# Leveraging Satellite Technologies and Space Agency Expertise for Monitoring and Decision-Making

## Big data & Remote sensing-based tools for water quality monitoring

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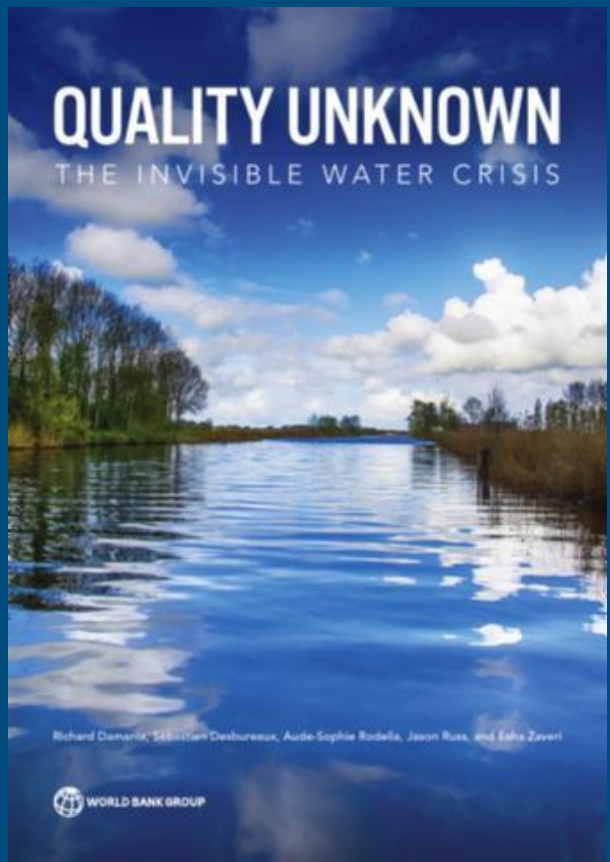
# Context

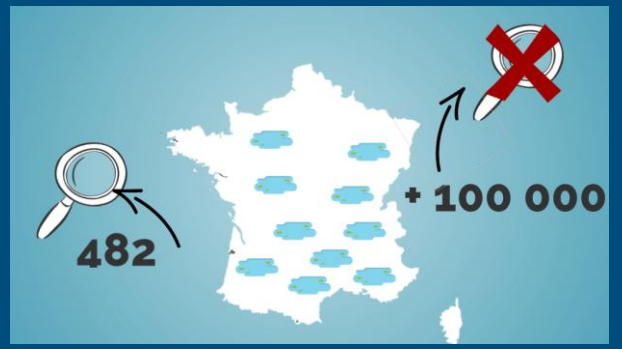
## World Bank Report : “Quality unknown : the Invisible water crisis”

- *“Water quantity … grabs public attention and the media spotlight”*
- *“Water quality … goes largely unnoticed”*
- “*Monitoring and publishing data on water quality are crucial*”
- “*Global water quality monitoring is severely lacking*”
- Remote Sensing as an efficient monitoring alternative tool

# Water quality issues in lakes and ponds

- **99 % of world's lakes and ponds are not monitored**
  - Over France, only 482 lakes monitored out of 100,000 lakes




- **Water quality as an integrative index for both regional and global changes**
  - Hydrological cycle intensification (extreme floods and dry periods)
  - Land use and agricultural practices, erosion, fertilizers, sewage, wetland degradation


- **How inland water bodies react to warmer climate and extreme events depend also on the catchment characteristics and management practices**
  - Information is needed for adaptation & mitigation

# Developing remote sensing-based applications

- **Developing the use of remote sensing for water quality policy enforcement**

- **XTREM-QUALITY "Space Climate Observatory" project**
  - Develop new services on the impact of climate change and regional environmental degradation on water quality
  - Quantify and map the vulnerability of water resources through the development of synthetic indices
  - Assessment over a large range of water bodies from 1 ha with multiple uses: irrigation, hydropower, flood control and ecological flows regulation, recreation etc..
  - Stakeholder: Adour Garonne Water Agency

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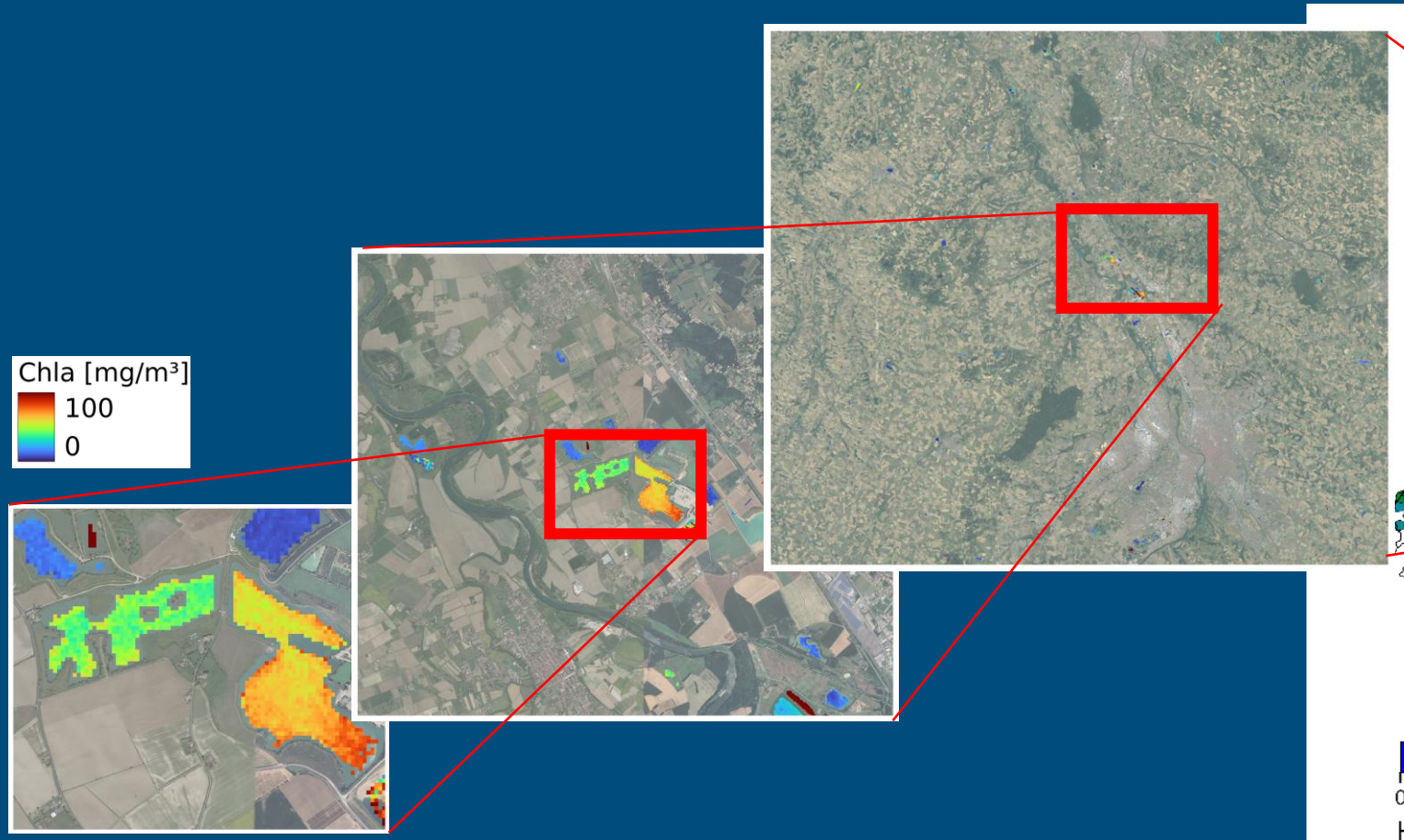
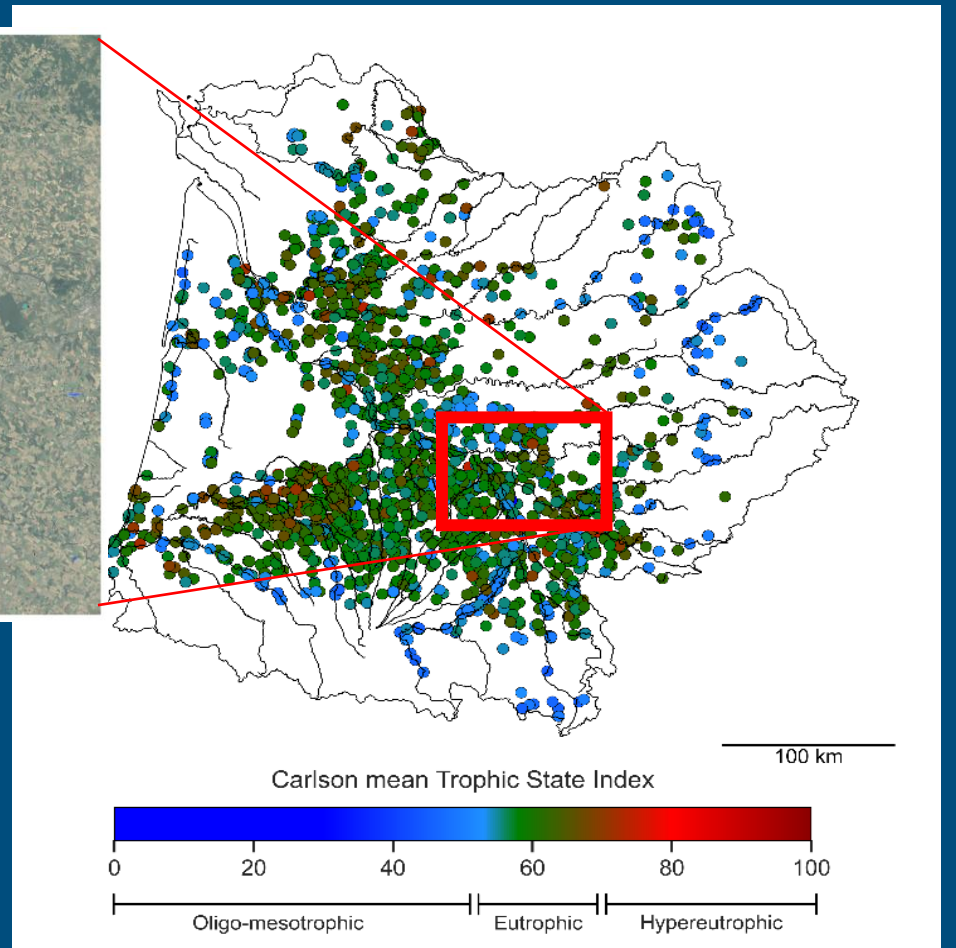
# Water quality monitoring: eutrophication

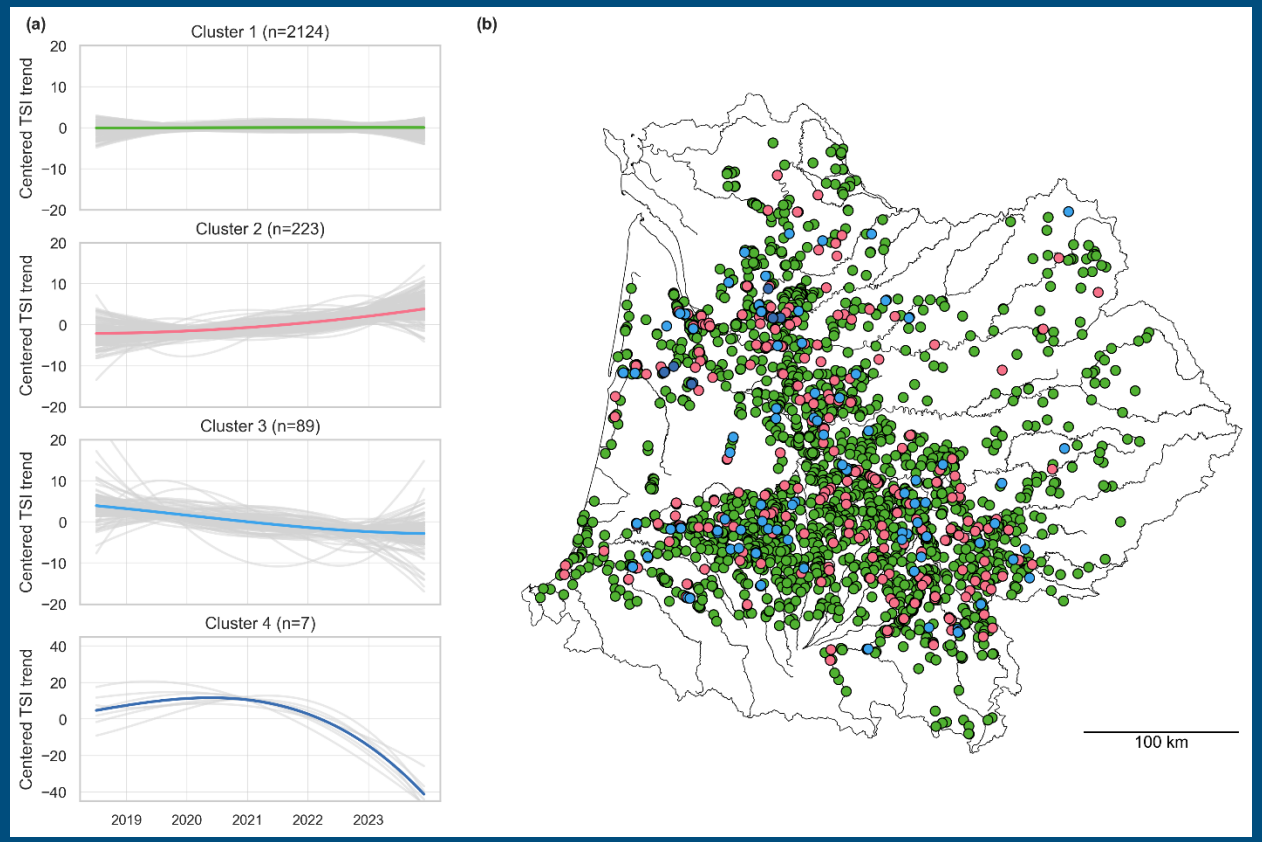
- **From local to regional scales (> 100,000 km²)**
  - ➢ COPERNICUS Sentinel-2 observation program allows multi-scales monitoring
  - ➢ >85% of the lakes are eutrophic to hypereutrophic in west southern France

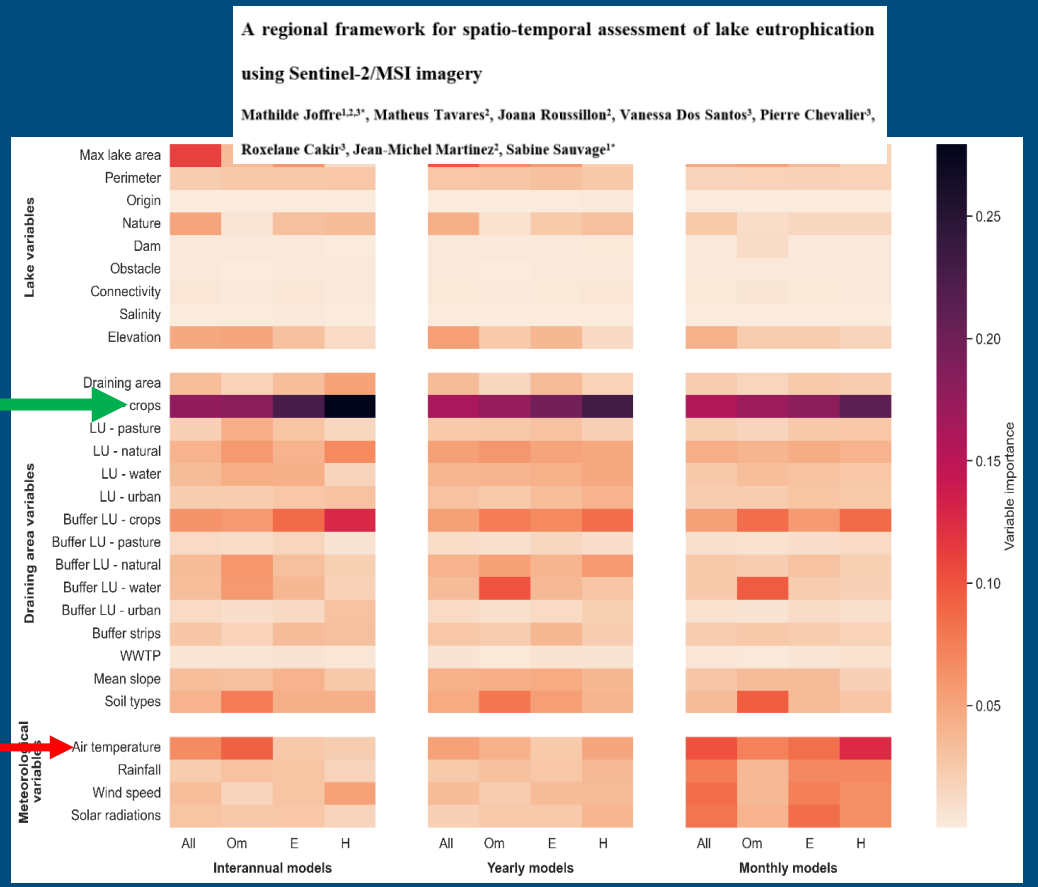


# Water quality monitoring: eutrophication

- **Providing water quality trend indices and insight on the main driving factor**
  - ➢ Coupling EO data, field data and ML/DL techniques
  - ➢ Extreme **climate events** (temperature) and of **agricultural practices** (corn crops) control is revealed



# Take-home messages

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- **Earth-observation data for water cycle monitoring**
  - ➢ **Innovative method allowing faster data exchange between agencies & countries**
  - ➢ **Extended time series & coverage**
  - ➢ **Deciphering CC-induce impacts from local contamination & degradations**
  - ➢ **Hydroweb-Next platform for integrated water cycle information from RS**
- **From observation to prediction**
  - ➢ Coupling ML/DL techniques for improved water policies enforcement & definition
  - ➢ Deciphering the impact of global change and local practices to foster adaptation
- **Importance of training and capacity building of stakeholders staff**

hydroweb.next Theia cnes