



Global Observatory of Lake Response to Environmental Change

Water Quality Information for the Benefit of Society | University of Stirling, 29-31 August 2018

καλή λίμνη

Operational processing with **Calimnos**

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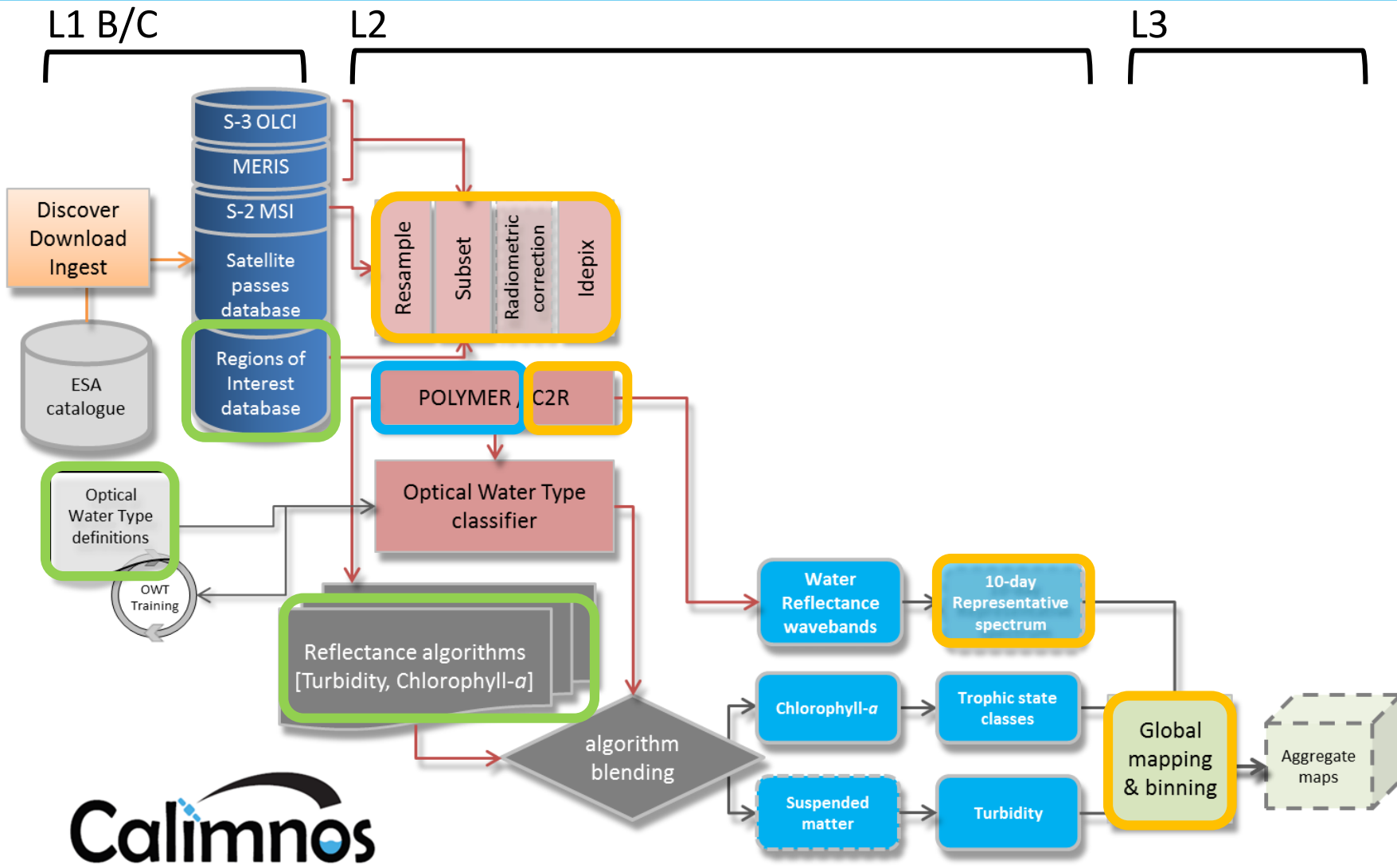


Implementing the globally validated set of GloboLakes algorithms in an operational framework for **global** inland optical water quality mapping:

- Handle 1000s of sparse and relatively small target regions
- Suitable for rapid algorithm evaluation
- Highly automated & fault-tolerant
- Multiple input sensors in one processing framework
- Single configuration and process chain for archive reprocessing, operational processing, point validation
- Easily manage, extend sets of target waterbodies
- Climate-data compliant output formats
- Ultimately transferable to remote and cloud-based environments



Processing chain



- SNAP
- Hygeos
- Publish(ed)



Processor optimization

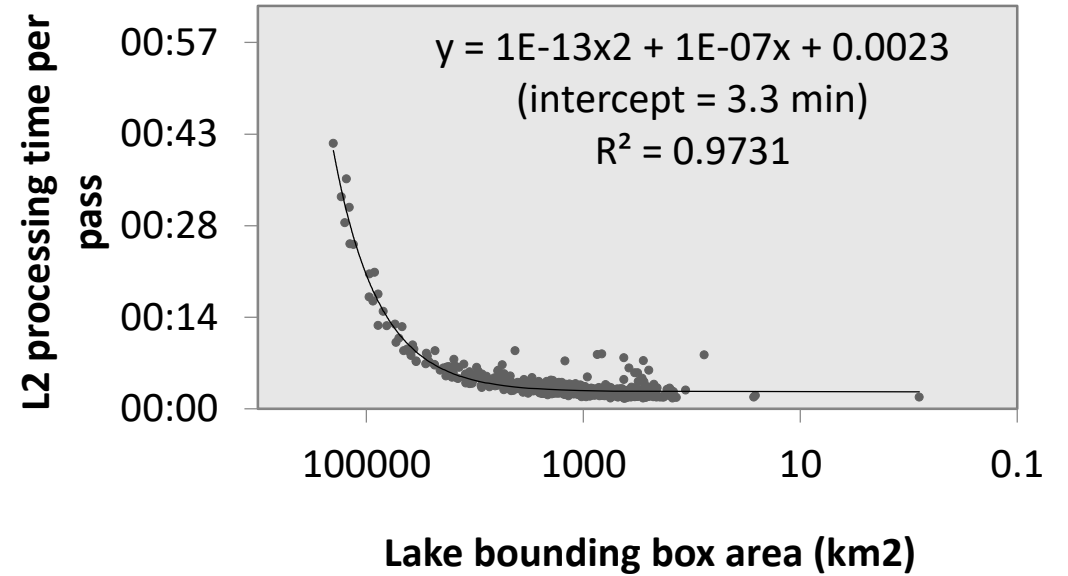
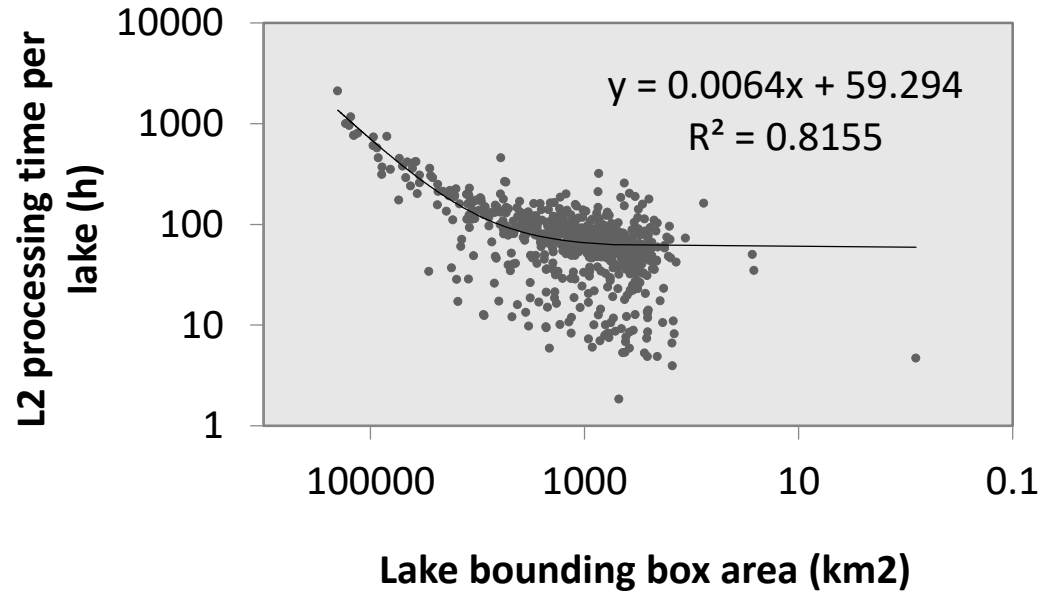
- Matching satellite archive against region of interest (seconds)
- Processing on regions within satellite scenes (minutes)

Data download

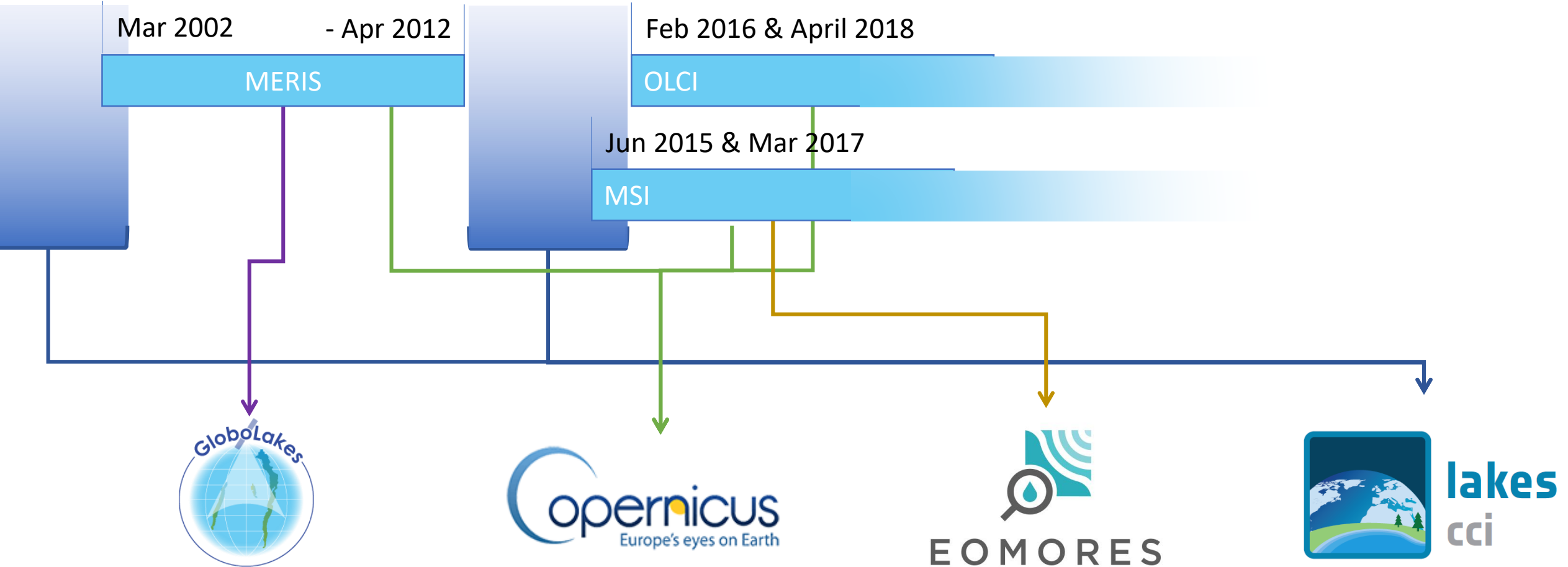
Sentinel-3 OLCI delivered in near real-time (< 3h) or non-time critical (NTC)

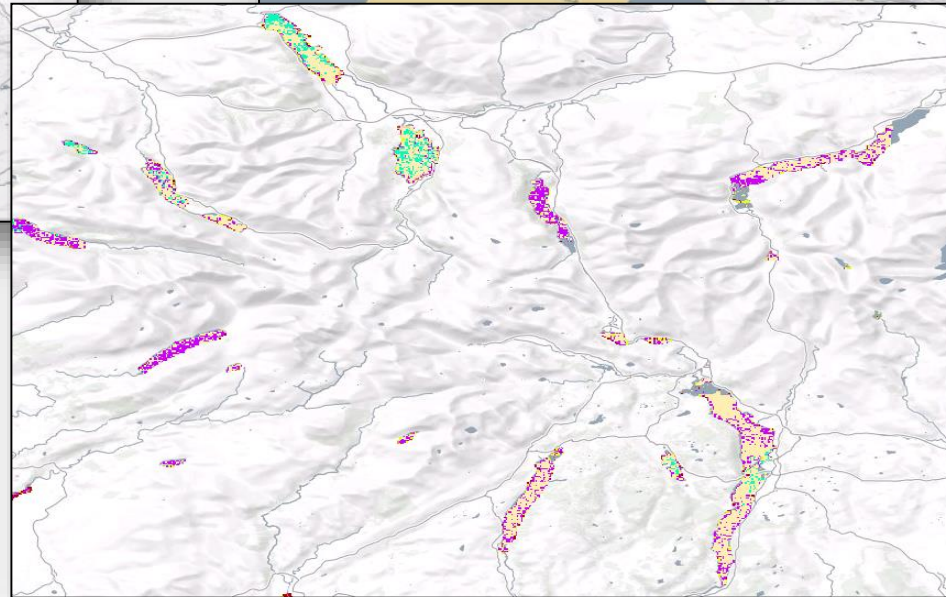
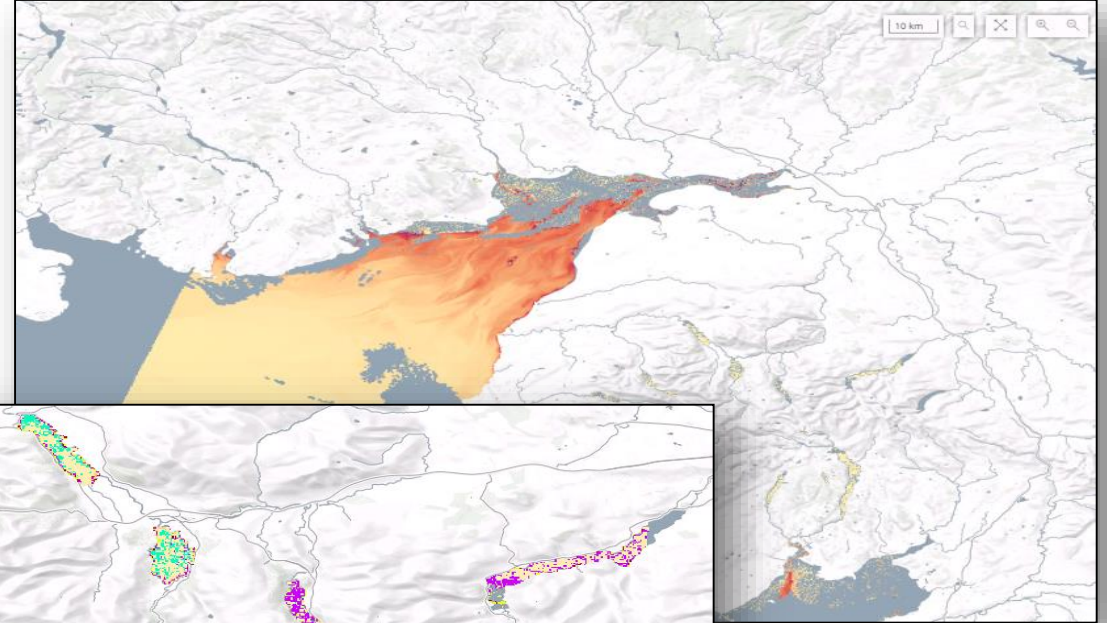
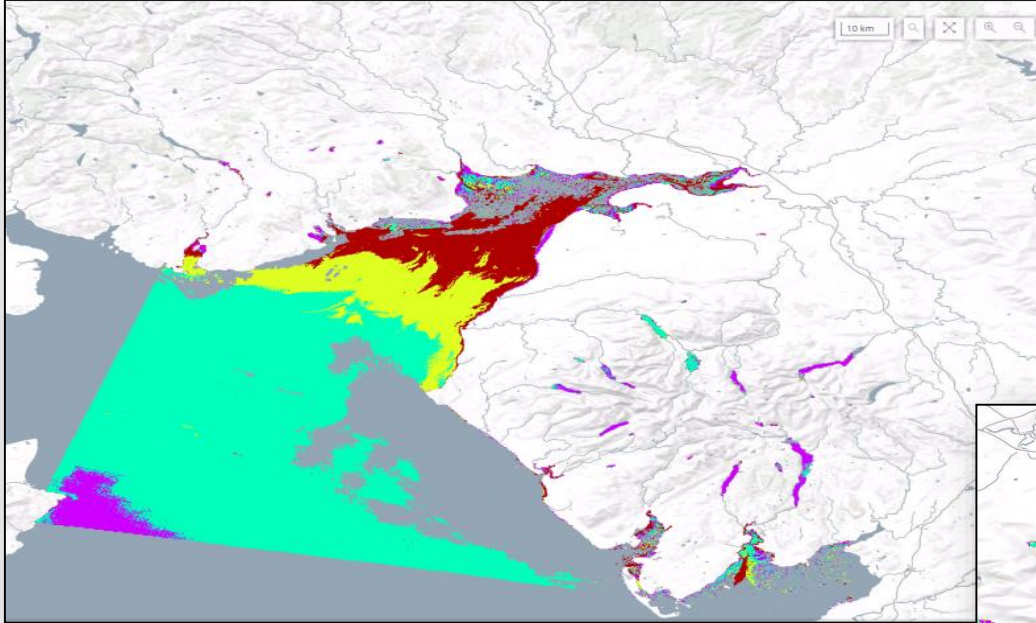
NTC data with precise orbit and meteorological data, approx 97% within 48 h

Sentinel-2 MSI downloads are relatively slow: move processing to data source.



Level-2 processing time: 9y 219d 1h 2m 2s
 Level-2 processed volume: 11.4 TB
 Level-3 (mapped): 1.4 TB for 1-day aggregation periods





Sentinel-2A MSI, 20 April 2018
UK Lakes district and Irish Sea
**Work continued in H2020 EOMORES
And Copernicus Land Service**

- Do new OWTs arise over time? Can new sensors distinguish more types?
- Do deteriorating sensors continue to accurately map OWTs?
- Do algorithm updates continue to map OWTs and water quality correctly?

In situ datasets may not identify all OWTs and ignore systematic errors introduced by atmospheric correction procedures

A streamlined method to identify OWTs library from 1000s of input images:

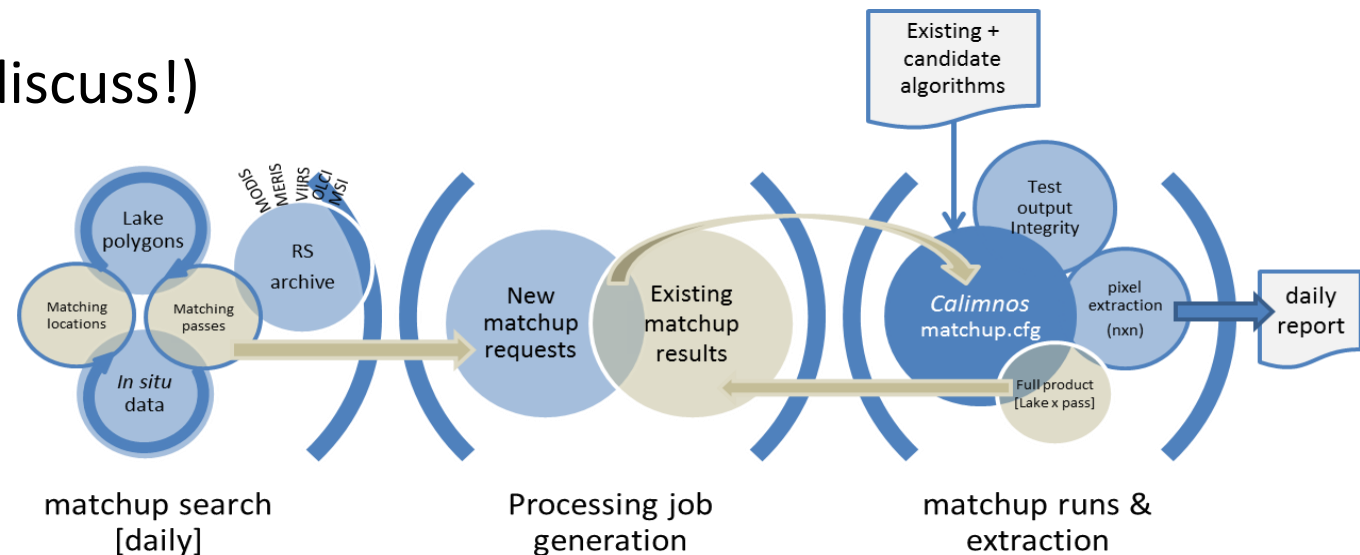
- Addresses systematic errors in AC
- Choice of similarity metrics
- Parallel processing

Calimnos uses the best-available algorithms, dynamically assigned to optical water types and tuned to remove systematic errors in atmospheric correction.

This is a work in progress:

Data from automated stations (and finally) including radiometry (EOMORES, MONOCLE) LIMNADES for archiving bio-optical data. Now linking with operational satellite processing (e.g. MONOCLE).

Need review of data licences / policies (discuss!)





Dissemination



Calimnos v1.04 (2002-2012) at 300m available through <http://globolakes.eofrom.space>

Calimnos v1.20 outputs available (300/1km) through <http://land.copernicus.eu>

Global lakes polygons from ESA LC maximum water extent (150m) available at <https://github.com/pmlrsg/lake-polygons-PML>

Full (quality controlled) GloboLakes data set release at end of project

Calimnos was designed to rapidly test prototype algorithms over multiple distinctly defined areas. Still needed to deliver Lake Surface Reflectance as an Essential Climate Variable (GCOS 2016)

Modular design: inexperienced programmers can add new algorithms from templates. Project-specific processing chains generated by switching modules on or off.

No data = no bad data. Results are not generated when OWT classification implies no suitable algorithm is known. OWT scores can be investigated to define new water types.

Ultimately, output data quality and continued development relies on continued and global validation. Global data sharing ensures that an EO solution is always at hand, even in data-poor regions.

Thank you

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This research was funded by the Natural Environment Research Council (NE/E009328)