Innovations in modeling and monitoring to optimize sediment magagement in Flanders, Belgium

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3 Flemish Environmental Agency
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SedNet

Vlaanderen

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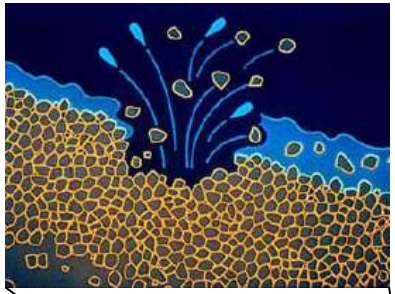
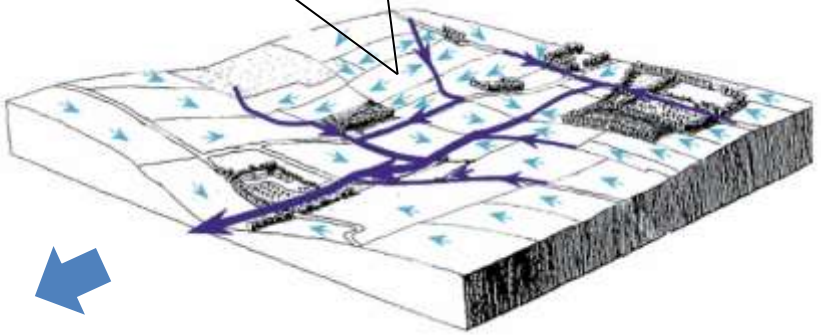
The source of anorganic sediment

Soil erosion





Evaluation of erosion and sediment transport

- Projects of the Flemish Environmental Agency and the Environmental Department of the Flemish Government
- Executed by Fluves and KULeuven

- Modeling
  - Sediment transport to waterways
  - Evaluating the effect of erosion control measures
- Measuring
  - Calibrating model
  - Getting more system knowledge

CN-**WS**

Curve Number Model
Discharge
= f(time, space)

+

WaTEM/SEDEM
Total Sedimentload
=f(space)

SEDIGRAM
Sedimentconcentrations
=f(time, space)

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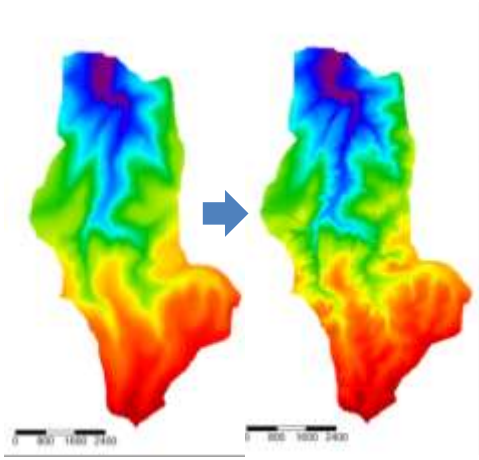
WaTEM-SEDEM

- Developed at KUL (Verstraeten et al., 2002)
- Based on RUSLE
  - Erosion = R * K * LS * C * P
- Transporting sediment trough landscape
  - Transportcapacity (TC) = kTc * R * K * LS
- If amount of sediment < TC: Erosion
- If amount of sediment > TC: Sedimentation

WaTEM-SEDEM 2.0

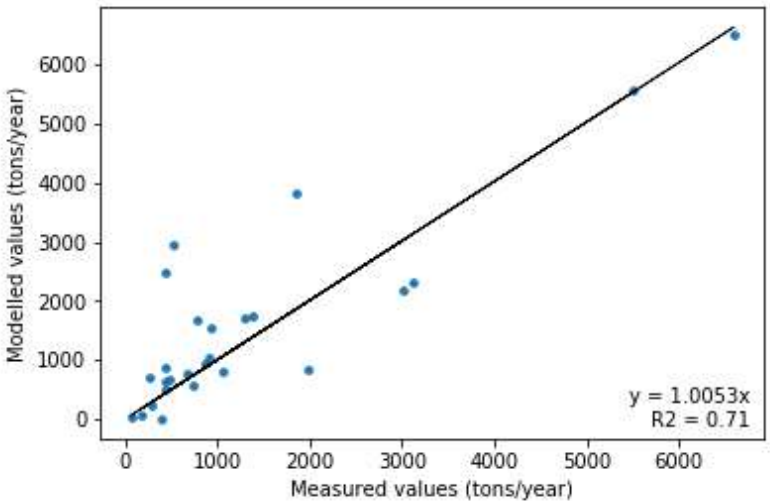
- New source data:
  - High Resolution DEM (LiDAR)
  - Detailed land-use data
  - Detailed information about crops
  - Updated R-factor → climate change
- Python toolbox
  - Automatically creating input data from source data
  - Post-processing of model results
- Model code was reviewed and debugged

→ Calibration necessary



Calibration

- Sediment measurements in small catchments/rivers
  - Turbidity + water sampling
- Dredged sediment volumes in sedimenttraps
- 43 datasets, 26 used for calibration



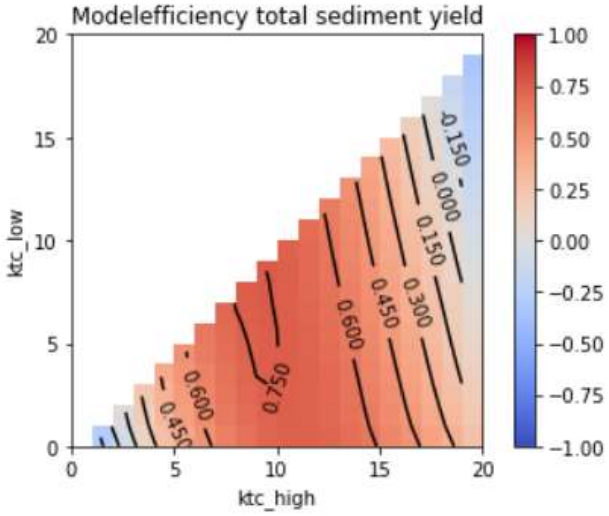
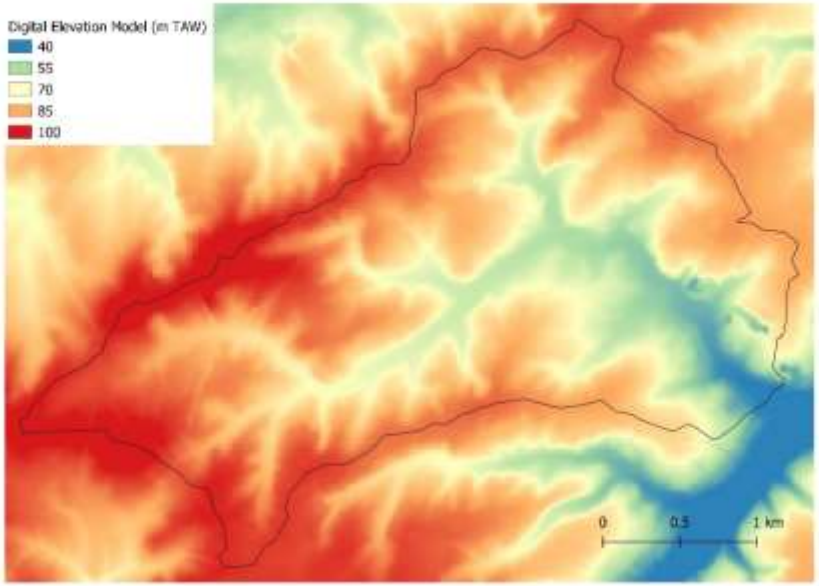


Illustration:

Input maps

- Catchment of Langegracht (830 ha)



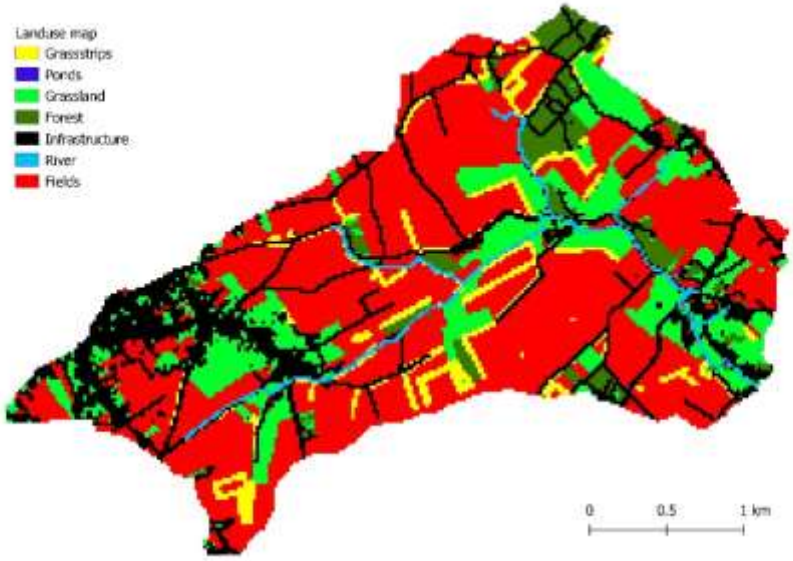
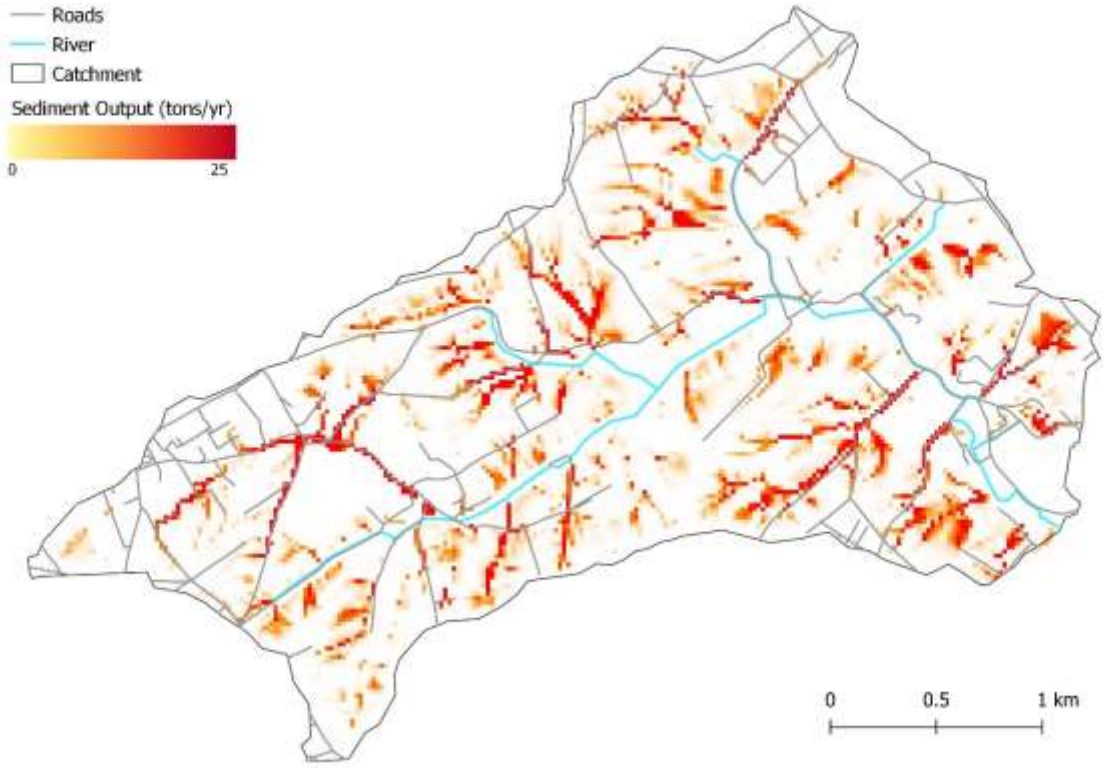
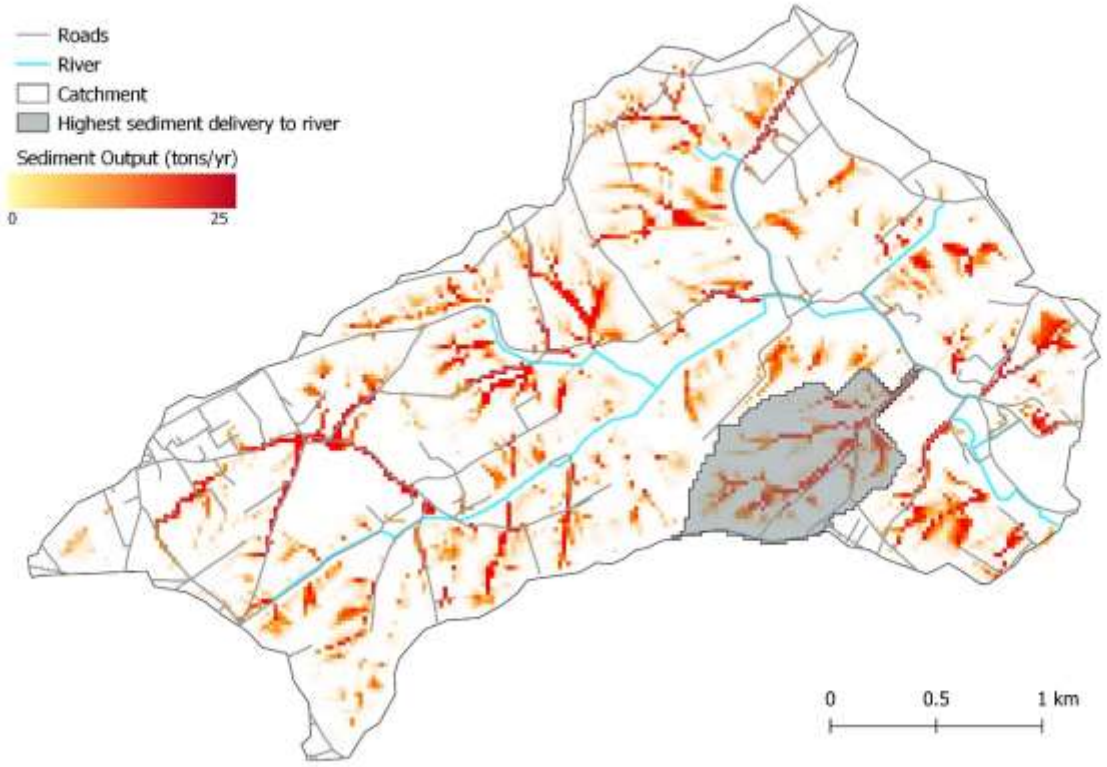
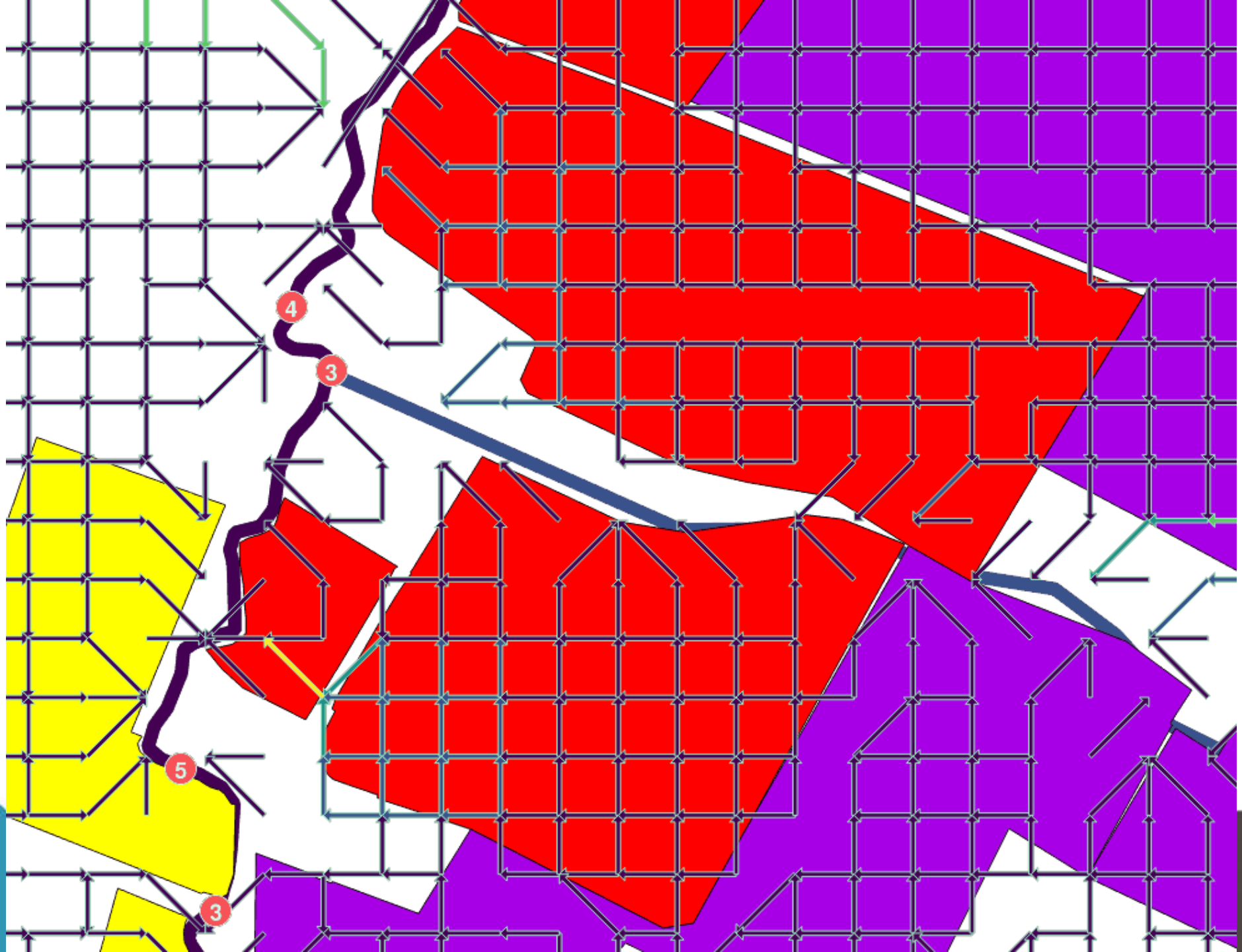


Illustration:
Output maps



Identifying areas with high sediment input

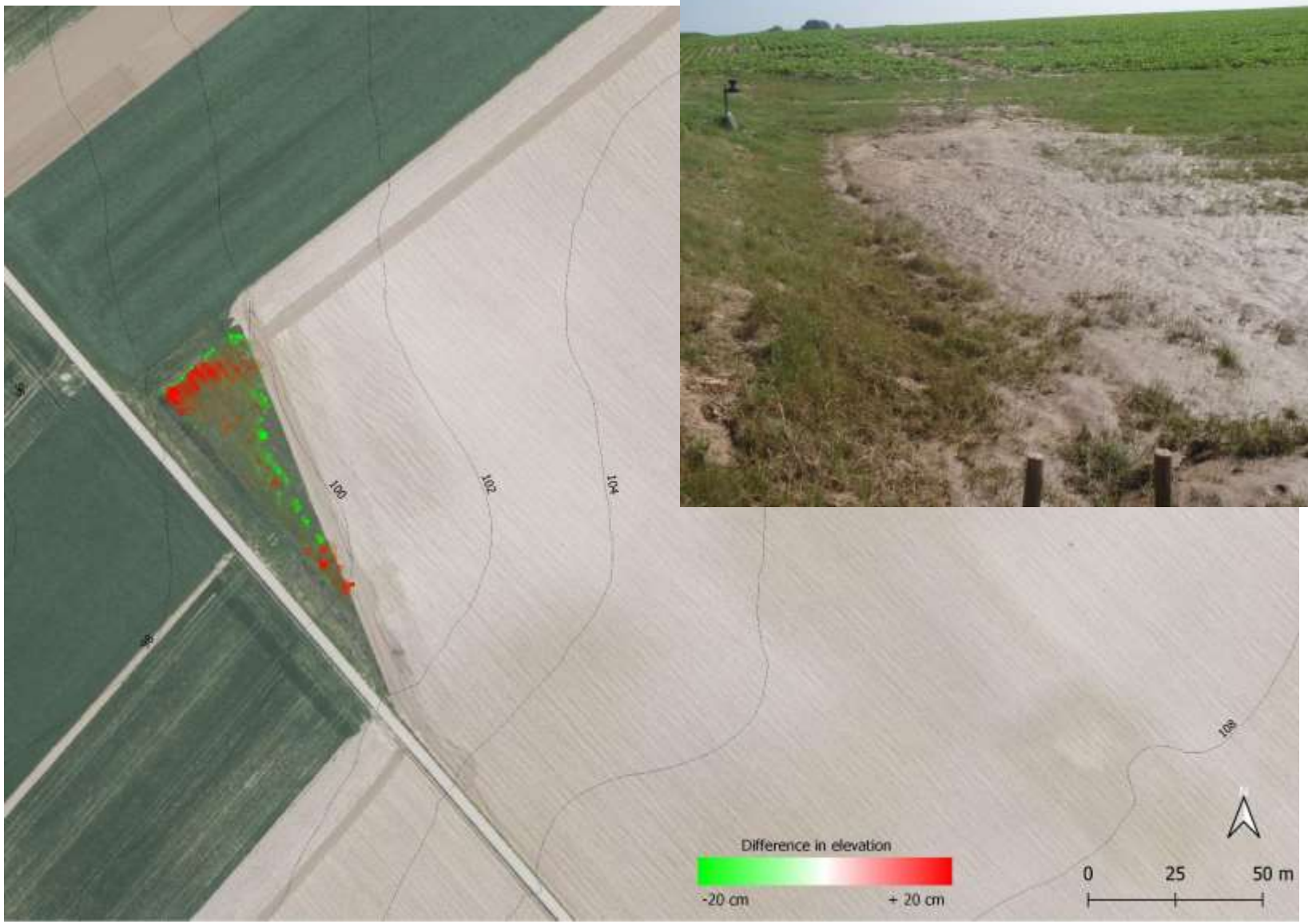



4
3
5
3

Event-based monitoring

IoT Network of pluviometers on dams

RTK GPS measurements



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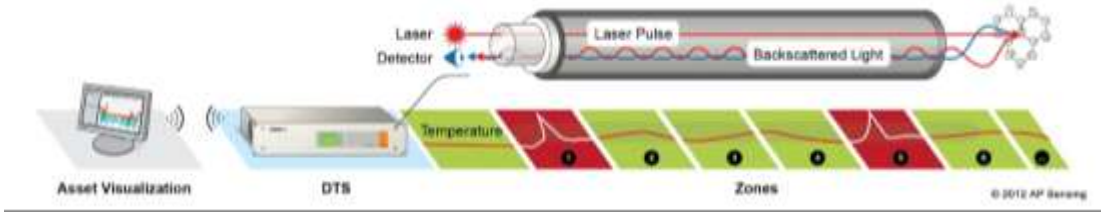
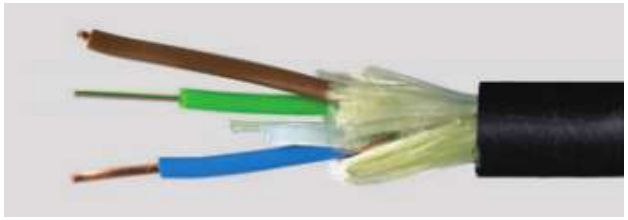
Continuous monitoring system

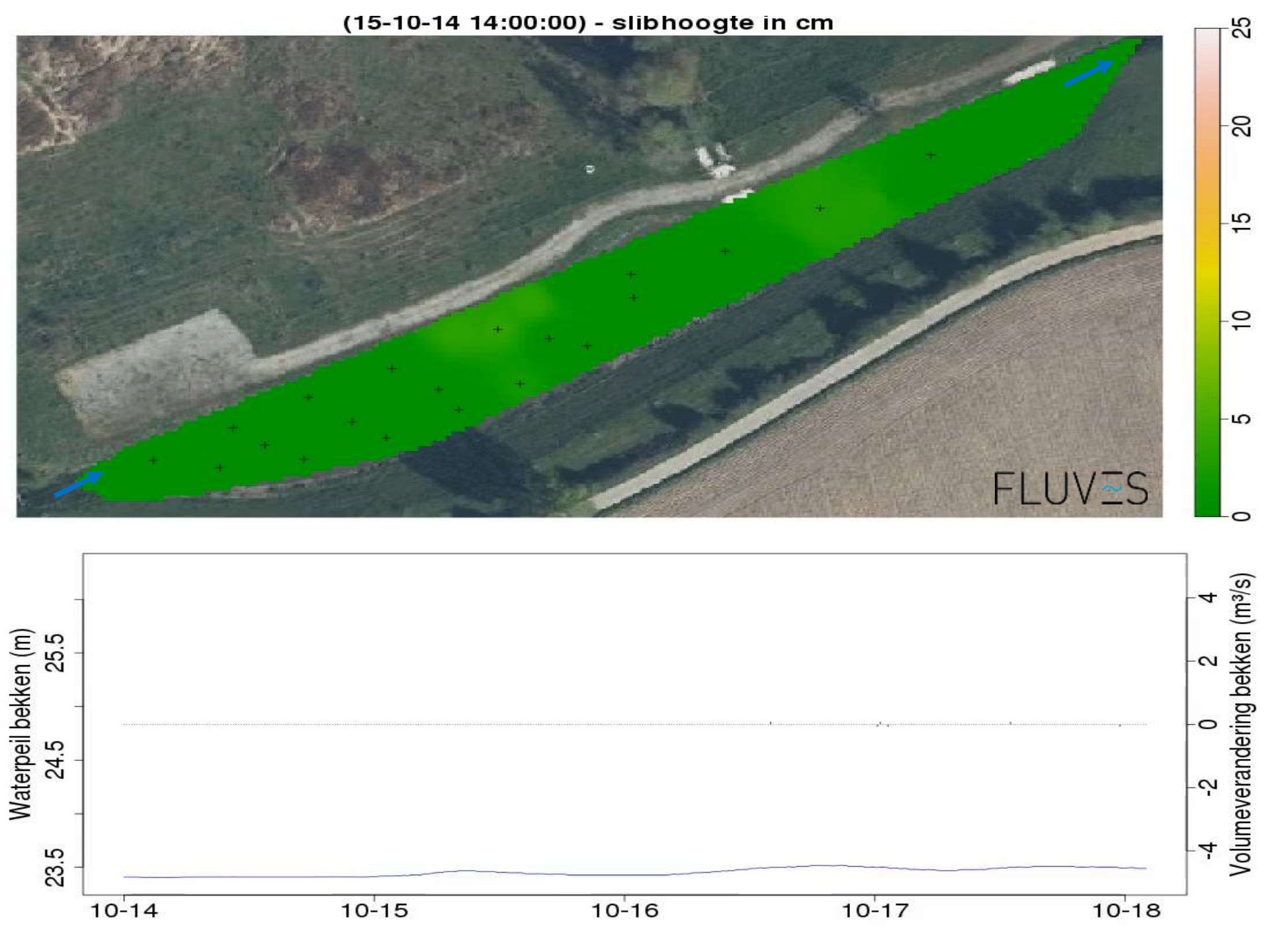




+

Cable

Control unit


(15-10-14 14:00:00) - slibhoogte in cm
FLUVIUS
0
5
10
15
20
25
Waterpeil bekken (m)
23.5
24.5
25.5
Volumeverandering bekken (m³/s)
-4
-2
0
2
4
10-14
10-15
10-16
10-17
10-18