

Satellite Monitoring of Water Defense Systems in Practice

Freek van Leijen¹ and Ramon Hanssen²

¹Hansje Brinker B.V., The Netherlands

²Delft University of Technology, The Netherlands



Background

- Sea level rise
- Increase extreme weather conditions (IPCC, 2007)
- Dike failures (Wilnis, 2003; New Orleans, 2005)
- Increasing socio-economic consequences



Situation in The Netherlands

Resultaten tweede veiligheidstoetsing primaire waterkeringen, 1 januari 2006

Legenda

- voldoet aan de norm
- geen oordeel
- voldoet niet aan de norm
- dijkeringgebied
- hoge gronden



Bron: RWS, Primaire waterkeringen getoetst, sep. 2006



17.000 km water defense structures (dikes, levees, dams)

24% of primary dikes not conform norm
32% status unknown

Vulnerability stressed by Delta Committee
→ advice on protection involving billions of Euros



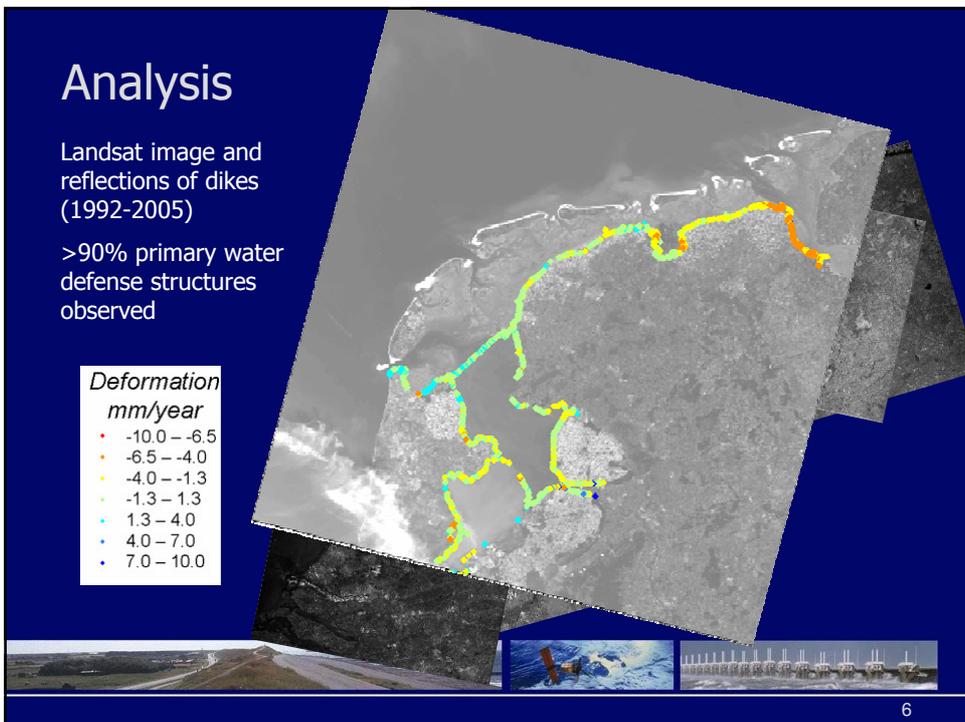
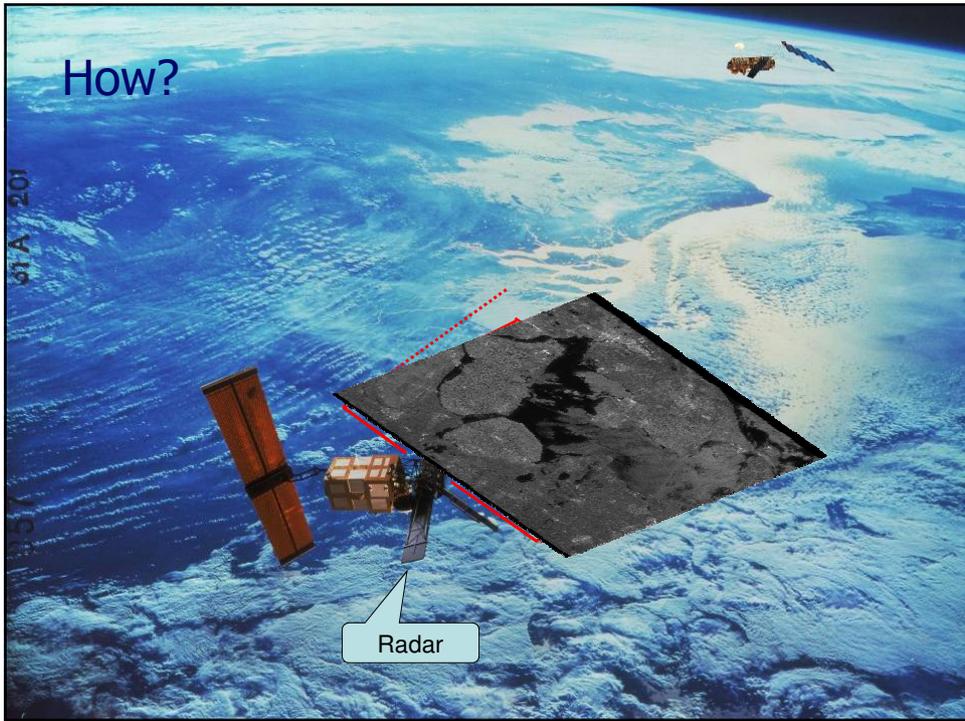
3

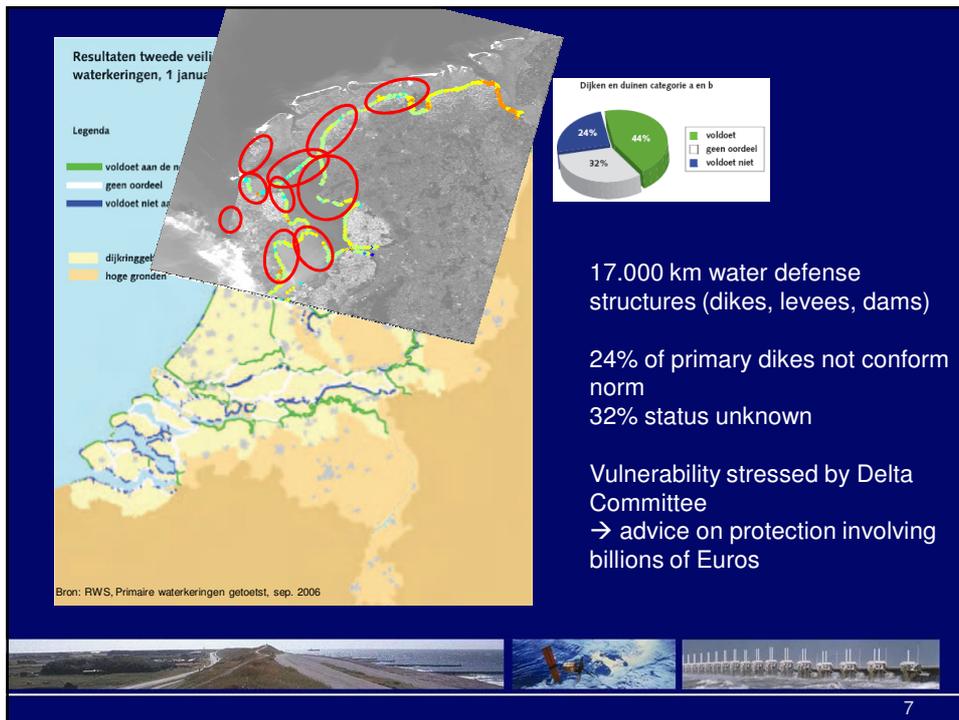
Stability Monitoring by satellite radar data

- Alternative for reinforcement works (cheaper)
- Additional to visual inspection (more efficient)



4





Satellite Monitoring

- Stability/deformation is the first indicator of weak spots (IJKdijk experiment, 2008)
- Dutch government indicated technique as an important added value (SBIR Digidijk, Agentschap.nl/RWS)



8

Case 1:
Analysis of large areas
Friesland, The Netherlands



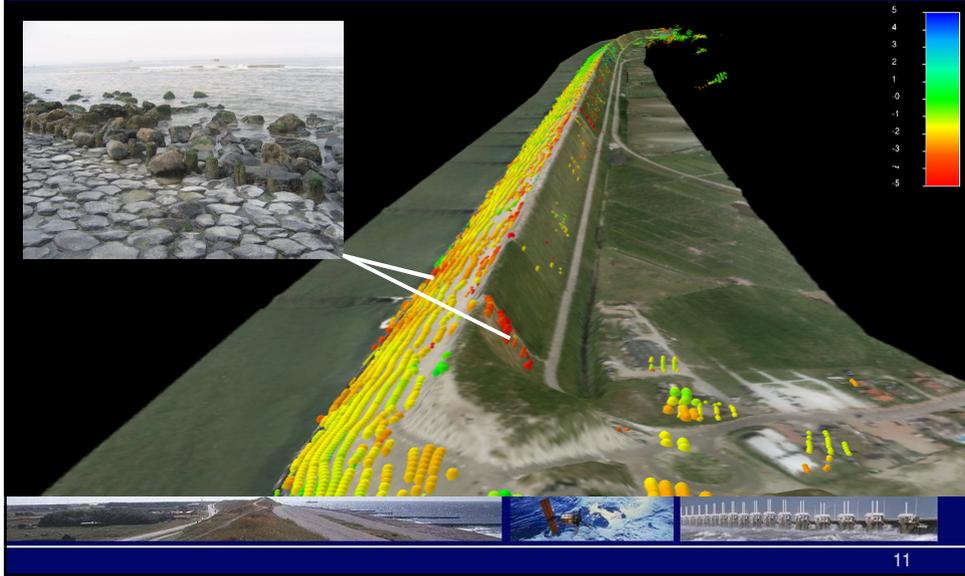
9

Case 1:
Analysis of large areas
Friesland, The Netherlands



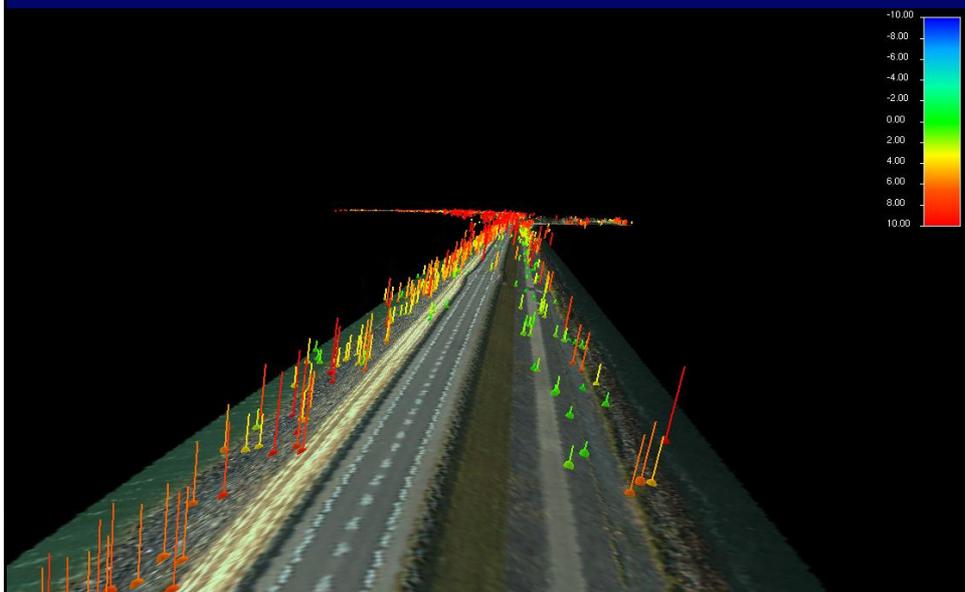
10

Case 2:
Hondsbosche and Pettemer zeewering, The Netherlands

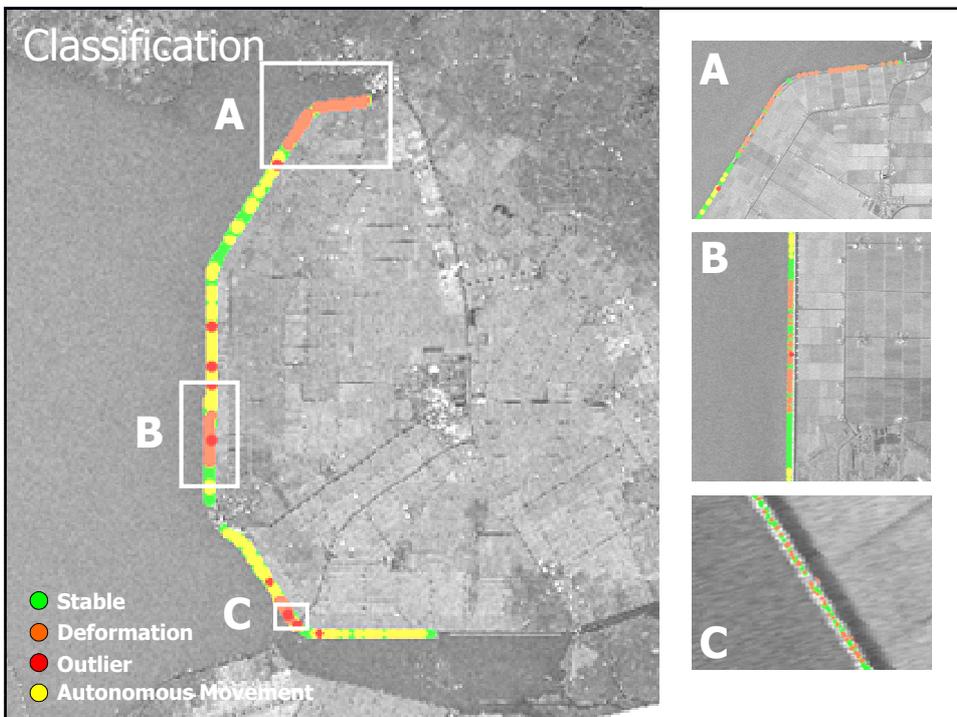
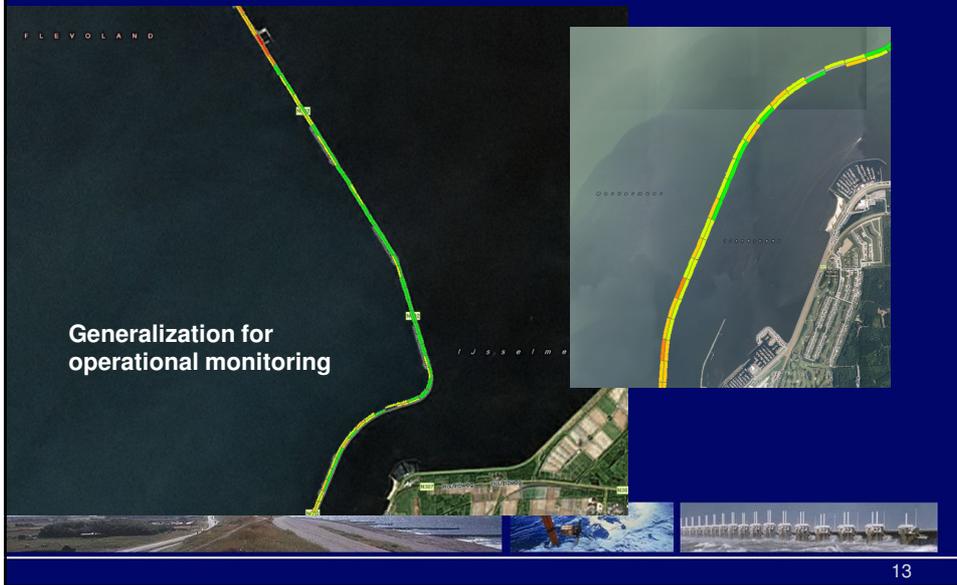


11

Case 3:
Houtribdijk, The Netherlands



Case 3: Houtribdijk, The Netherlands





Conclusions

- Satellite monitoring is an alternative for reinforcements
- Indicator function for visual inspection and dedicated reinforcements
- Applicable world wide and for large areas



Integration in European projects

- Terrafirma



Pan-European Ground Motion Hazard Information Service

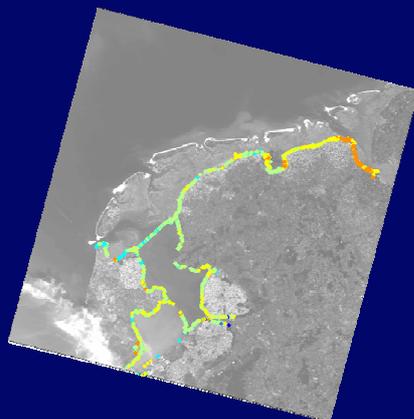
- Subcoast



developing an European service for monitoring and forecasting subsidence hazards in coastal areas



17



**Satellite Monitoring of
Water Defense Systems in
Practice**

