

Input from Copernicus Services: Requirements for in situ water quality data (inland waters)

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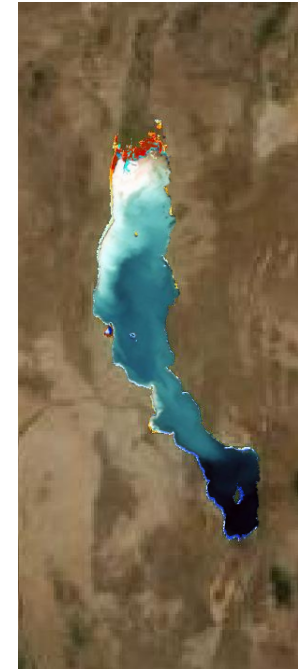


Requirements for water quality in-situ data - Approach

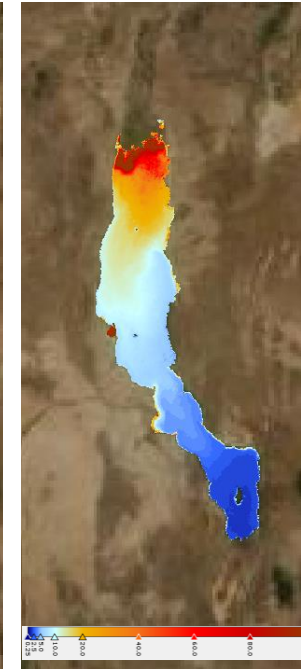
- Requirements from Copernicus Global Land Service – Lake Water Quality products
- Summary of previous surveys (e.g. MONOCLE)
- Analysis of existing data sources
- Gap analysis

Parameters provided by the Copernicus Service (CGL, LWQ)

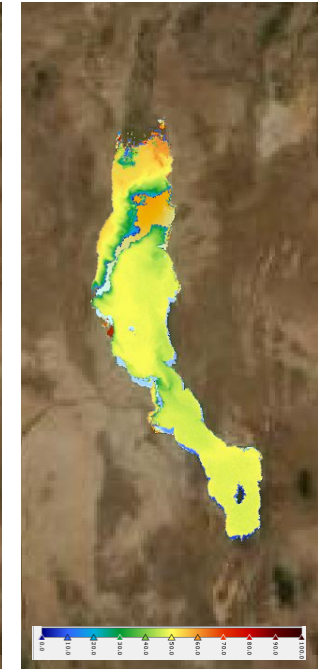
- Current variables delivered
 - lake surface reflectances
 - turbidity
 - trophic state index (based on chlorophyll-a)
- Planned near future variables
 - chlorophyll concentration
 - suspended sediment concentration
 - surface cyanobacteria blooms
- Proposed future variables
 - Coloured Dissolved Organic Matter



RGB from
lake surface
reflectances



Turbidity



Trophic state
index

Purposes of in-situ in the scope of the service

- Algorithm development

- Calibration of algorithms



High qualified in-situ data

Covering wide range of water types

Dedicated measurements for EO data applications

Outlier removal

- Algorithm validation

- Verification of algorithms



High qualified in-situ data

Covering wide range of water types

Different from calibration data set

- Product validation

- Fit-for-purpose of products



Continuous data sets

Covering wide range of water types

Different from calibration data set

Proxies can be used for verification of products, e.g. turbidity and TSM or Secchi disk depth

Often compiled from monitoring data, not dedicated for EO validation purposes

Requirements in terms of resolution and availability

- Sampling frequency (temporal match-up)
 - Short time difference between EO and in-situ needed
 - high repetition rate of measurements needed for good match-up retrieval
 - Alignment of measurement campaigns with satellite overpasses
- Sampling locations (spatial match-up)
 - Outside of shallow water areas
 - Not too close to land to avoid direct land effects (e.g. mixed pixels at measurement position)
 - Different distances to land (verification of adjacency effect on algorithms)
 - Distributed among different water types (currently undersampling of locations far from shore)
- Comparability of data
 - Surface vs depth integrated samples
 - HPLC vs. fluorometric, etc.
 - Separation of pigments for Phycocyanin vs Cyanobacteria

Data organisation (lakes and coastal waters, selection)

Instruments	Fixed Platforms	Buoy data	Moving Platforms
	AERONET-OC	CEFAS smart buoys	Boats
	Hypernets	MOBY	Ferrybox
	installed monitoring stations	CoASTS	Drones
		BOUSSOLE	
		GLEON	
Databases	Inland waters	Coastal / marine	
	LIMNADES	MERMAID	
	GLEON	CCRR	
	GEMS/Water	NOMAD	
	US EPA Water Quality Portal	ICES	
Services		EMODNet	
		SeaDataNet	

Requirements for data organisation

- Regional centres that integrate with a global data centre -> wider distribution of in situ data based on regional portals that allow access to Real-Time and historical data collected and validated for a specific region.
- Quality controlled & harmonized (e.g. units)
- Common metadata
- Clear access policy
- Open for algorithm developers to provide comparable quality indicators

Requirements for metadata and documentation

- Metadata are almost as important as the measurement data itself.
 - Position of the measurement (latitude, longitude, depth/height, coordinate system)
 - Date of the measurement (date and time in UTC or clearly specified local time zone)
 - Sampling and analysis methodology of the measurement
 - Specification of the measurement (e.g. platform code, data distribution centre).
 - PI of the measurement (name and institution of the data originator for traceability reasons).
 - Processing of the measurement (date of last sensor calibration, details of processing and calibration already applied, algorithms used to compute derived parameters).
 - Calibration method used
 - Comments on measurements (e.g. problems encountered, comments on data quality, references to applied protocols).
- Documentation
 - In-situ measurement protocols & user Manuals

Identified gaps and requirements for in-situ data and supportive actions

- **Measurements**

- readily available (hyperspectral) radiometry data
- open-water for chlorophyll, suspended matter and turbidity
- transect radiometric data to assess adjacency effects particularly on small water bodies

- **Data Organisation**

- in-situ database (quality controlled/harmonized + metadata) open for algorithm developers to provide comparable quality indicators

- **Activities**

- dedicated field campaigns and data sharing arrangements needed throughout EU funding programmes
- regularly repeating round robins for different algorithms (AC, in-water, cloud/pixel classification)