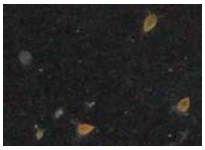
Digital counting of Daphnia

first results the lab and the field



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Counting Daphnia

- Hand method:
  - Labour intensive, thus expensive, also not attractive
  - Sample preparation
    - 70 % alcohol
    - thus killing the Daphnia
  - Need for better method: digital……

Dead or alive ?

Contents

- Method UFZ-Leipzig eco-toxicological tests: alive
- First results Universiteit van Amsterdam: dead
- First results in the field - Texel: alive
- Practical use

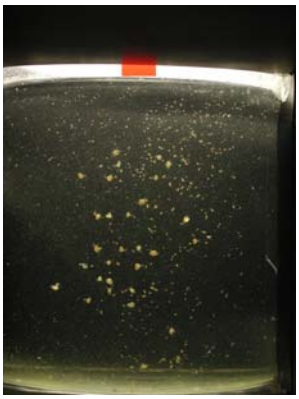
Eco-toxicological Research UFZ

Method developed by the
Effect Propagation group
department of Chemical
Ecotoxicology of UFZ Centre for
Environmental Research
Leipzig-Halle

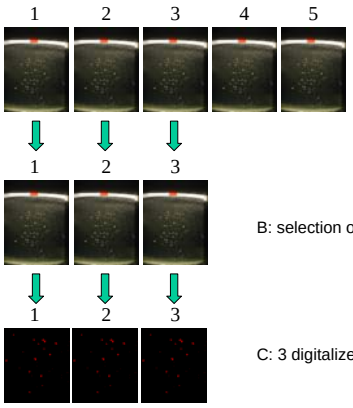
Matthias Liess and Barry Pieters
in cooperation with Universiteit van Amsterdam

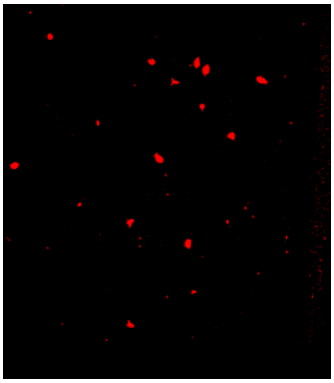
How does it work?

- Toxicity test in 4.7 l round vessels with a black backside
- Digital camera mounted in a device aimed on a vessel
- 5 photos with a short interval



Test vessel with Daphnia





Digitalized Daphnia

Principle UFZ

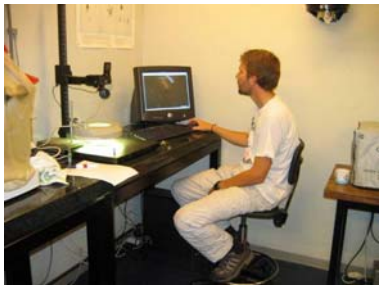
- Living Daphnia and other living organism are moving during the procedure
- Suspended solids and dead material is not moving
- DIAS – digital Image Analyzing System
  - Digital imaging and substraction of particles not moved

Results UFZ

- Very useable method !
- Makes it possible to follow population dynamics on life Daphnia in groups
- Making the pictures is an easy job
- But, processing data less easy

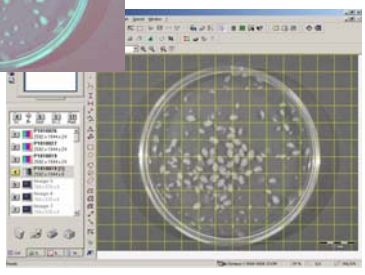
- Thesis Barry Pieters

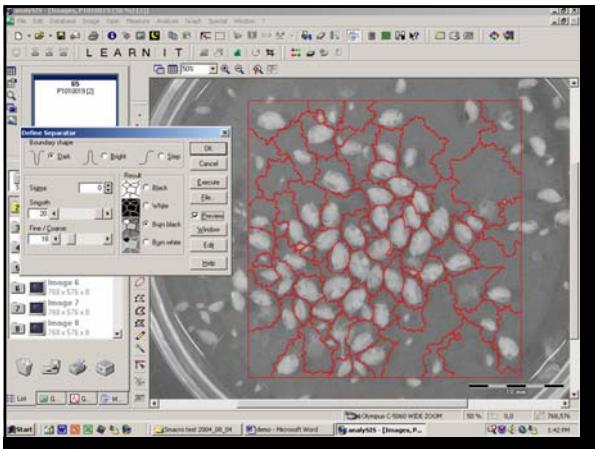
Counting by digitalizing UvA

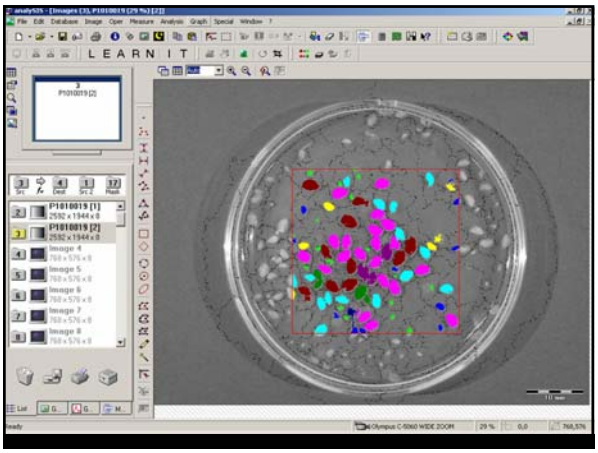


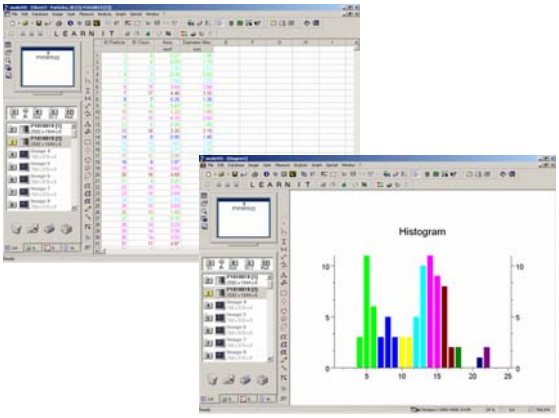
Harm van der Geest, Universiteit van Amsterdam

Use of standard software AnalySis







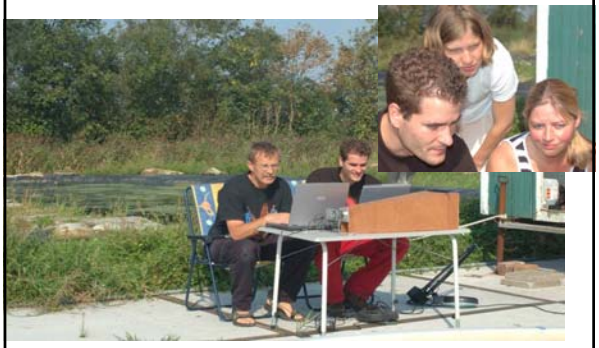


First results digitalizing UvA

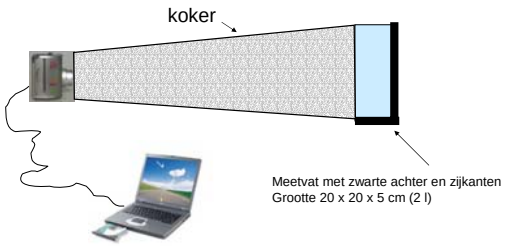
- Works quick and easy
- Software easy to use
- Very promising

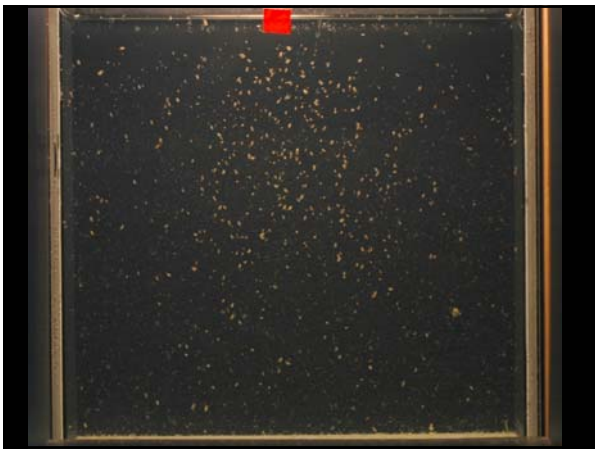
- Could also be possible for living Daphnia using UFZ technique

Live in the field



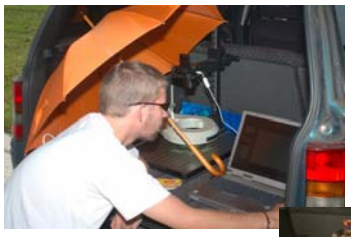
Field method





Preliminary results

- Field method based on work of UFZ works
  - Smaller vessel and why not use the lab-method used in UvA?
  - Differences:
    - Pro: Much smaller volume
    - Pro: Photographes from above, eliminating “front or side effect”
    - Con: Influence suspended solids on petri-disc?



- UvA labmethod used in the field
- Good alternative ?
- Sampling of the herds of Daphnia is still biggest problem

Time schedule

- 2004: Experimental
  - 1 a: July: making system
  - 1 b: first test experiments beginning of August
  - 1 c: test weeks: two last weeks August
  - 1 d: interpretation of results: end of 2004
- 2004/5: publication UFZ method Barry
- 2005: publication field method Barry + Ruud

Parties envolved

- UFZ Centre for Environmental research, Leipzig
  - Prof. Matthias Liess (department of Chemical Ecotoxicolgy)
  - Barry Pieters (PhD Universiteit van Amsterdam)
- Universiteit van Amsterdam, Amsterdam
  - Prof. Wim Admiraal (promotor Barry Pieters),
- Waterboard Hollands Noorderkwartier
  - Ruud Kampf (PhD Vrije Universiteit Amsterdam)
- Vrije Universiteit Amsterdam
  - Prof. Nico van Straalen (promotor Ruud Kampf)
- Technische Universiteit Delft
  - Prof. Jaap van der Graaf (copromotor Ruud Kampf)

Goal experiments

- To adapt the Daphnia counting method of the Effect Propagation group of Matthias Liess of the department of Chemical Ecotoxicoly of UFZ Centre for Environmental Research Leipzig-Halle for use in the field

Analysing the digital data

- use of the UFZ-systematics (DIAS – digital Image Analyzing System)
- UFZ uses cilindrical vessels
  - Used for the ecotox experiments
  - Round, no edges, no kit or glue needed
  - Results in systematic, but acceptable errors
- For use in the fields rectangular vessels more attractive