Seamless Integration of Pixel Time Series in the Sensor Web

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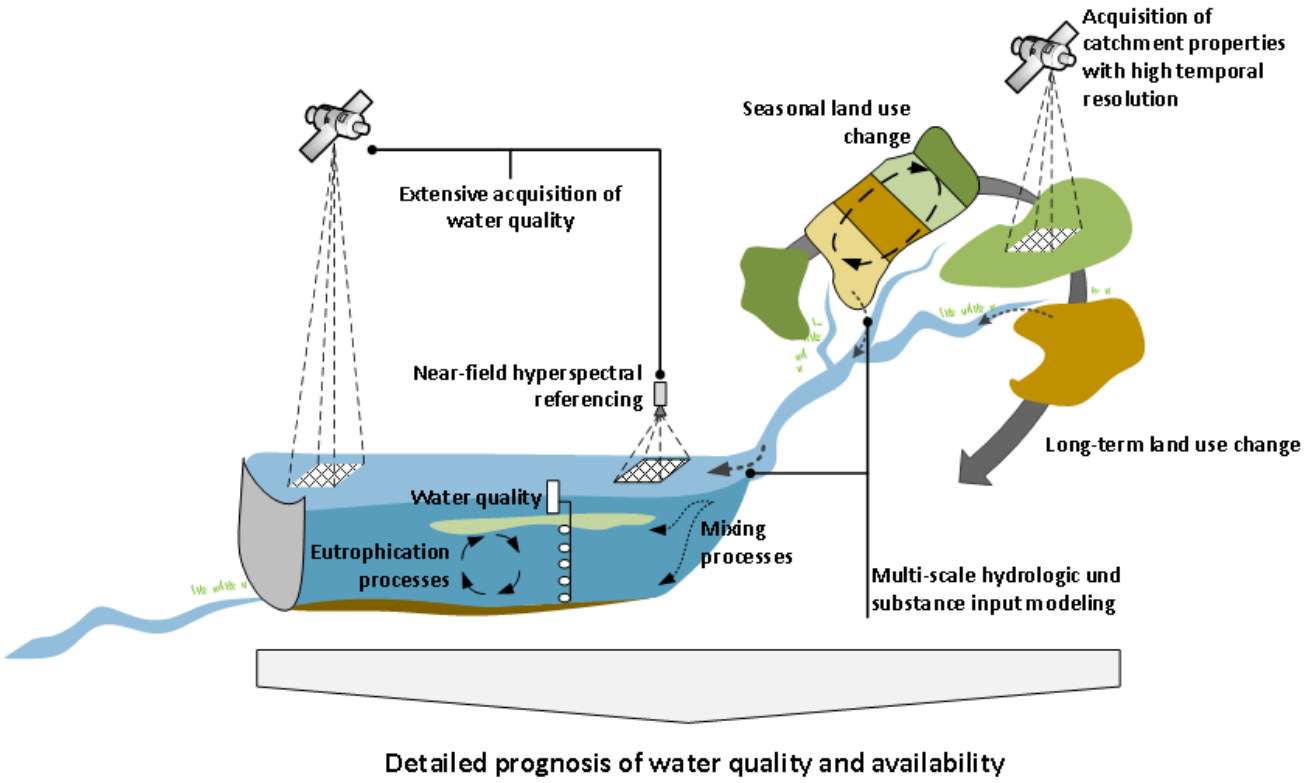
52north exploring horizons

MuDak-WRM project

- Assessing water quality in dams through remote sensing.
- How to combine in-situ time series with pixel time series?
- Challenges for modeling and technical solutions.



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Remote Sensing vs Time Series Data

- Used to be conceptually different
- Used to have incompatible temporal resolutions: weeks vs hours
- Different APIs: WCS/WMS vs SOS/STA
- Increased temporal resolution of remote sensing data → few days/daily
- A coverage can be seen as very dense pattern of Features of Interest
- Cave: the representation is different!
  - Pixel: average value of a region (the column of air from ground to the sensor)
  - Point: in-situ measurement on a small spot

Pulling out pixel time series

- A single pixel and its change over time can be understood as a time series
- Approach: wrap WCS (with time support)
  - have a single request with temporal filter and location
  - understand REST requests that are the same as for the STA interface
  - mimic the result of a STA interface, i.e. a JSON representation

Implementations - gdalcubes

- Open source C++ library and R package for creation of data cubes from irregular satellite image collections (e.g., Sentinel-2, PlanetScope, Landsat)
- facilitates multivariate time series analysis and combination of data from different EO missions
- On-the-fly processing, no need to maintain a 2nd copy of imagery
- Supports interactively changing data cube parameters (spatiotemporal resolution, extent, CRS)
- Details in the tutorial: “Analyzing Multi-Variable Earth Observation Data Cubes”

Implementations - proxy webapp for GeoServer

- Docker based infrastructure set-up
- GeoServer 2.16.2 + ImageIO + netcdf (+ out) plugin + …
- PostgreSQL 11.0 with PostGIS
- Coverages as GeoTiff
- Spring Boot 2.2.4

Open issues

- mapping multivariate pixel time series (e.g. RGB, multi band)
- mapping all concepts of the STA to WCS
- handling STA metadata on the raster side
- a performance study has been initiated