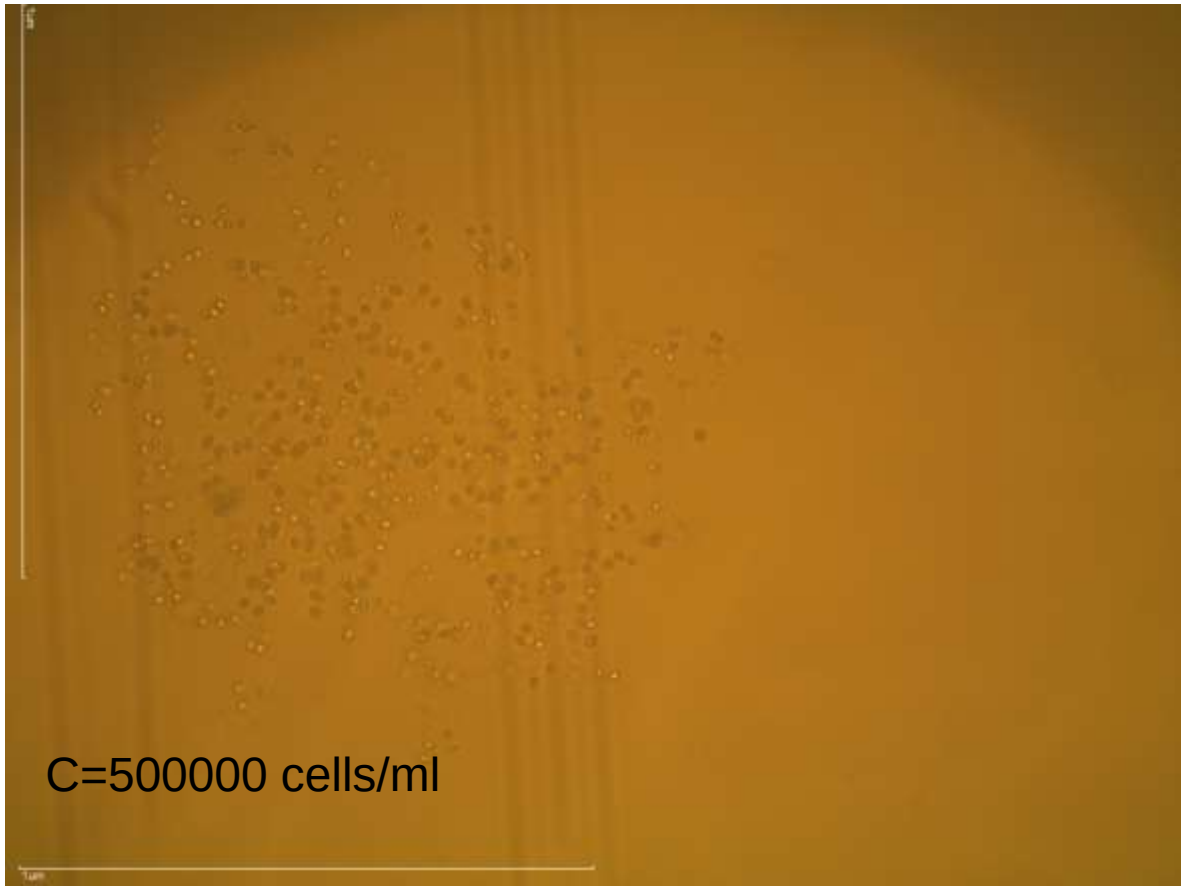
Do inorganic sediments and algae flocculate?

If so, how does the algae changes the size and settling properties of the inorganic sediment?

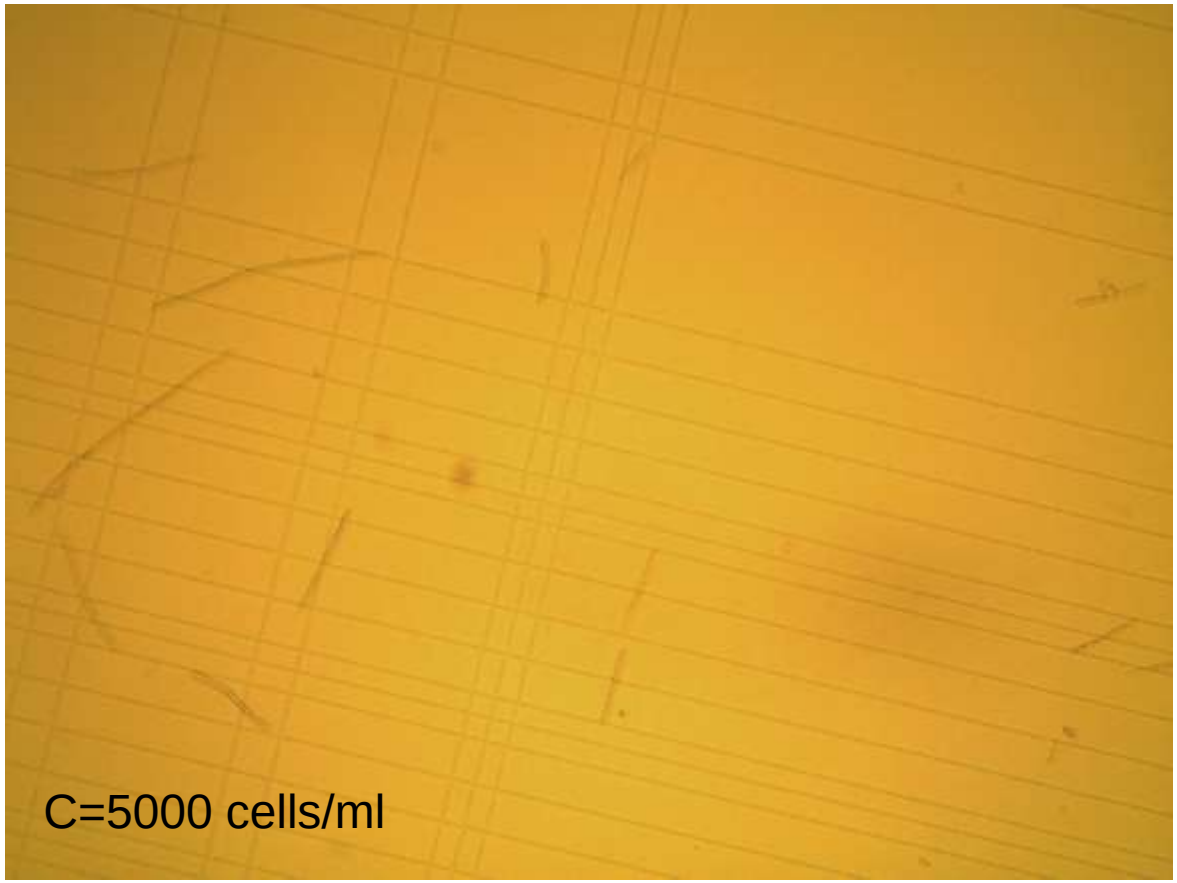
Can the changes in turbidity and transparency over the years be partly explained because of the change of algae communities?

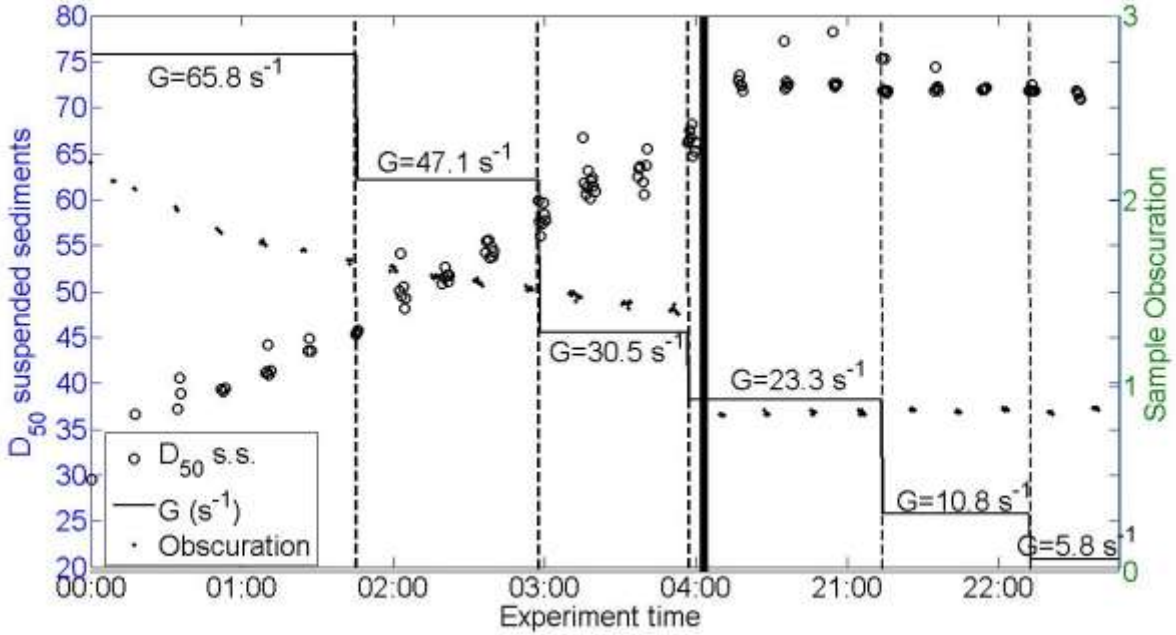
EXPERIMENTS (Dirk Sarpe, NIOO)

New specie: Aphanotece



Old specie: Aphanizomenon

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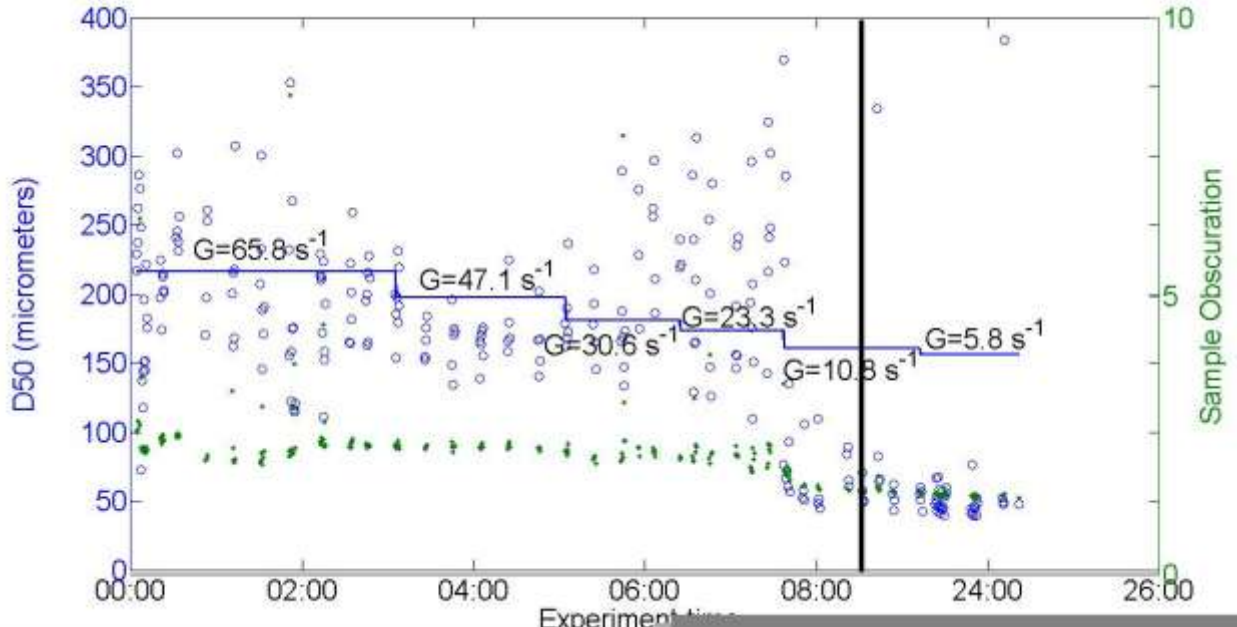
G=47.1 s-1
G=30.5 s-1
G=23.3 s-1
G=10.8 s-1
G=5.8 s-1
D50 suspended sediments
Sample Obscuration
D50 s.s.
G (s-1)
Obscuration
Experiment time
00:00
01:00
02:00
03:00
04:00
21:00
22:00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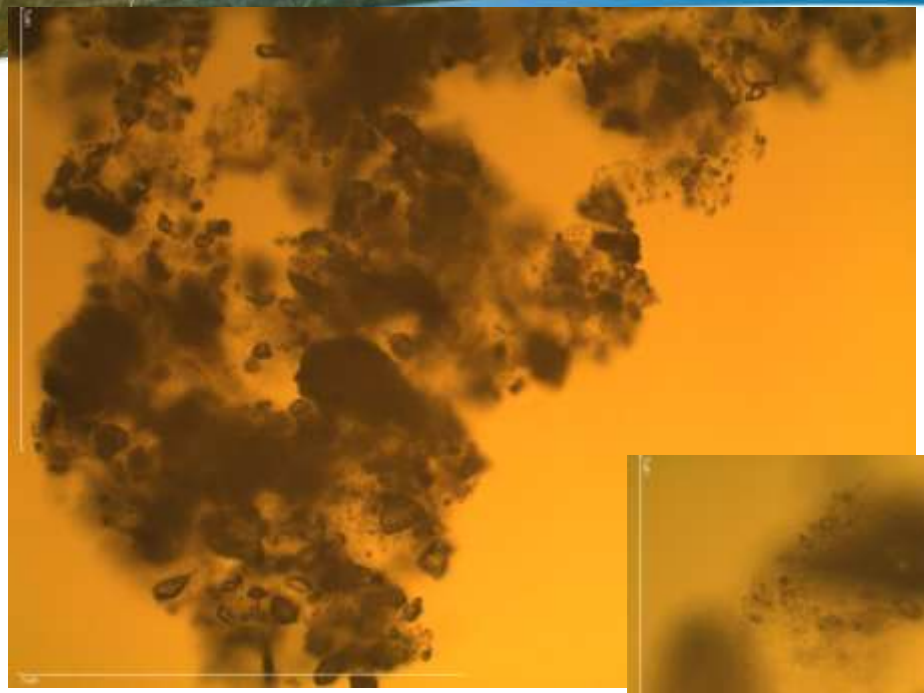
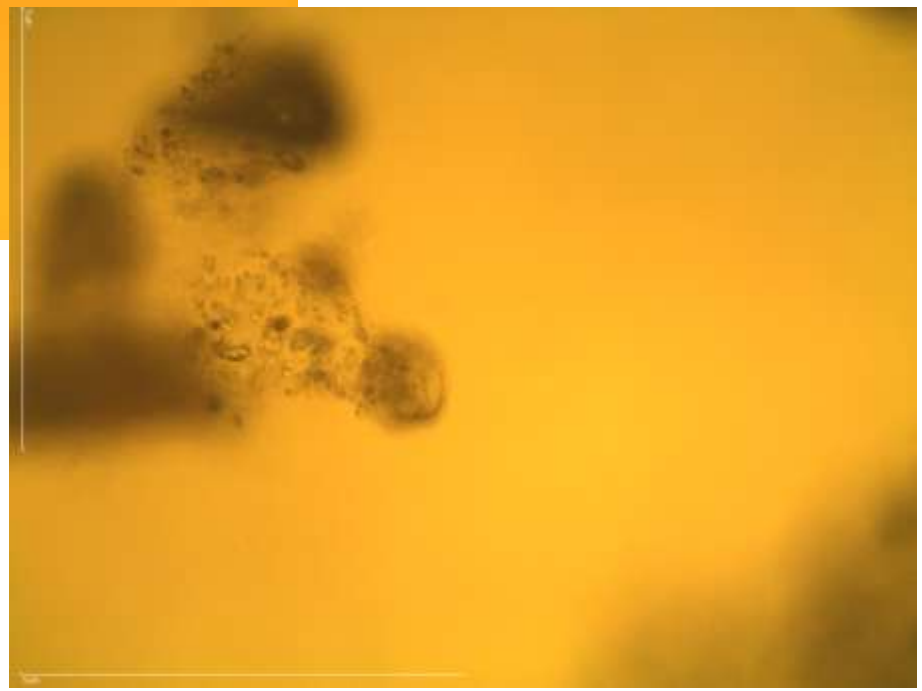
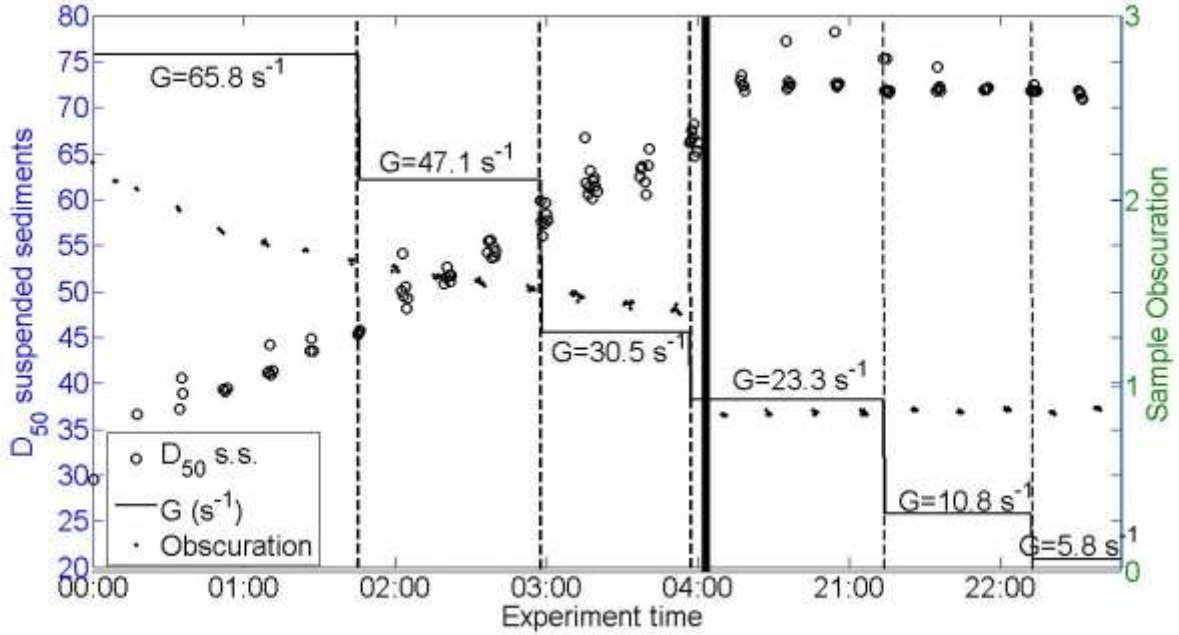
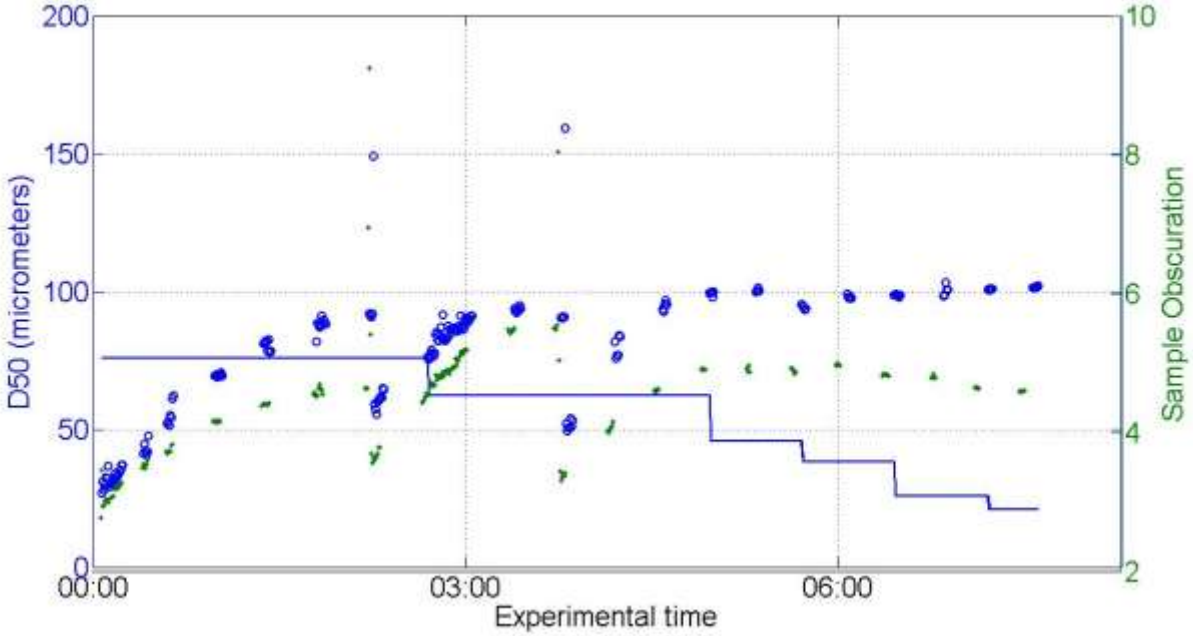
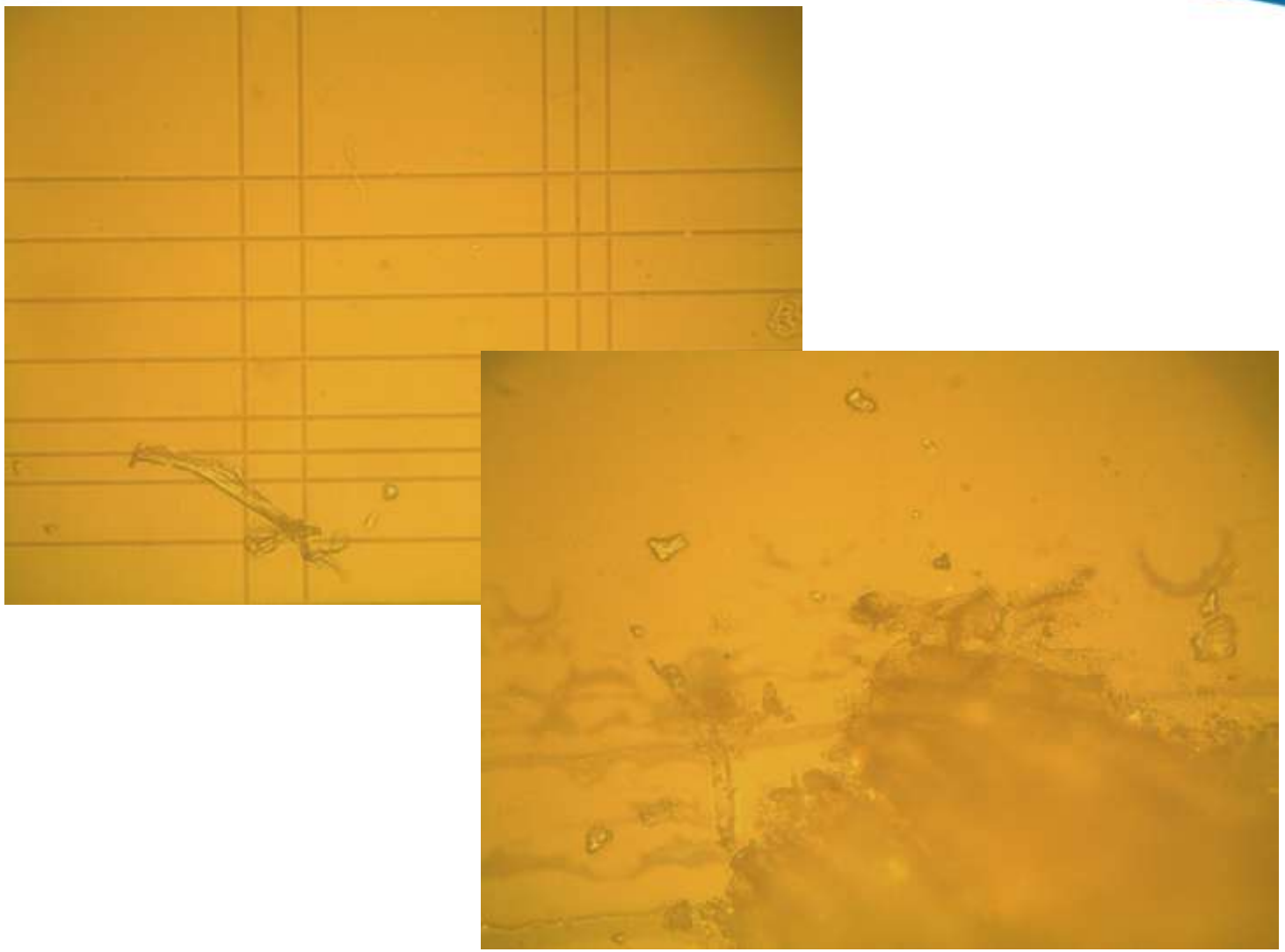
G=47.1 s-1
G=30.6 s-1
G=23.3 s-1
G=10.8 s-1
G=5.8 s-1
D50 (micrometers)
Sample Obscuration
00:00
02:00
04:00
06:00
08:00
24:00
26:00






G=65.8 s-1
G=47.1 s-1
G=30.5 s-1
G=23.3 s-1
G=10.8 s-1
G=5.8 s-1
D50 s.s.
G (s-1)
Obscuration
D50 suspended sediments
Sample Obscuration
Experiment time
00:00
01:00
02:00
03:00
04:00
21:00
22:00


D50 (micrometers)
Sample Obscuration
Experimental time
00:00
03:00
06:00



Flocculation

Addition of algae:

Impact in floc sizes

Impact in light climate

Impact in settling behaviour

Conclusions

The interaction between biota (Tubifex, Ostracoda, Aphanotece) and inorganic sediments plays an important role in the sediment dynamics of Markermeer.

From my very limited experience, I would say that understanding the sediments dynamics and prediction of many physical processes can not be done without taking into account interaction with biota.

Thanks for your attention!!

Questions?