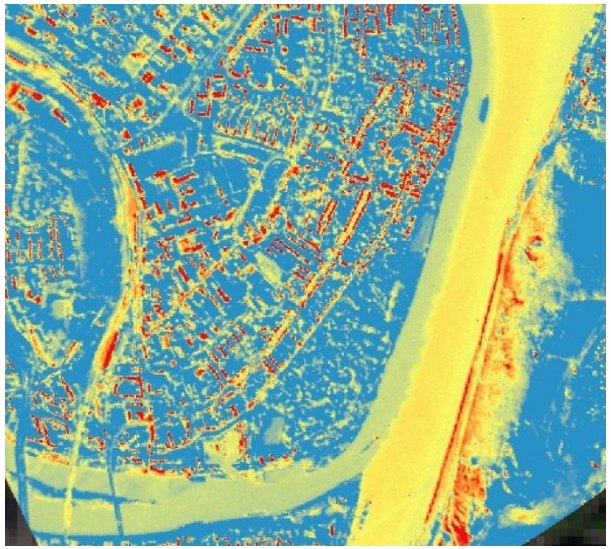
Monitoring of surface water temperature and turbidity from remote sensing platforms – activities at BfG



Compiled by
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  remote sensing at BfG

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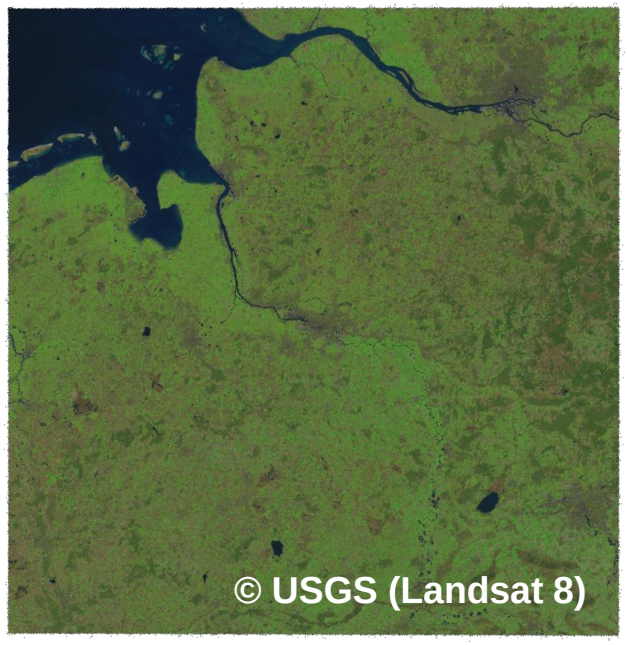
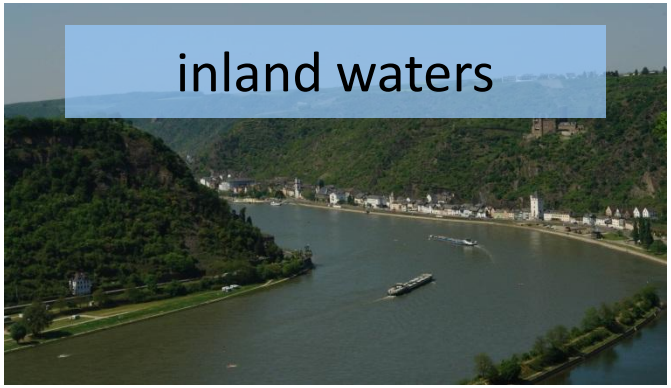
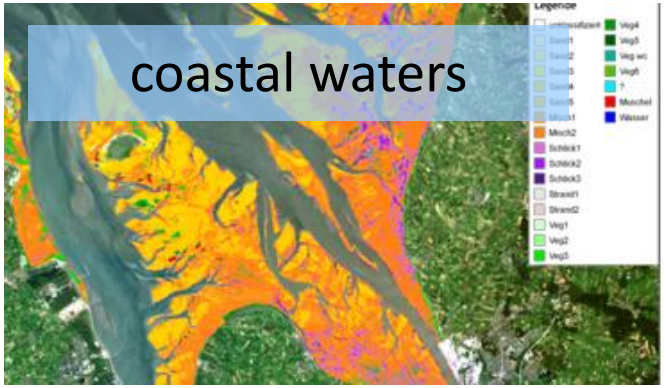
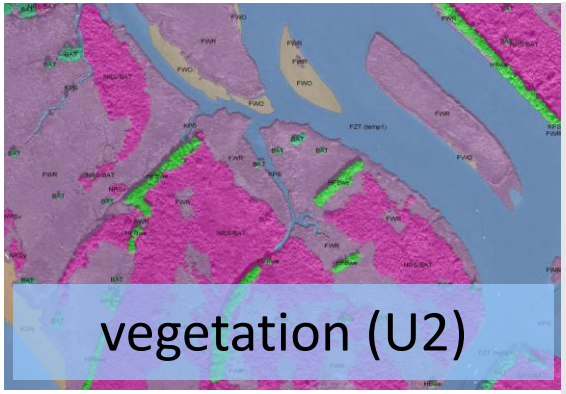


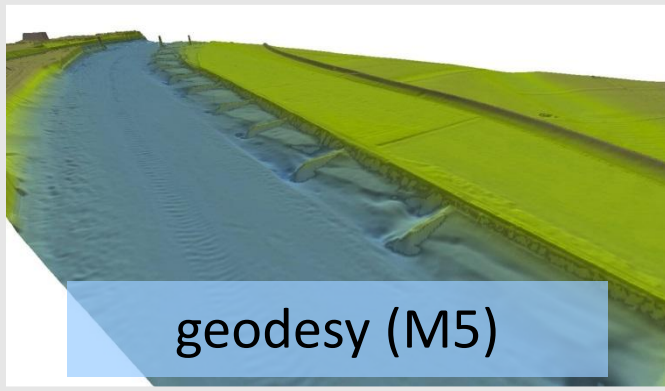
Remote sensing at BfG

- applications for waterways
- new methods
- projects
- Copernicus (M4)









remote sensing in several departments
oriented on applications
R&D as well as operational usage

hydrological simulations (M2)

Water surface temperature

Objectives of R&D-project

- make TIR-applications accessible, e.g.:
  - validation of numerical models
  - distribution of water masses (inflows)
  - representativeness of measurement stations
- investigate uncertainties (e.g. atmosphere, mixing)
- new methods & measurement concepts

TIR-remote sensing + in-situ
= spatial RST-distribution
for applications

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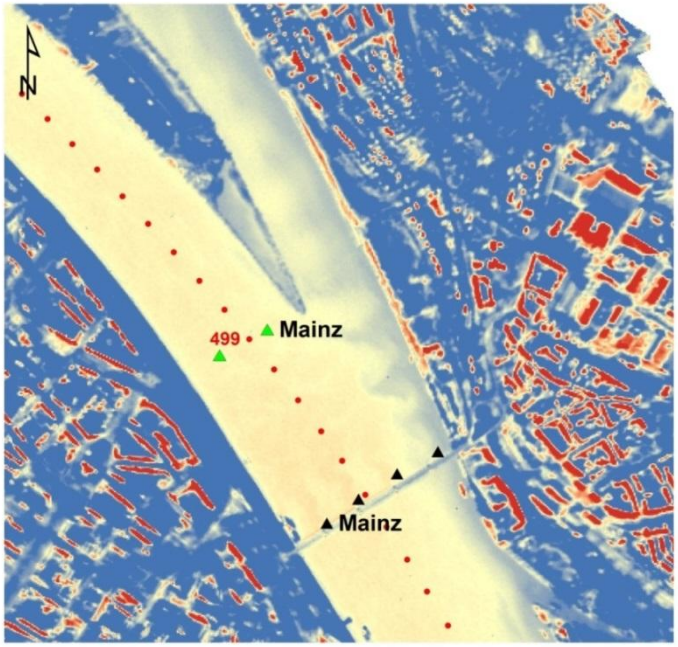
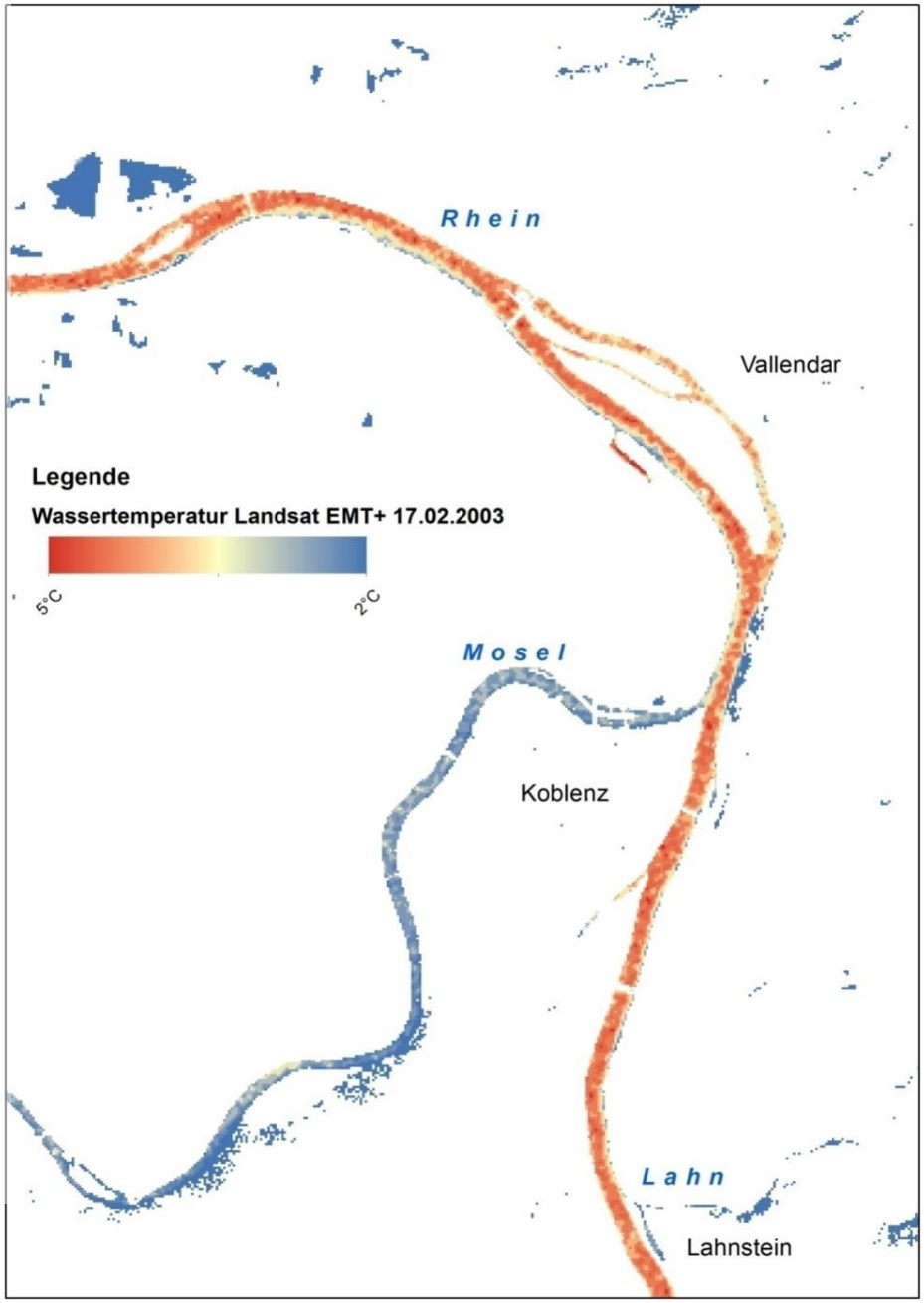


Product example: satellite

- spatial distribution: 60 m (not Sentinel)

- few in-situ-measurements
- atmospheric correction

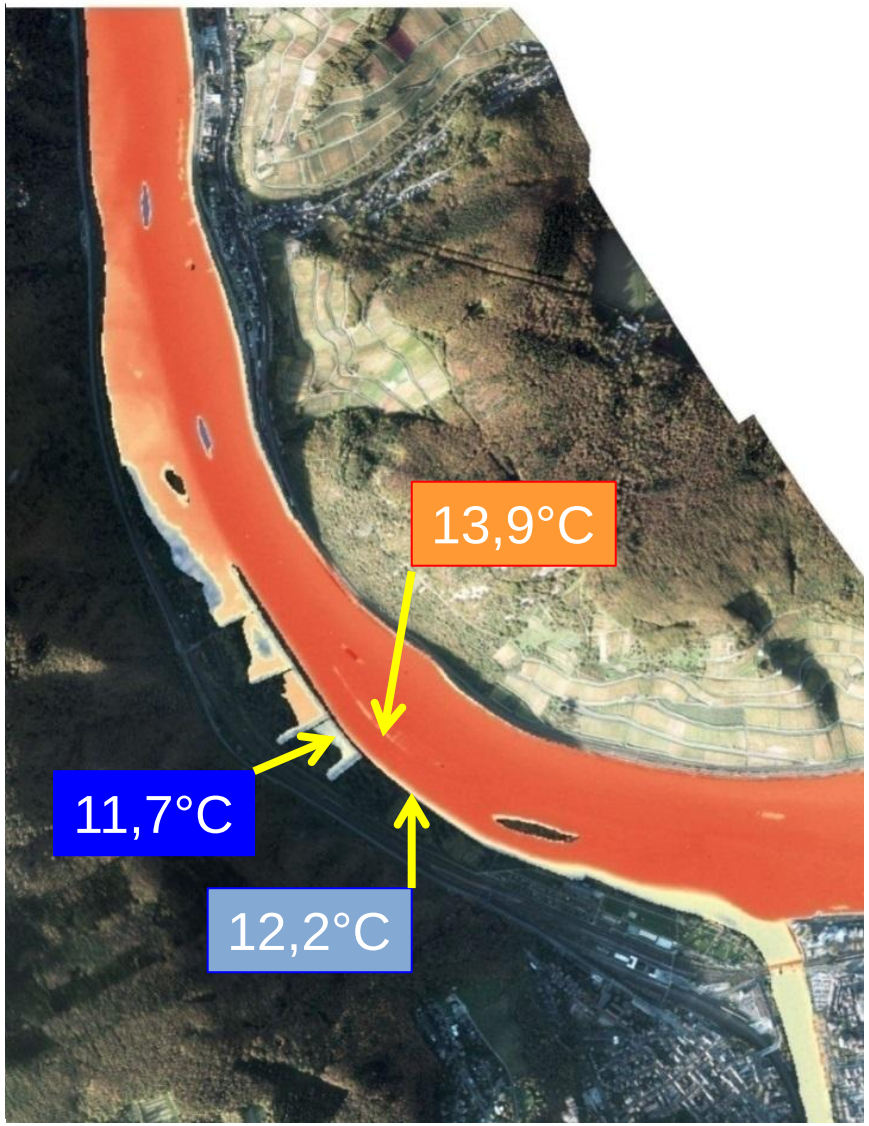
- comparison in-situ / Landsat-7 example River Rhine (mixing)
  μ = 0,5°C σ = 0,7°C



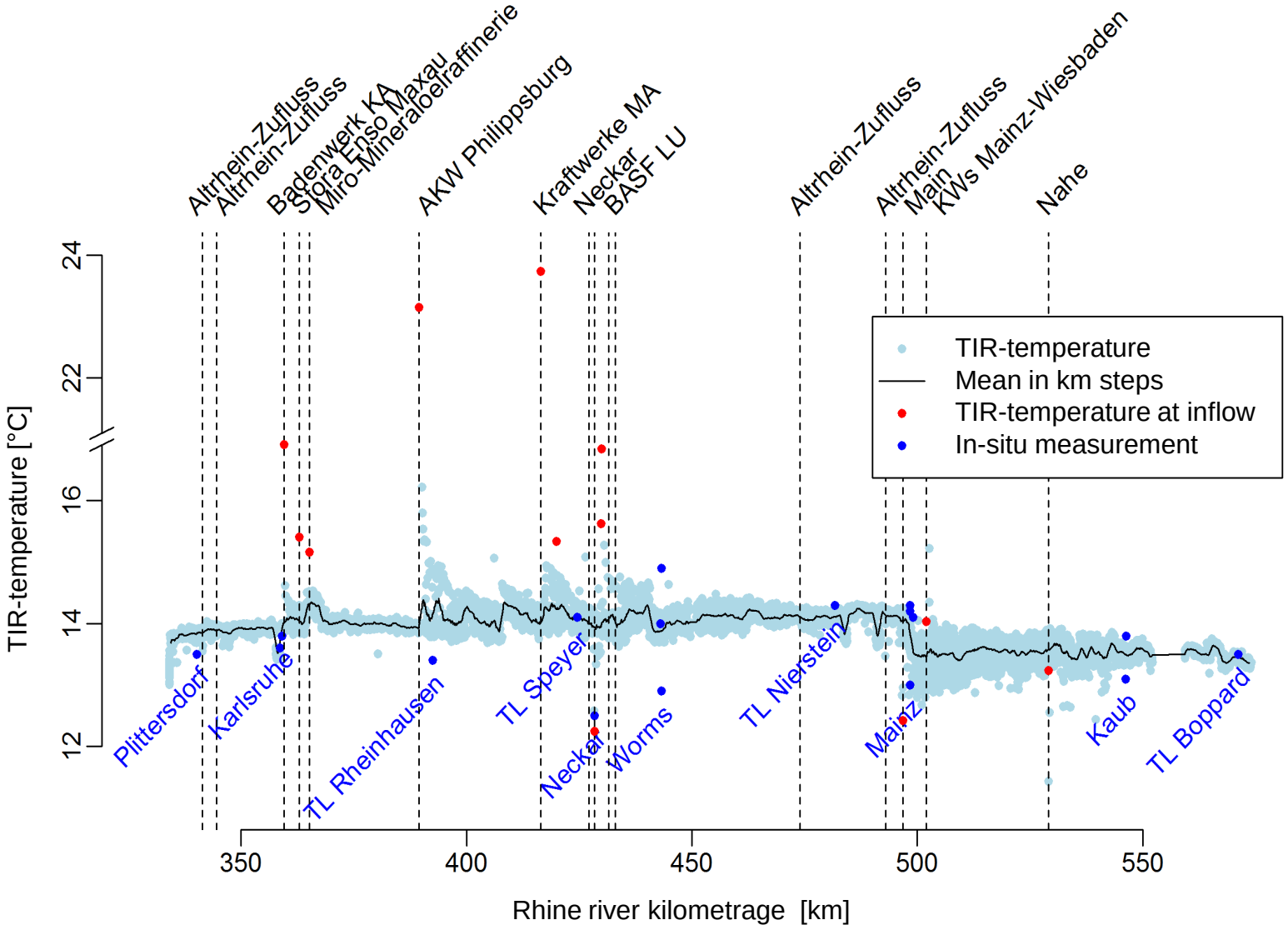
Product example: Aircraft

- spatial resolution: ~4 m
  (depending on sensor / altitude)

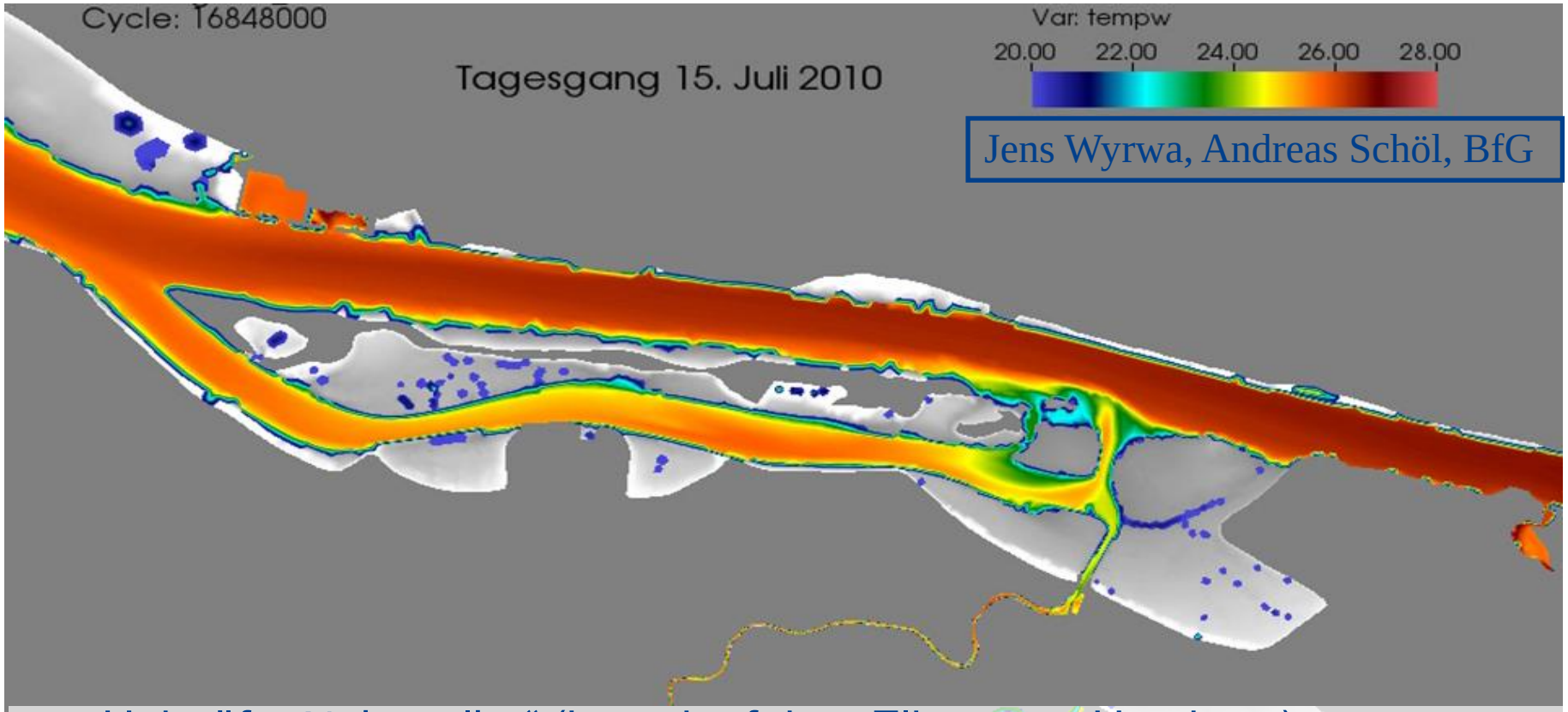
- comparison in-situ / remote sensing
  example River Rhine (mixing)
  with in-situ-calibration:
  μ = 0 °C, σ = 0,2 °C
  (without: μ = 0,2 °C, σ = 0,4 °C)



Example product: longitudinal profile



Aim: modell validation



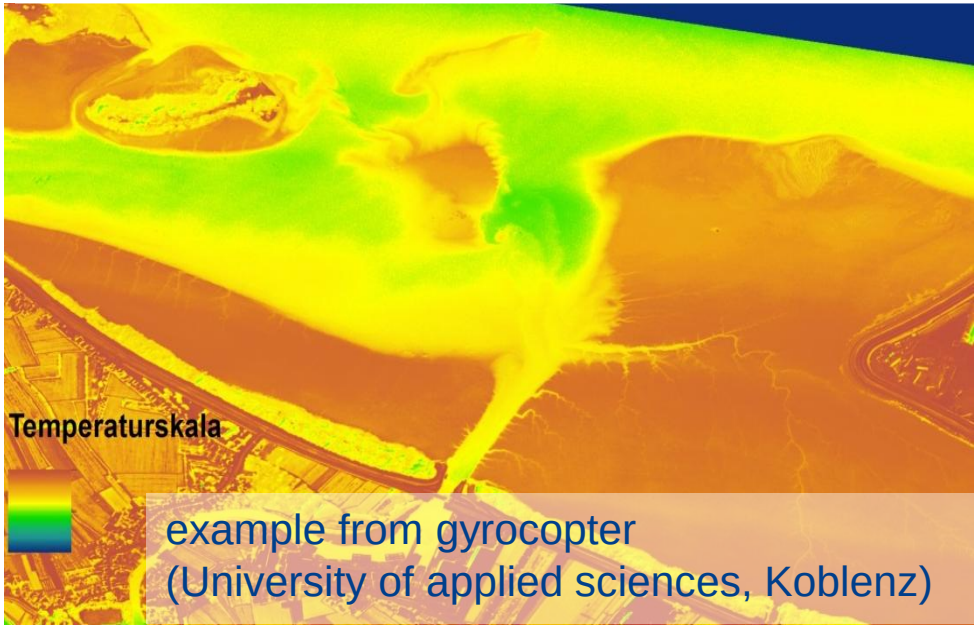
- „Hahnöfer Nebenelbe“ (branch of river Elbe, near Hamburg): Tidal influence
- Are temperature patterns and contrasts realistic? (numerical diffusion)
- Dynamics ➔ frequent, low level overflight needed ➔ best platform?

Monitoring of dynamic processes

combined usage of gyrocopter and UAS/RPAS

photo composition: Baschek, BfG

- frequent flights
- thermal infrared
- + in-situ measurements of (radiation) temperature
- analysis ongoing



example from gyrocopter (University of applied sciences, Koblenz)

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Jens Bongartz et. al, Hochschule Koblenz

Project example: turbidity: *WasMon-CT*

- **Objectives**
  - integration of satellite retrieved turbidity (Landsat, Sentinel)
    - ➔ proxy for suspended sediments
    - ➔ joint picture with in-situ & model
    - ➔ application
  - spatial monitoring, e.g.
    - position of the turbidity zone (Elbe) vs. run-off
    - mixing at inflows
    - representativeness of measurements
    - dredging
- **Cooperation with LUBW**
  - (indicative) chlorophyll monitoring in lakes

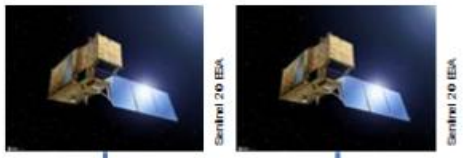
Cooperation:
BfG:
Dorothee Hucke (M3/M4)
Gudrun Hillebrand (M3)
Axel Winterscheid (M3)
Björn Baschek (M4)

LUBW:
Thomas Wolf
Nathalie Karle

funded by BMVI / DLR

Application of satellite data

Landsat / Sentinel



- validation
- derived products in combination with in-situ data

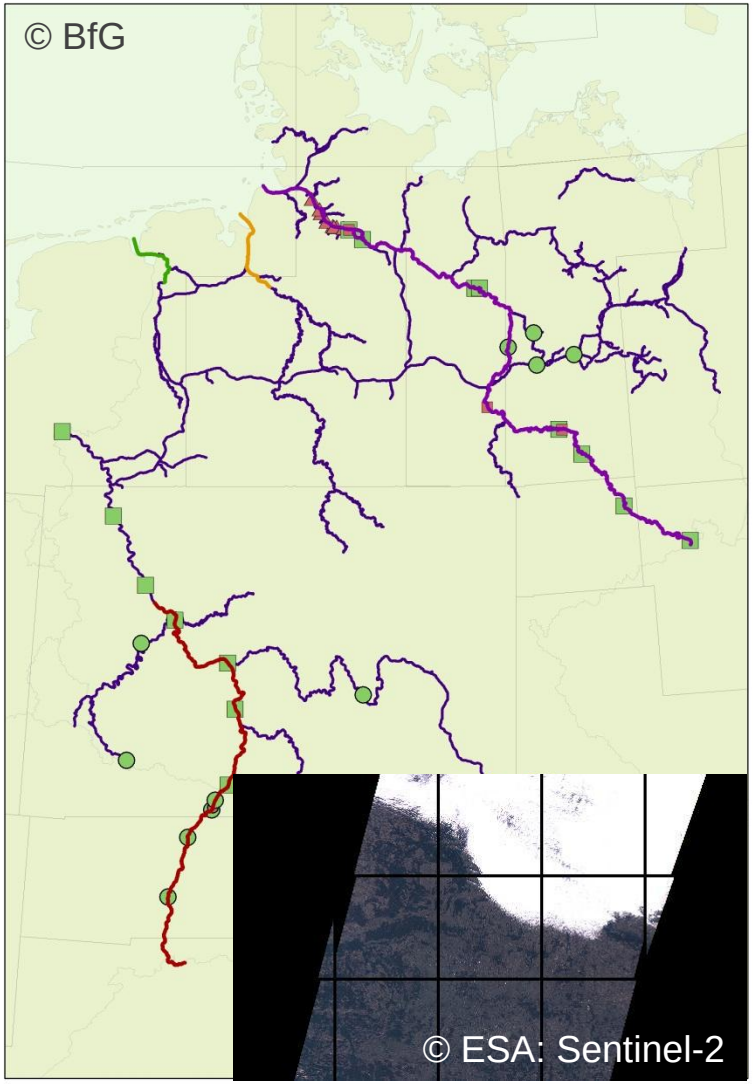
integration into existing procedures combined with in-situ data

spatial turbidity data

data storage, metadata, data availability

transfer on other applications

Status



- **project start: January 2016**
- **data selection**
  - Landsat-8 & Sentinel-2
  - python-tool for access of ESA science hub; automatic download of metadata and quicklooks

    ➔ metadata-database, GIS
  - collection of in-situ-data

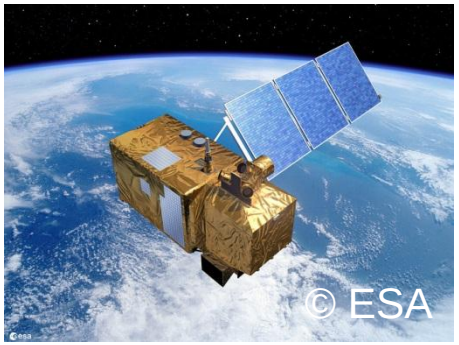
    ➔ metadata-database, GIS
- **tender for processing of satellite data**
- **exchange with e.g. gemstat**

Summary

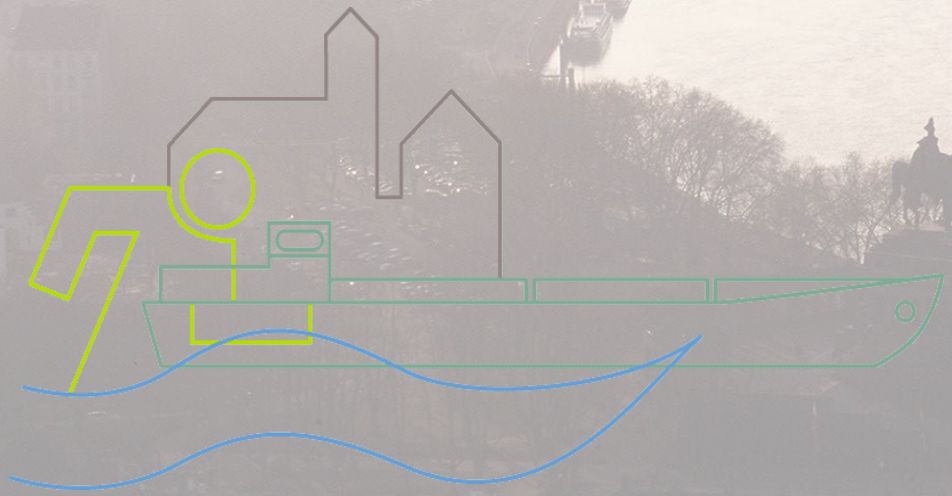
- applications of remote sensing

  e.g. oil spills, vegetation, geodesy, water quality, sediment management, modelling…

- remote sensing platforms:
  - satellite, aircraft, gyrocopter, UAS/RPAS, in-situ



- interested in exchange
- open for discussion of further GEO cooperation



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