Sediment monitoring in the Port of Antwerp

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Port of Antwerp


OBJECTIVES
1. Port of Antwerp: Where? What?
2. Trend monitoring program 1
3. Regular monitoring program 2
4. Conclusion
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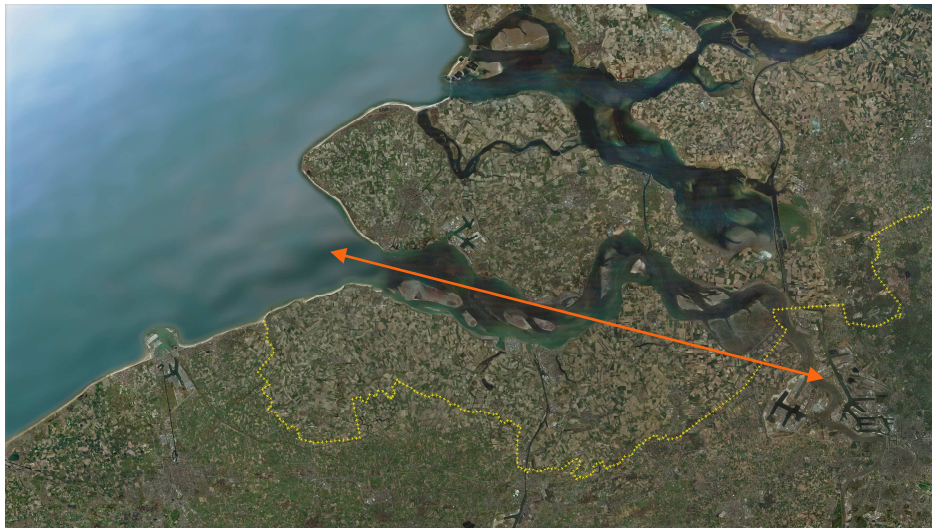
Port of Antwerp - intro

- North west Europe
- Distance to the sea: approximately 100 km



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Port of Antwerp - intro

Classic port activities:

– storage and transshipment

– petro chemistry

– container terminals

– 2 shipyards

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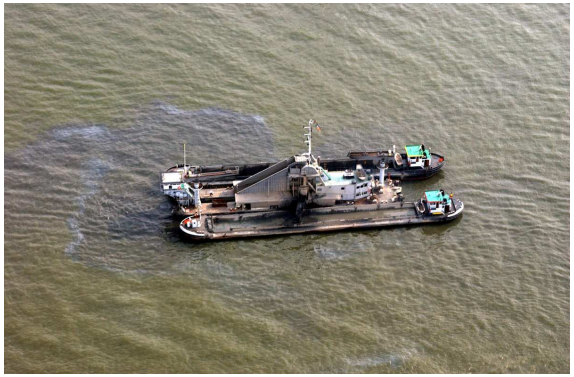
Port of Antwerp - intro

Operational dredging activities:

– river Scheldt: Flemish government

– docks: port authority with own fleet



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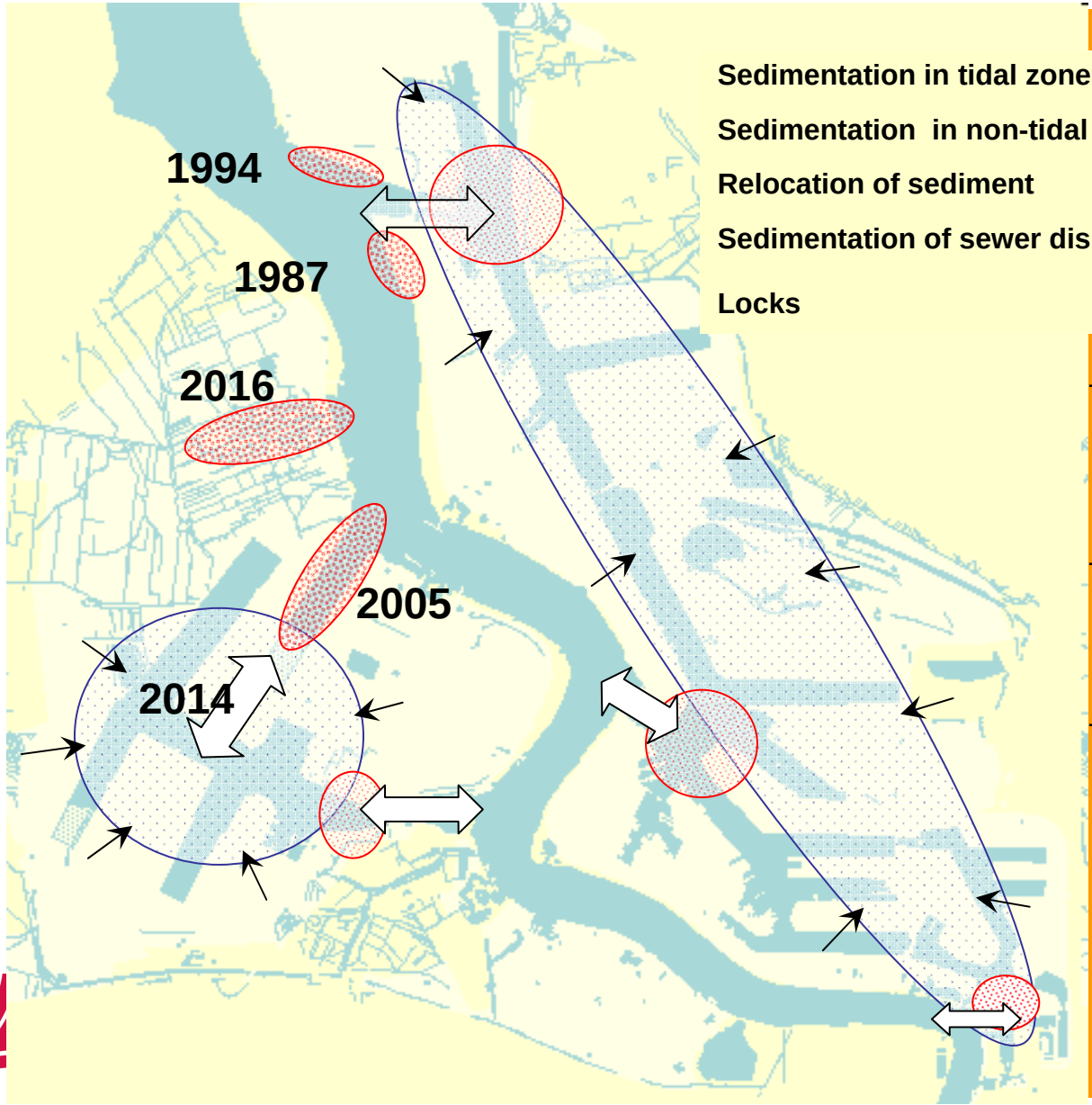

Sedimentation in tidal zones

Sedimentation in non-tidal zones

Relocation of sediment

Sedimentation of sewer disposal and spillage

Locks

- Annual deposition:
  ~ 550.000 TDM
  ~ 1.200.000 m³
- deposition caused by contact salty and fresh water
- Dredging for nautical reasons

Sedimentation in the port of Antwerp

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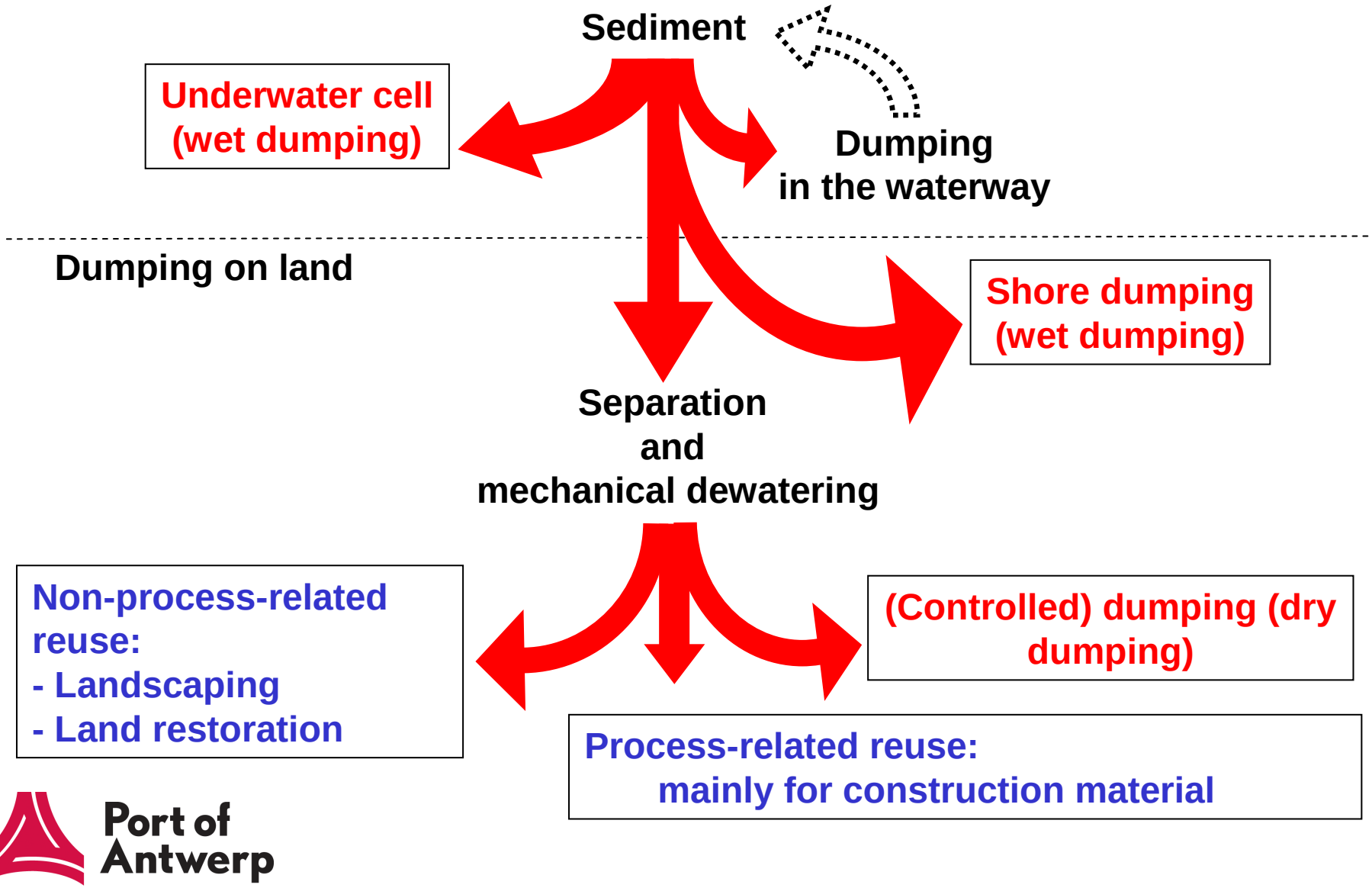

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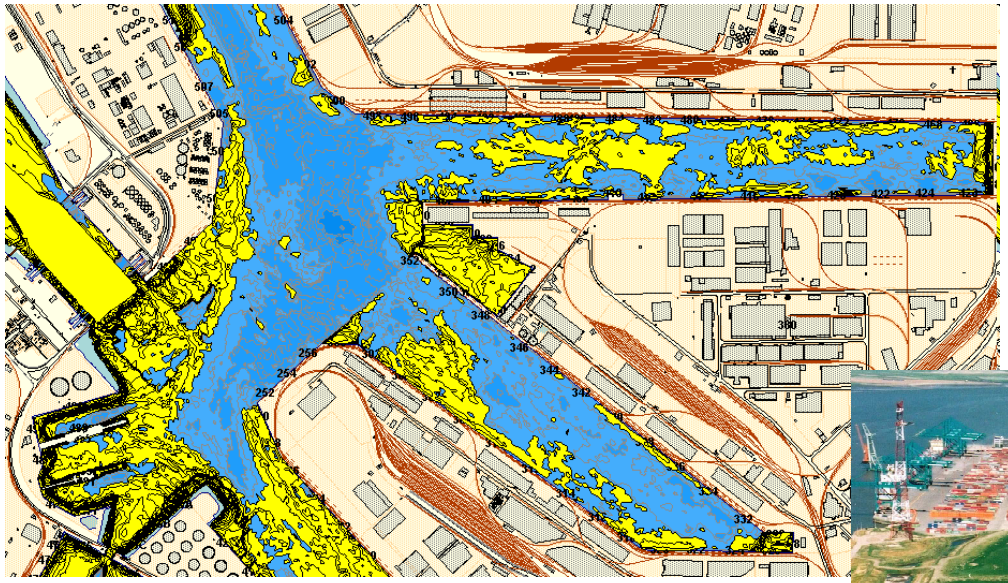
Port of Antwerp - intro



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Port of Antwerp - intro

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More info at: www.amoras.be

Trend monitoring program 1

– 2001 ◄⋯► 2010

– Aim:

  – Evolutions in parameters / quality

  – Impact of nautical dredging on sediment quality

  – Impact of harbour activities on sediment quality

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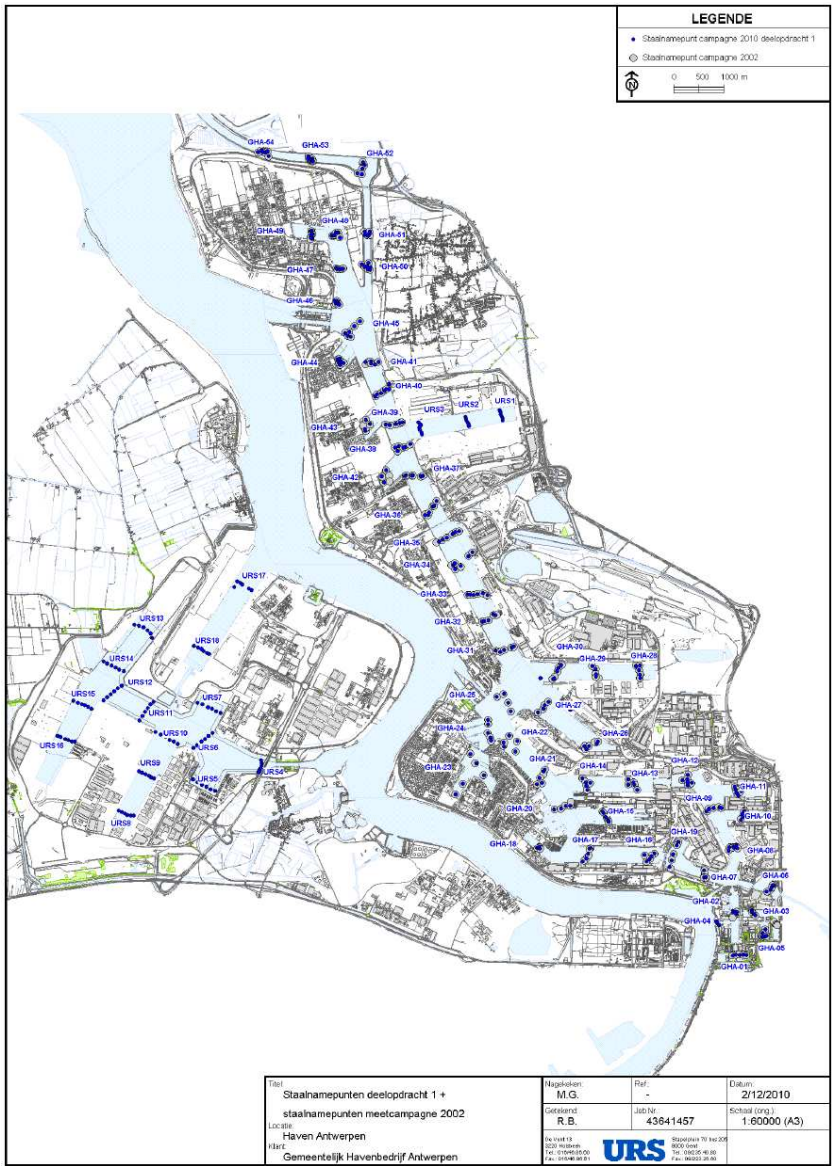
Trend monitoring program 1

Method:

- 57 locations on the right bank
- 15 locations on the left bank
- 50 locations nearby harbour activities



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Trend monitoring program 1

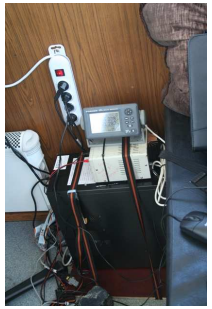
Method:

- Van Veengrapp
- 4 graps for 1 analysis
- GPS
- Analyses
  - of physical parameters
  - of chemical parameters
- Based on own licenses
- Based on European / Flemish standards







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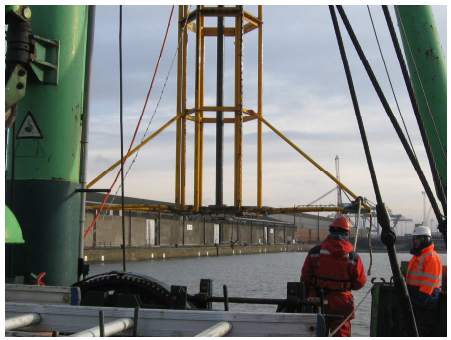
Regular monitoring program in function of dredging activities and the relocation of sediments (program 2)

~ 130 samples/year for 1.000.000 m³ since 1996

Frequently dredged zones

2 campaigns a year



Not frequently dredged zones

1 campaign a zone

Number of samples based on:
- m² to dredge
- m³ to dredge
Van Veengrapp
Cores! -> difficult

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Regular monitoring program in function of dredging activities and the relocation of sediments (program 2)

Fysical parameters:

– organic matter
– Clay content
– Grain size distribution

Chemical parameters:

– Heavy metals (As, Cd, Cr, Hg, Pb, Ni, Zn)
– PAH’s
– PCB’s
– mineral oil
– pesticides
– TBT – BFR (bromated flame retardants)
– Chlorides and sulfates
– leaching parameters

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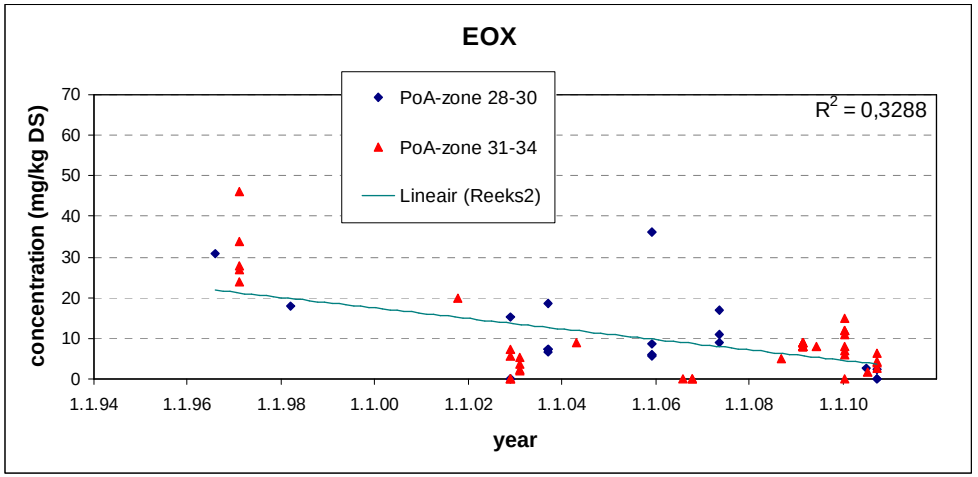
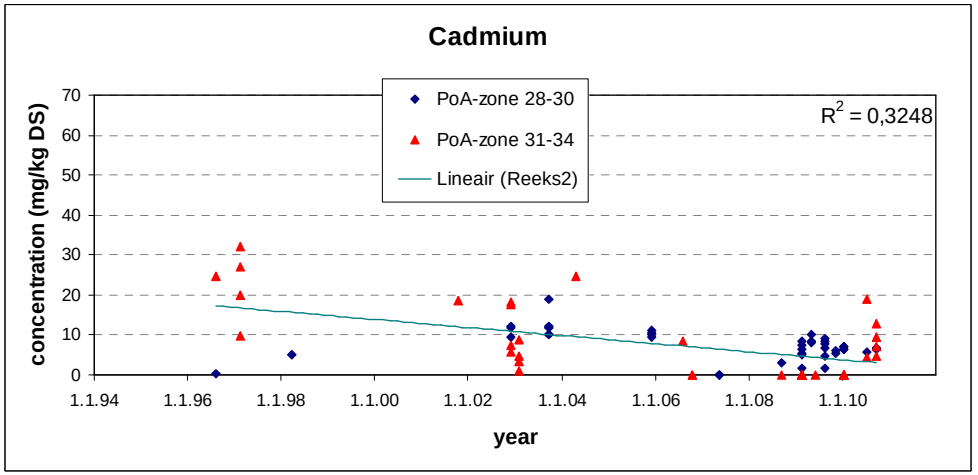
Monitoring programs results

1. Quality for most parameters gets better





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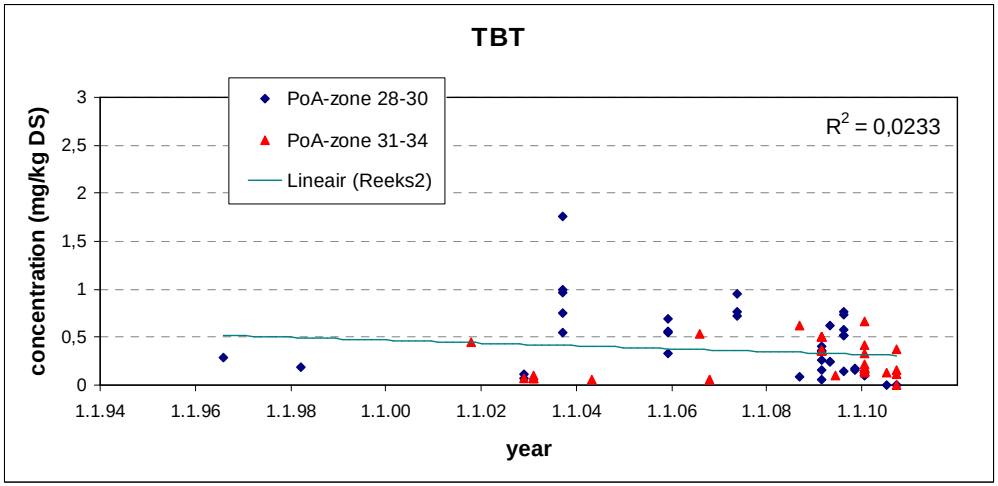
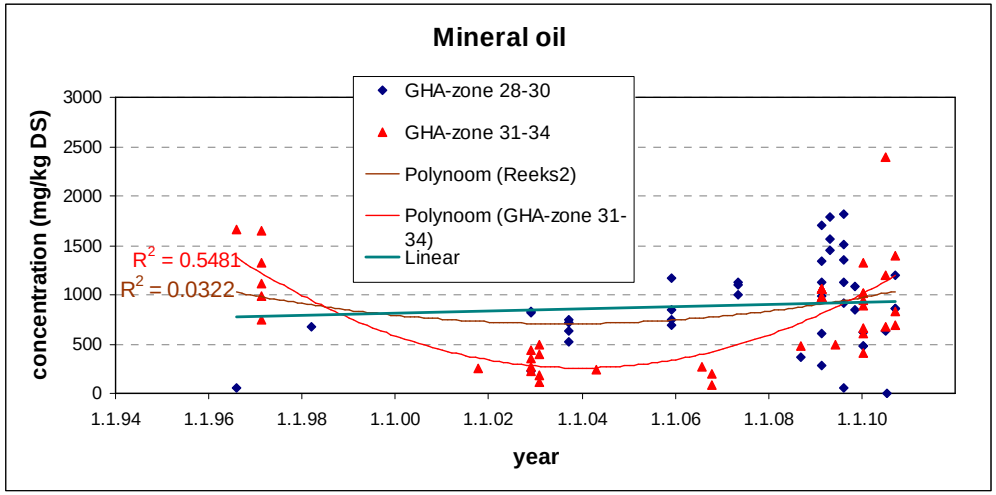
Monitoring programs results

Except:





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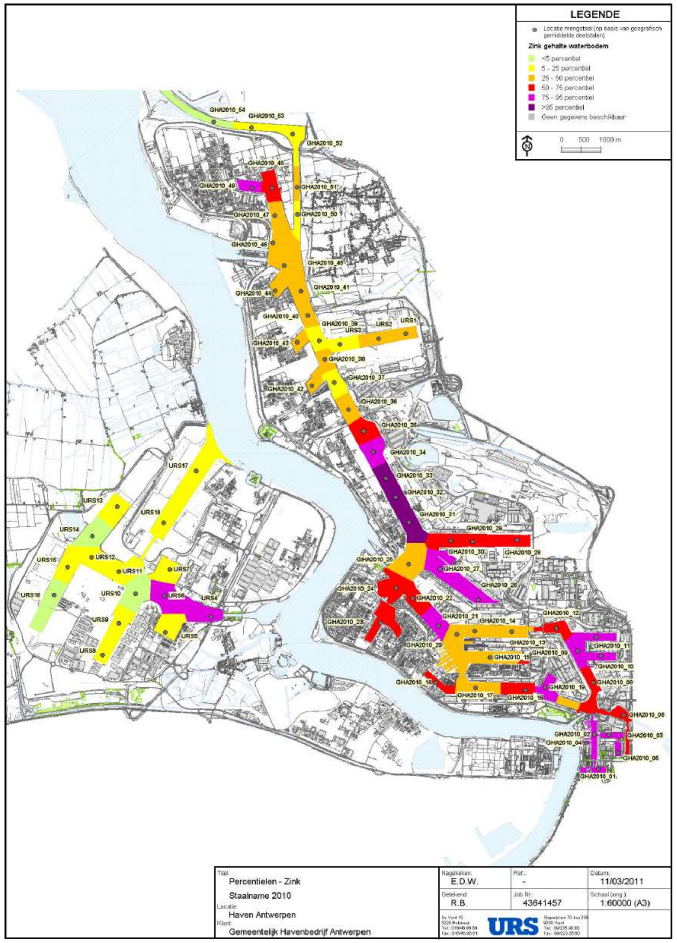
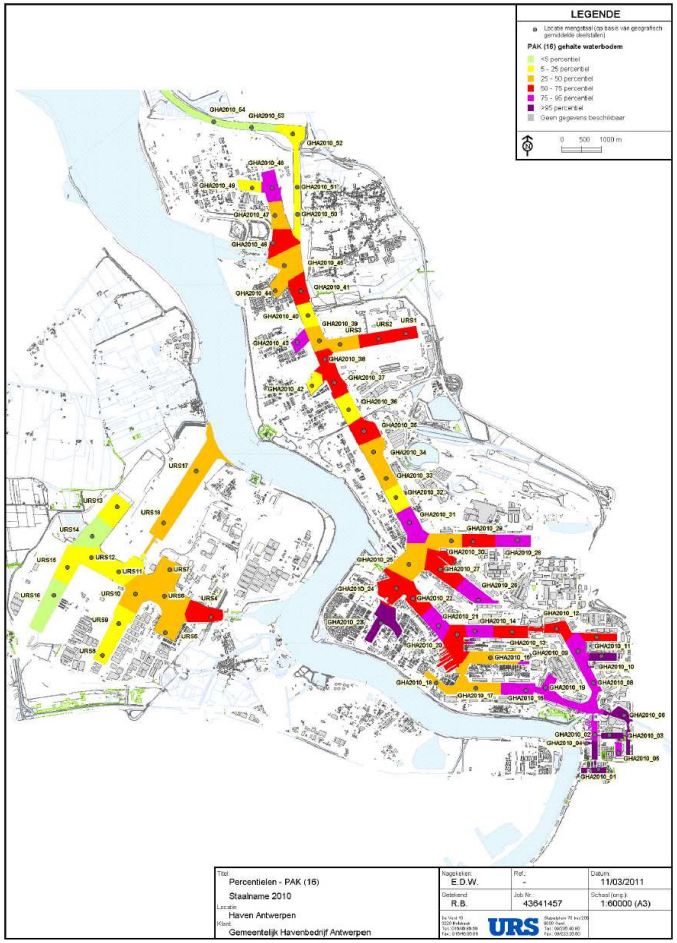
Monitoring programs results

2. Historical pollution



Left bank ↔ right bank



South ↔ north

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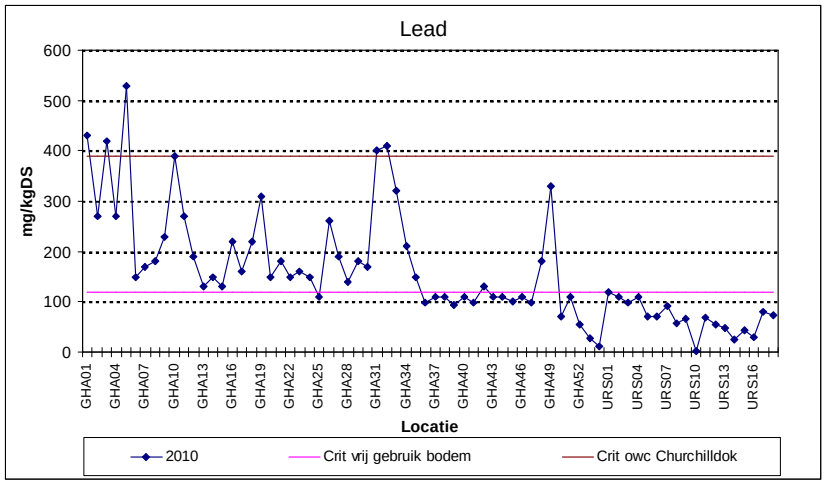
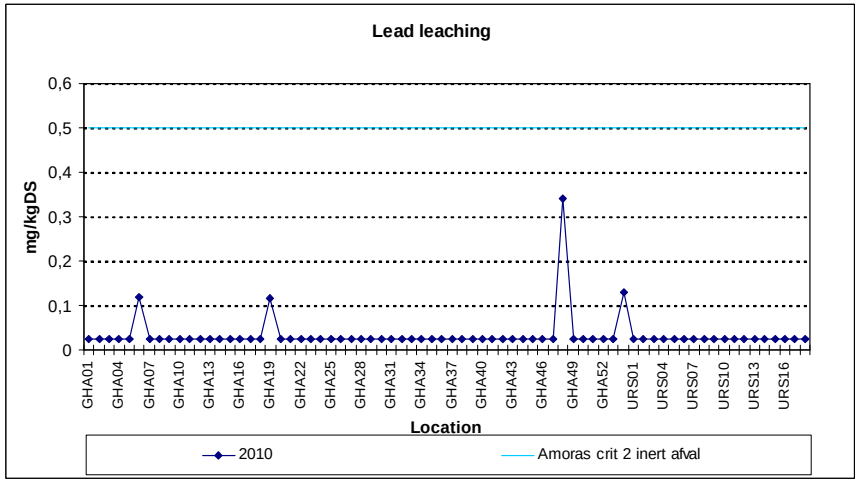
Monitoring programs results

3. Relation between concentration and leaching is not clear





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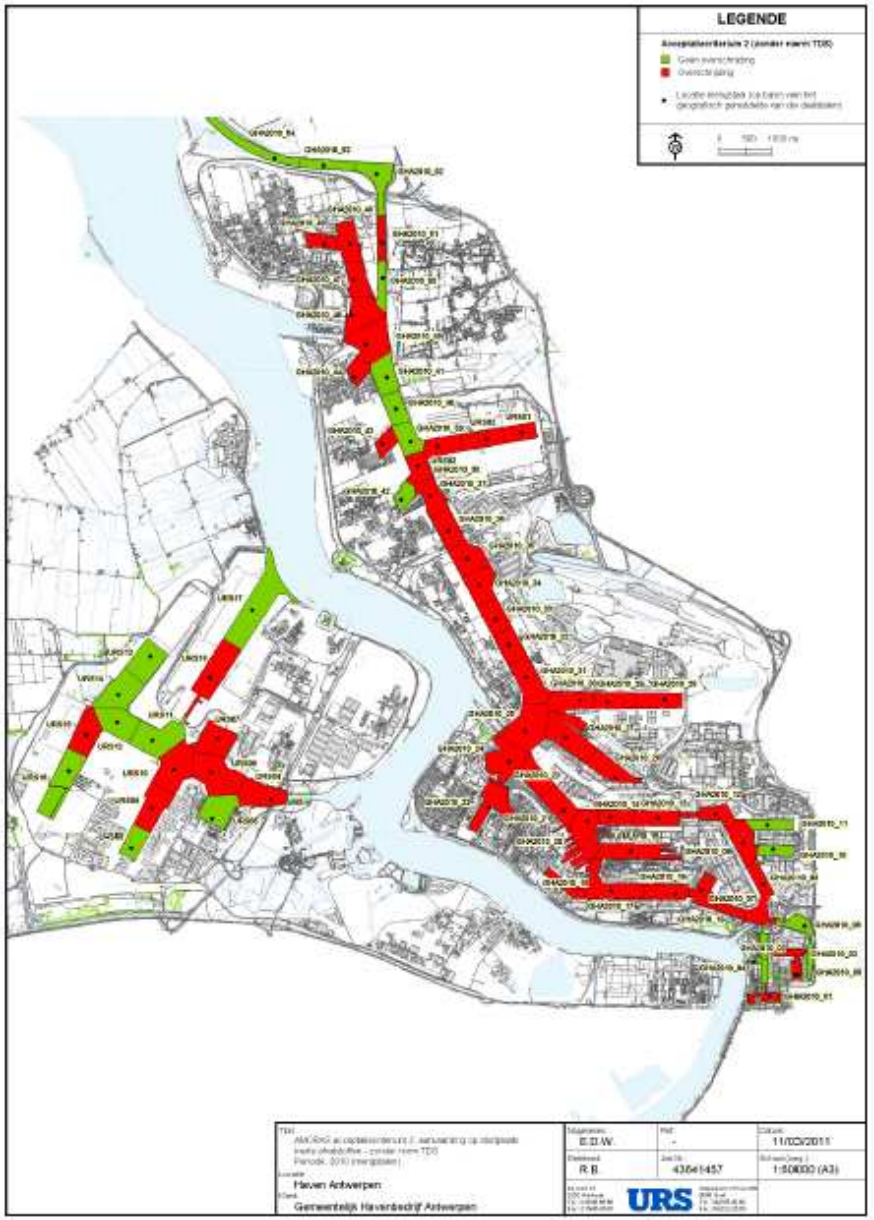
Monitoring programs results

Bottleneck cfr. European waste directive (inert waste):

- Chlorides and sulfates
- antimony (Sb) leaching
- mineral oil



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Conclusions

1. Relation: harbour activity – sediment quality = difficult
   => Future = establish a “0-situation”

2. Trend monitoring every five years to see evolutions remains important

3. Port of Antwerp = frequent monitoring comparing to other European ports
   ⇒ one European approach!

4. More detailed sampling in order to define:
   - remediations
   - re-use options
   - relation harbour activity v sediment quality

5. Coring remains difficult in silty material

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