An experience from Germany
Lake water quality monitoring in Baden-Württemberg

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Institute for Lake Research (ISF) of the LUBW
➔ Classic Lake Monitoring Tasks

Lakes in federal state Baden-Württemberg

- 28 WFD-lakes > 50 hectar
- 260 lakes > 10 hectar
- 1300 lakes > 1 hectar

Using Classic lake monitoring methodology

➔ **approx. 10 lakes/year**

Total during the last 20 years

- Lake Constance (area 536 km^2)
- 50 Natural, small lakes
- 20 Gravel ponds

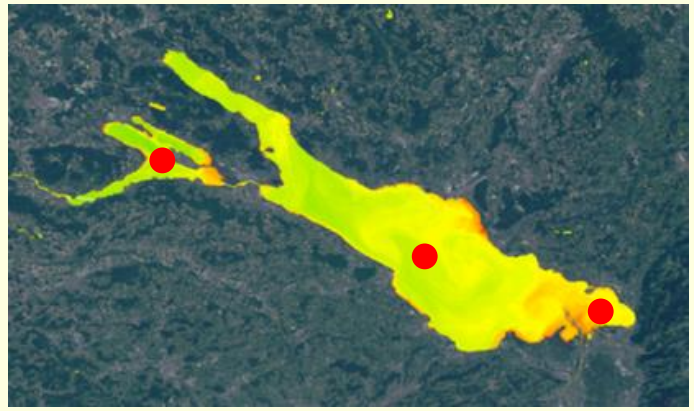
Satellite-based inland water monitoring

- **Expanding the lake monitoring data base through satellite-based information**
- Use at LUBW : External service provider **and** in house data processing

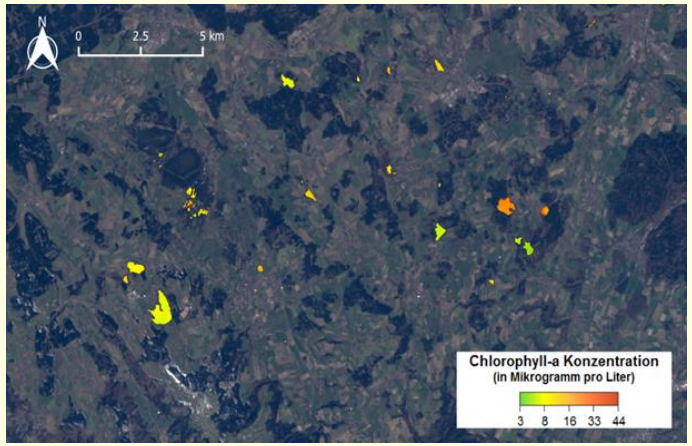
More frequent monitoring of **all lakes > 10ha**
➔ **Higher temporal & spatial resolution**

Detection of **spatial inhomogeneities**
➔ **Patchiness**

Monitoring of a **large number of small lakes**
➔ **Indicative water monitoring**



Lake Constance (processed by EOMAP)



Oberschwäbische Seen (processed by EOMAP

- **Trusted quality** ➔ continued validation (BIGFE)
- **Regulations** ➔ use of Copernicus for WFD ?

In situ Monitoring + **Satellite based Monitoring**

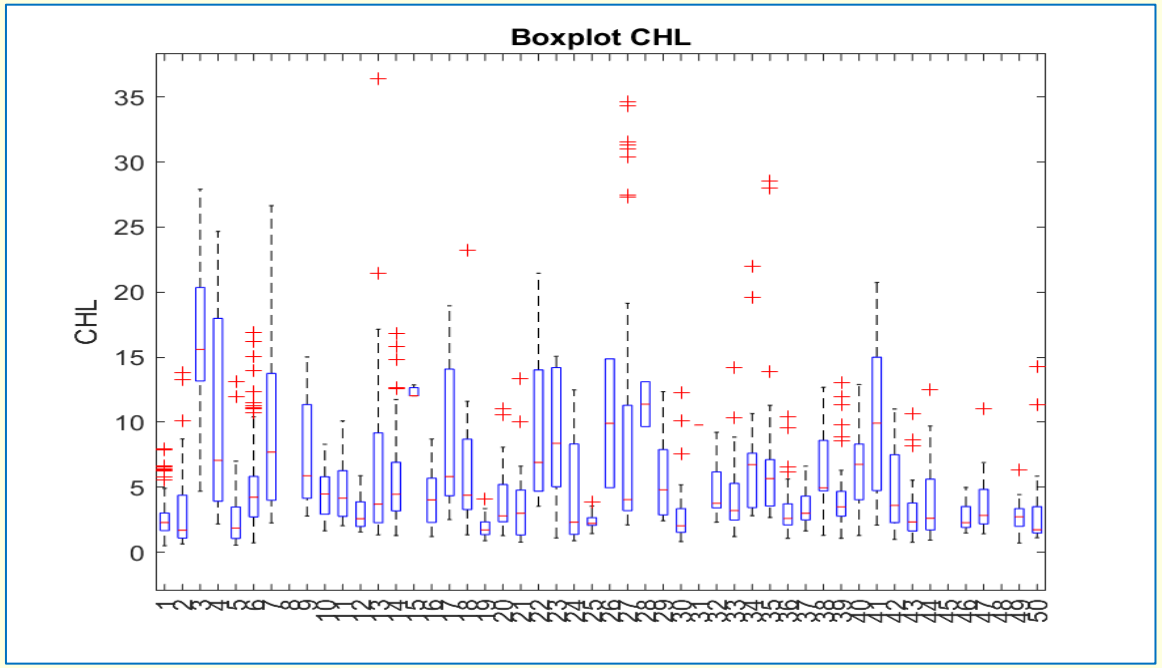
New quality of monitoring and information

- **Federal state synoptic lake monitoring ➔ 50/200 Lakes in 2022 ➔ 200 Lakes in 2023**
  - Water quality parameter CHL, CDM, SDD, TUR, TSC, TSM, HAB ➔ **Assessment of WAQ in Lakes**

New possibilities for monitoring and water protection

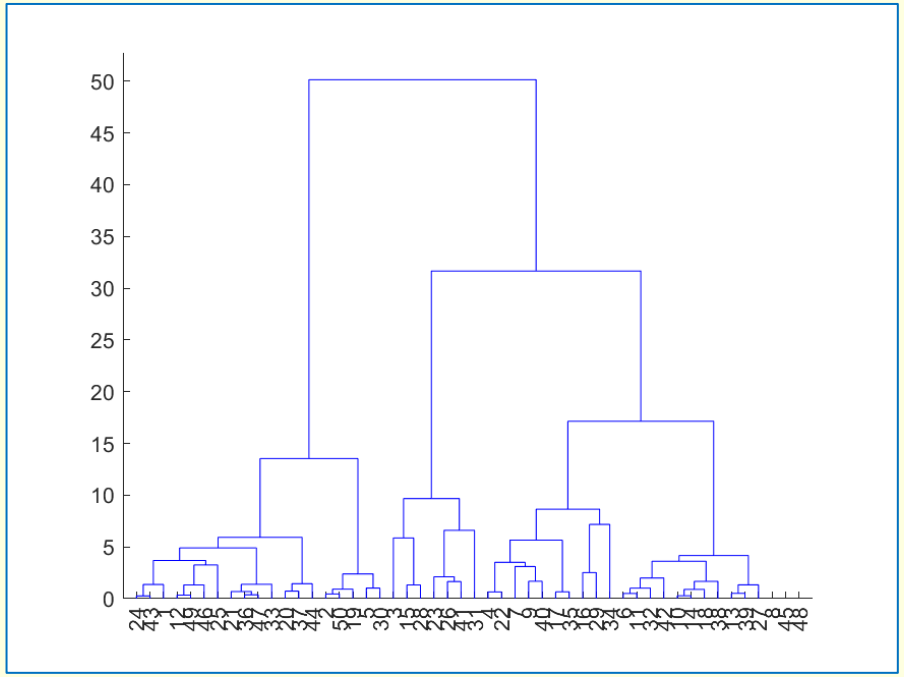
- federal state scale, methodologically uniform, synoptic recording of water quality in lakes
- ➔ better systemic understanding of lakes and lake reactions / resilience ?

Ensemble of 50 lakes
Boxplot Chlorophyll a Year 2022



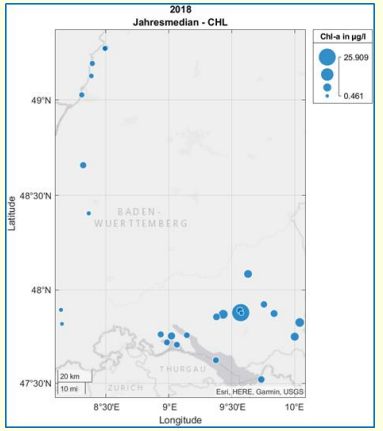
MSA

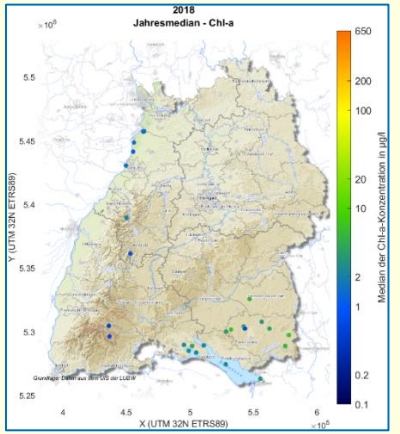
Ensemble of 50 lakes
Grouping and similarity analysis



Activities on different levels - Rollout and Harmonization

- **State level: Implementing remote sensing for routine monitoring of water quality**
  - Federal State of Baden-Württemberg
  - **Ensemble of 50/200 Lakes for 2022 and 2023**
  - Quality assessment
  - „last mile“ ➔ easy to understand information
  - **New Near real time processing system eoApp AQUA in 2024**





- **Federal Level Germany : Harmonization of remote sensing methodology for inland water monitoring**
  - BIGFE – remote sensing of inland water quality throughout Germany
- **International regional Collaboration (IGKB) ➔ Austria & Switzerland & Germany**

- **European regulatory frame work (Water Framework Directive WFD)**
  - ➔ Copernicus services and data ➔ **monitoring and reporting tools ???**

LUBW