

# Optical water type guided selection of algorithms for global remote sensing of lake biogeochemical properties

Vagelis Spyrakos [evangelos.spyrakos@stir.ac.uk](mailto:evangelos.spyrakos@stir.ac.uk)

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**PML** Plymouth Marine  
Laboratory

 University  
of Glasgow

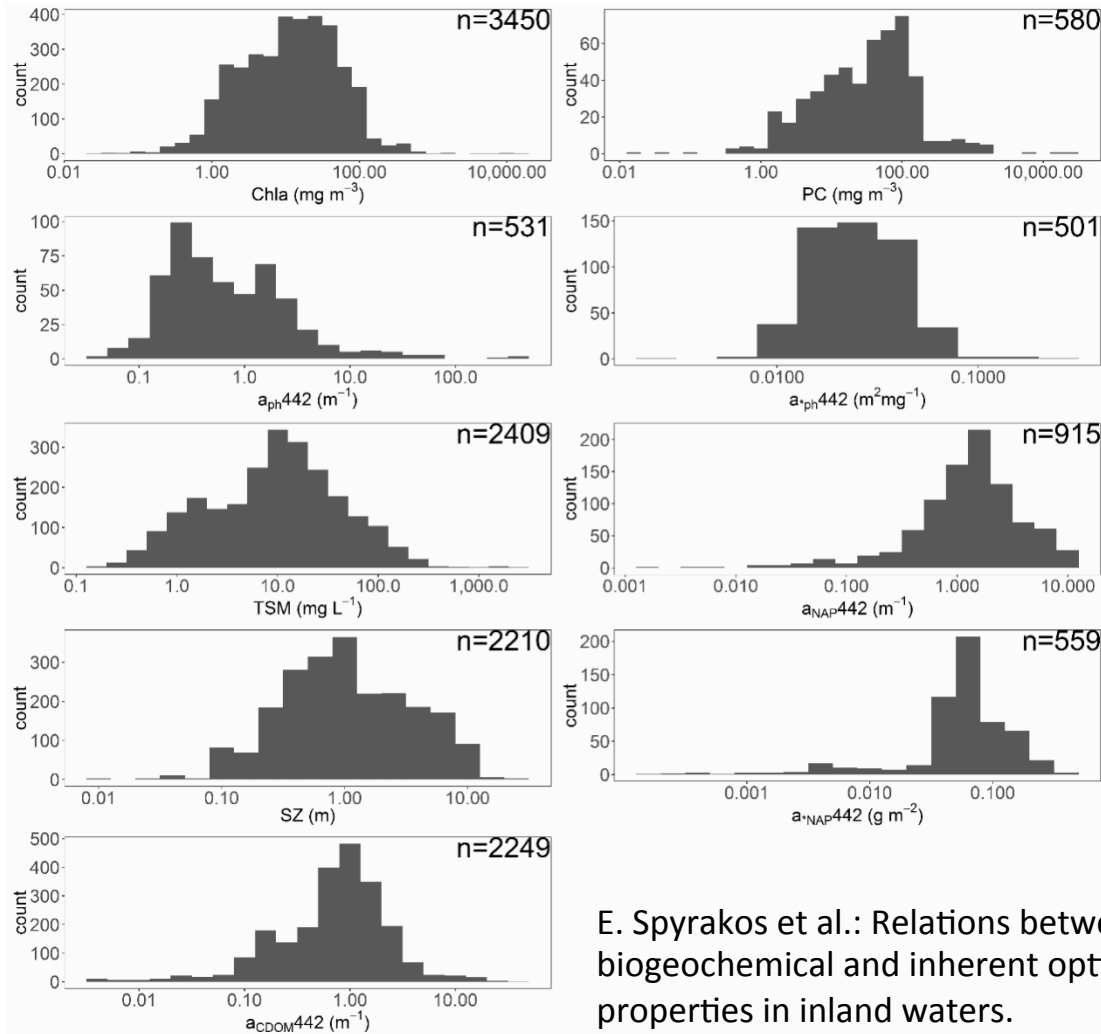
UNIVERSITY OF  
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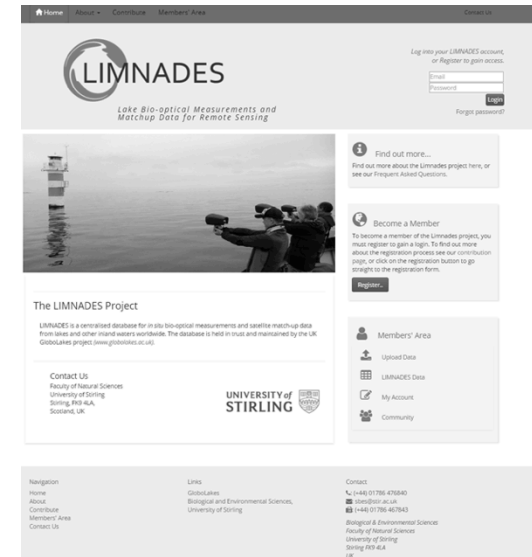
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of Reading



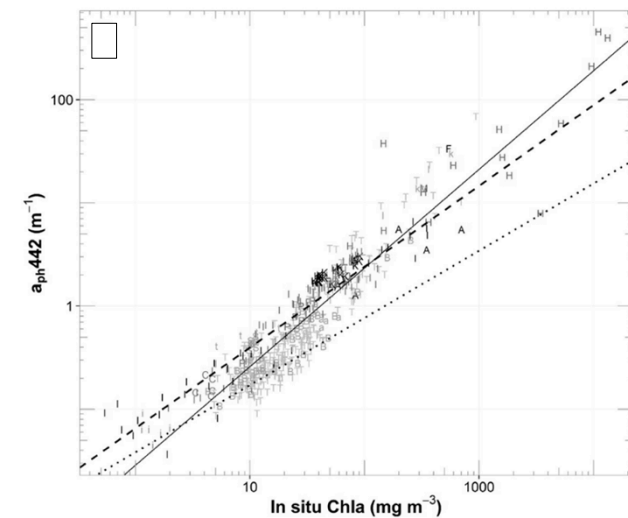
**NERC**  
SCIENCE OF THE  
ENVIRONMENT

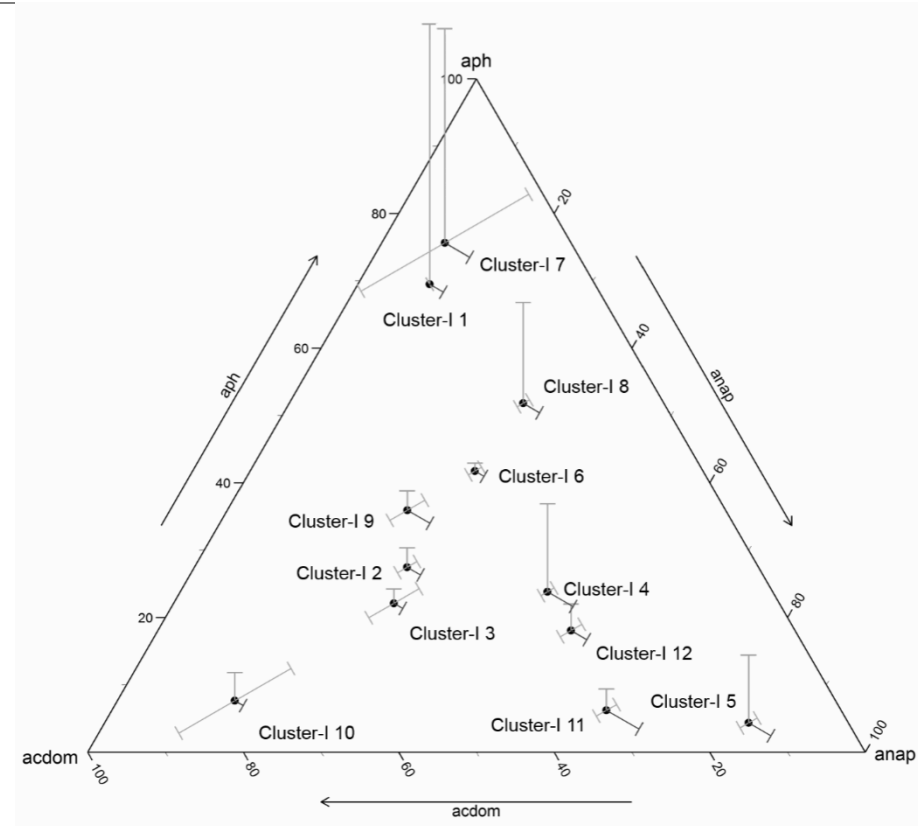
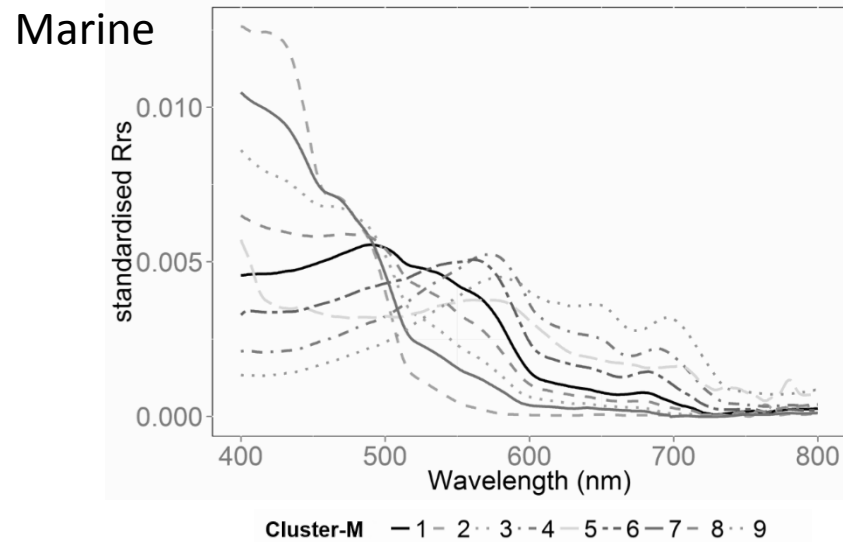
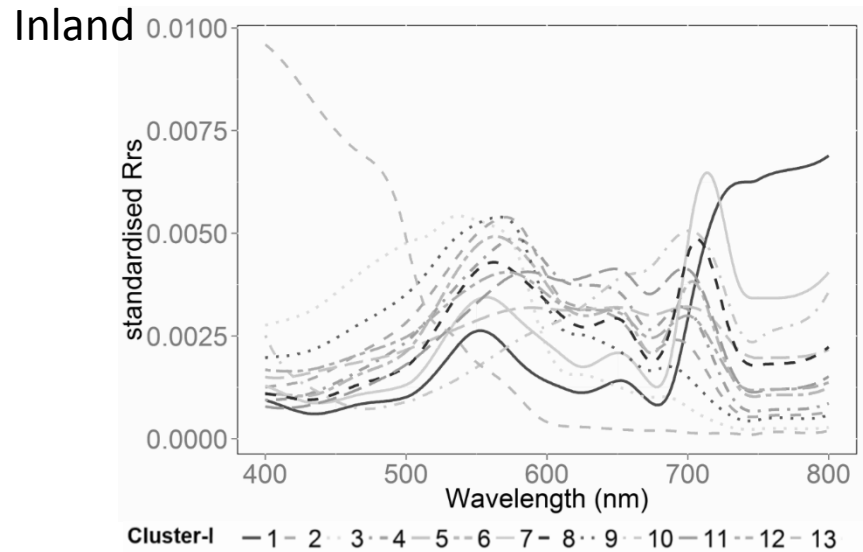


E. Spyrakos et al.: Relations between biogeochemical and inherent optical properties in inland waters.

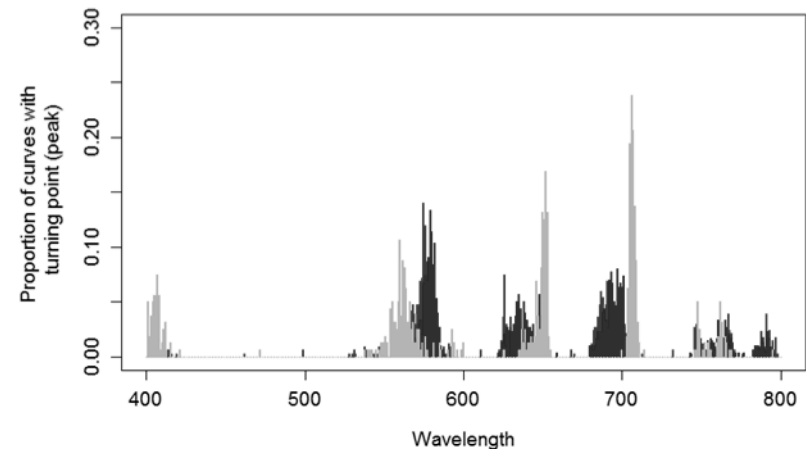
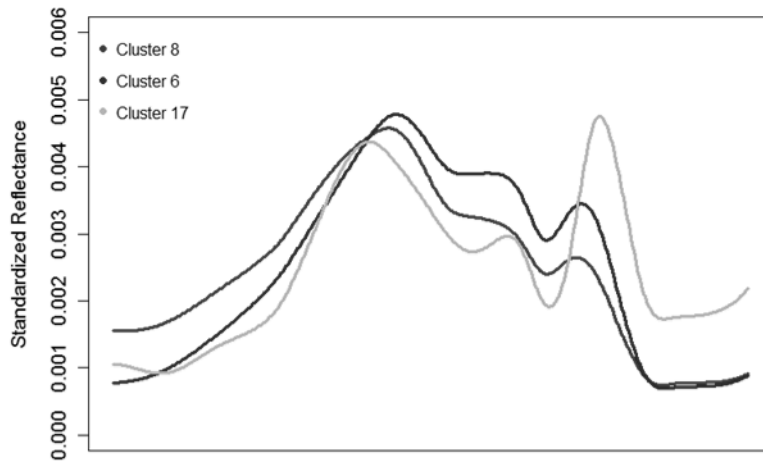
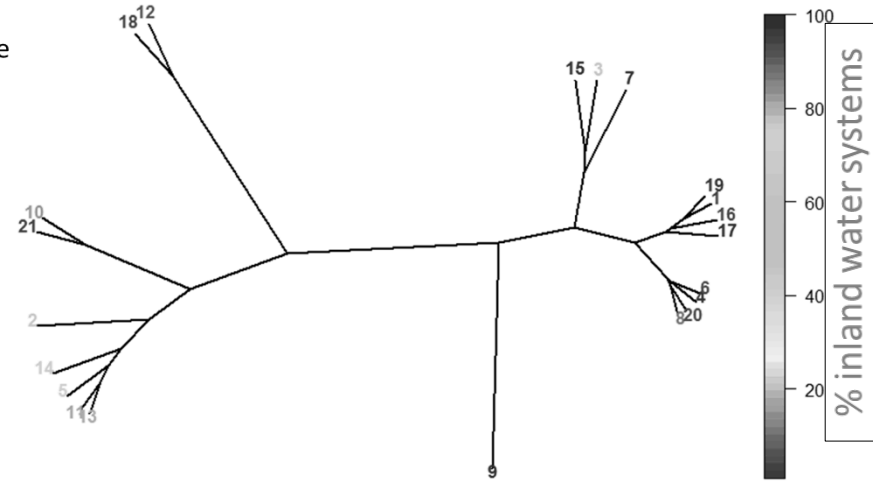
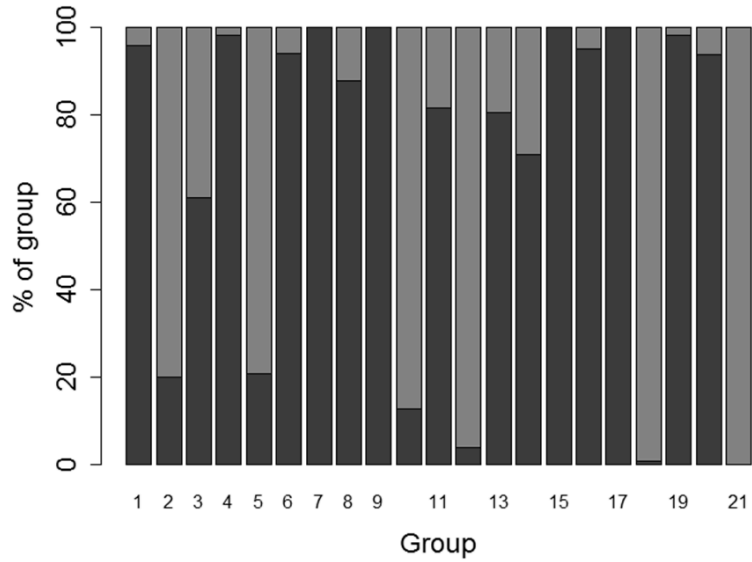


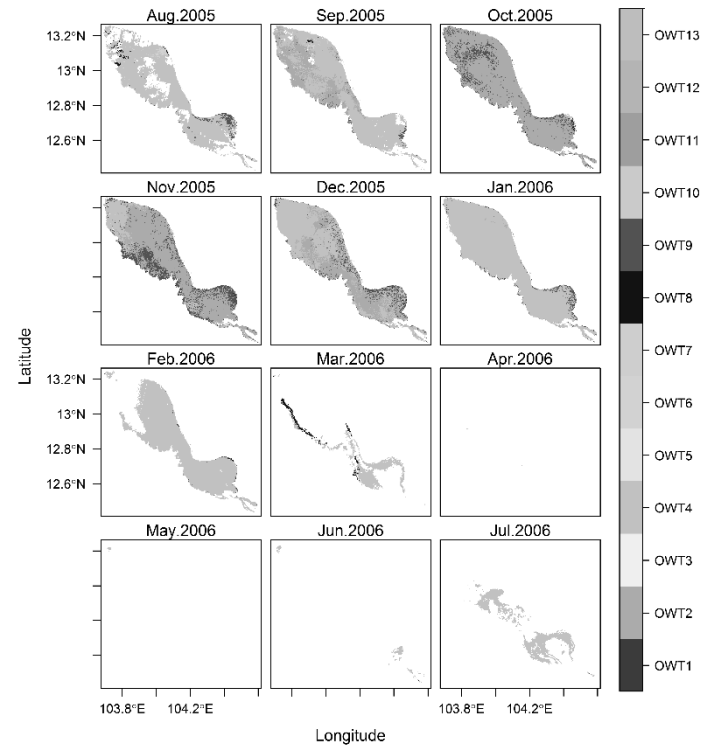
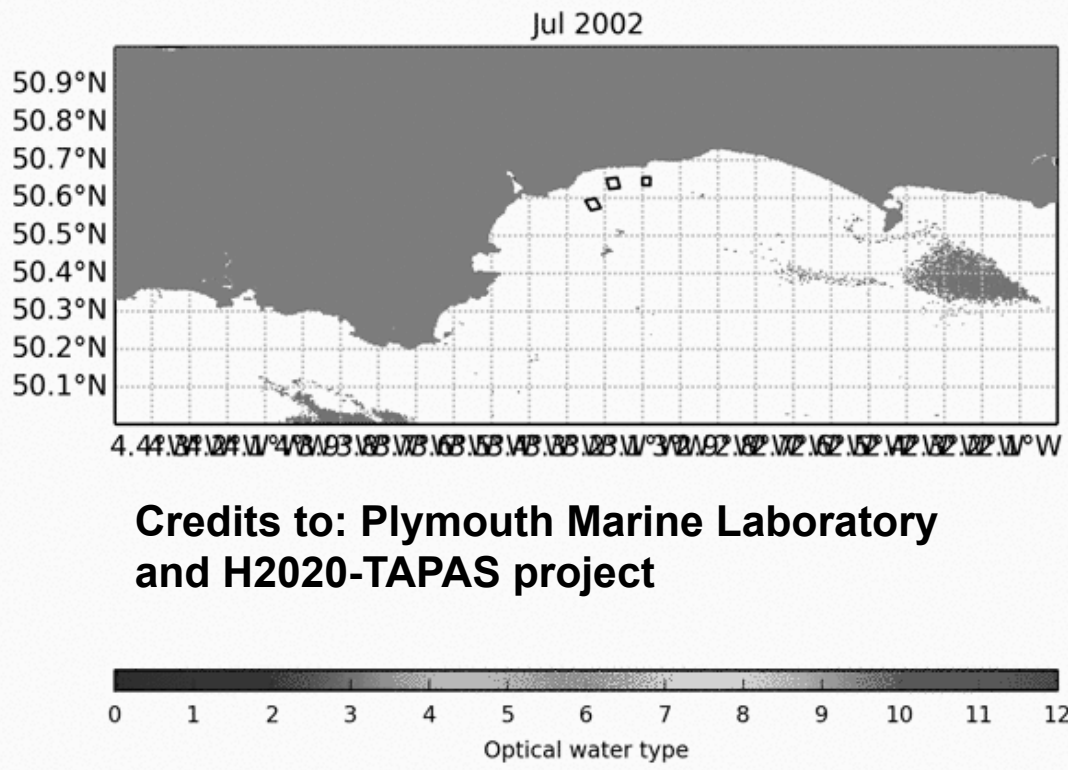
[www.limnades.org](http://www.limnades.org)





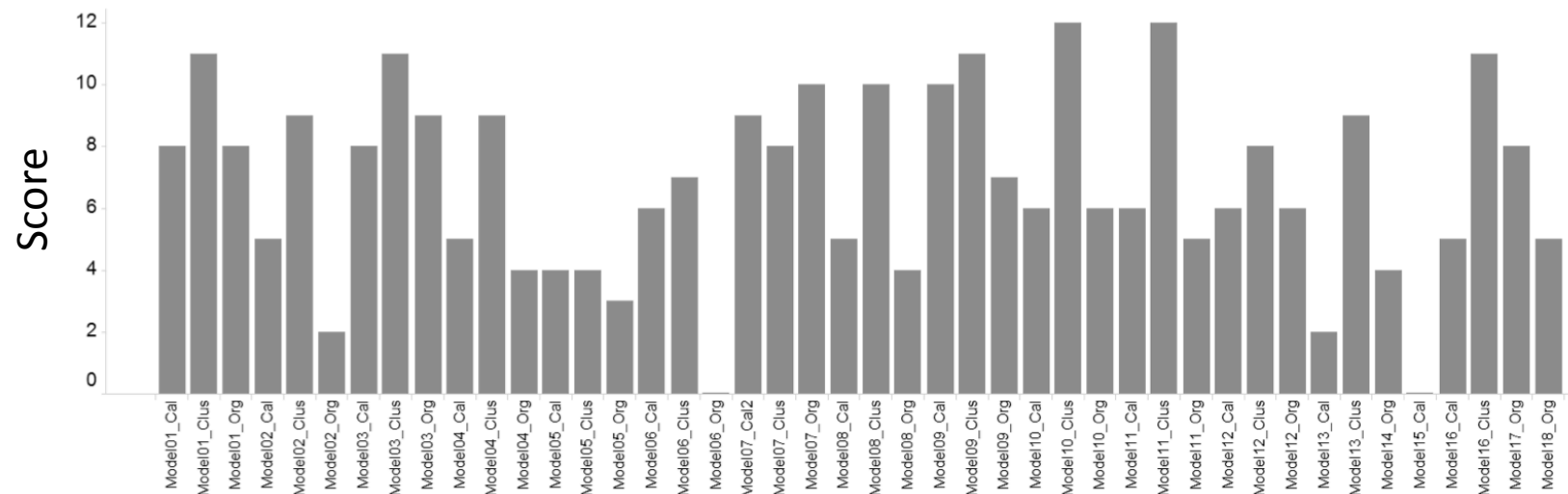
E. Spyrakos et al.: Optical types of natural waters. Submitted to Limnology and Oceanography.

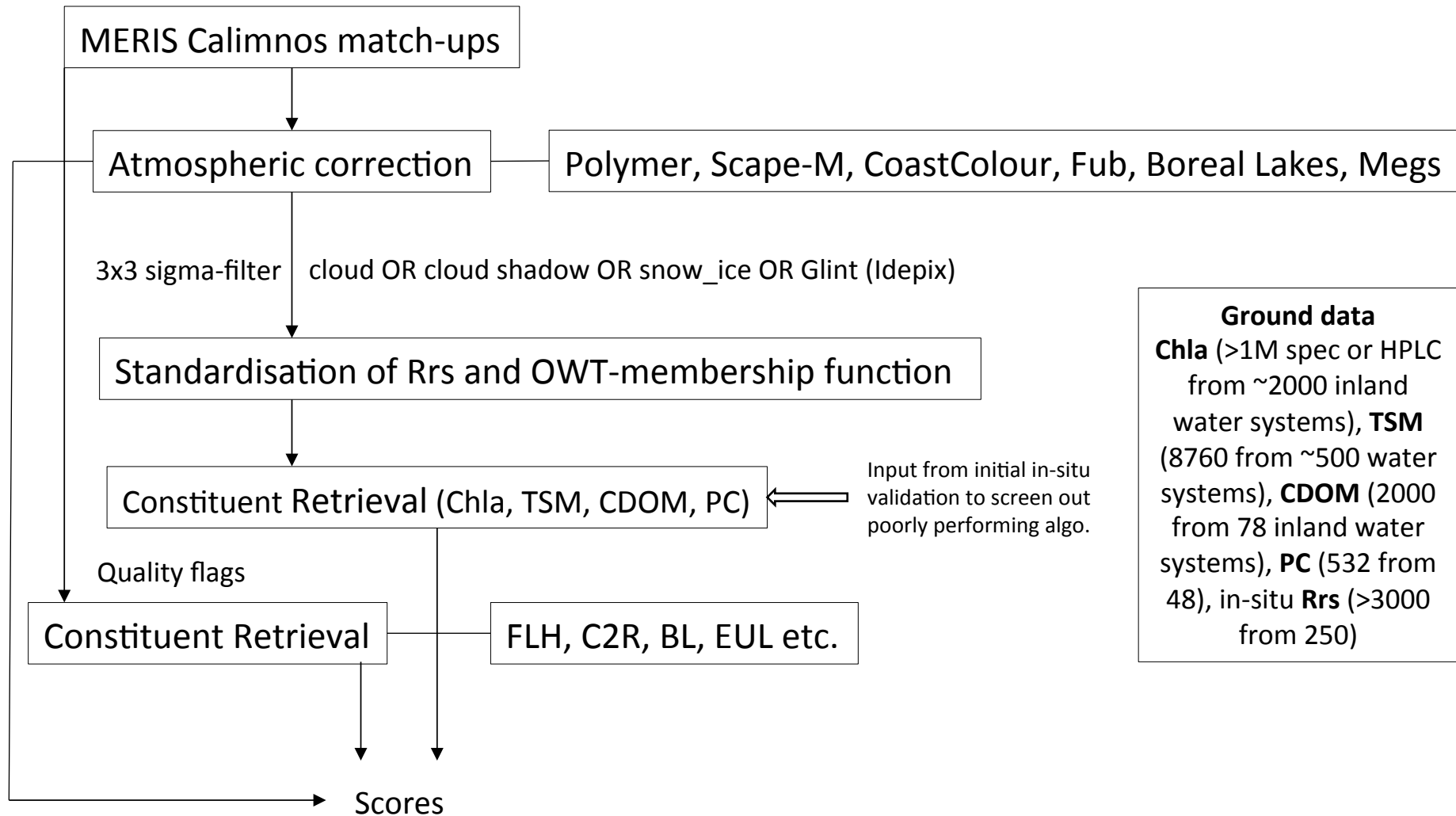




Algorithms tested: 28 for Chla; 13 for TSM; 11 for PC and 10 for  $a_{CDOM}(440)$   
(Bootstrap validation on the performance measures):

- No single algorithm performed consistently well
- Most algorithms showed an improvement in their performance when they were re-parameterised for LIMNADES dataset
- Some algorithms performed well for several OWTs (e.g. Gons, Rrs708:Rrs665, QAA)
- All tested algorithms performed poorly for some specific cases (e.g. low Chla, high CDOM waters)
- All algorithms showed an improvement in their performance when they were retuned at each OWTs



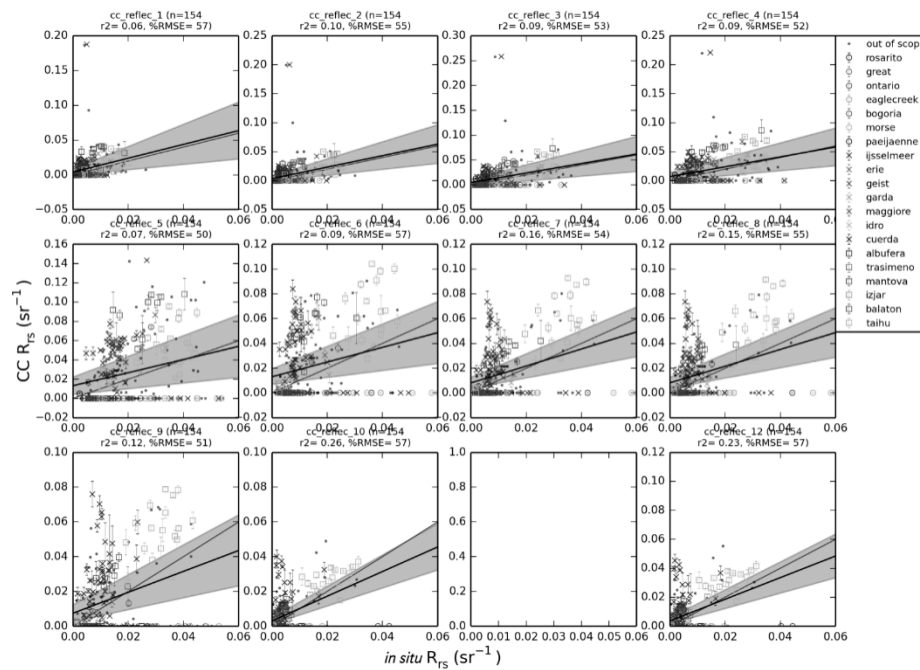


**Ground data**  
**Chla** (>1M spec or HPLC from ~2000 inland water systems), **TSM** (8760 from ~500 water systems), **CDOM** (2000 from 78 inland water systems), **PC** (532 from 48), in-situ **Rrs** (>3000 from 250)

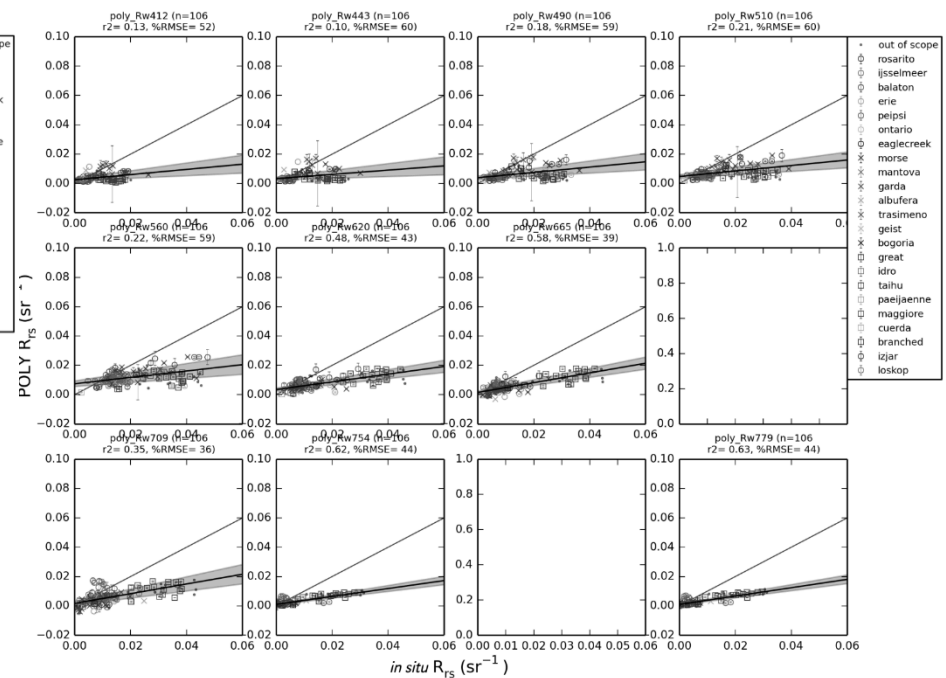
## Evaluation of atmospheric correction processors against *in situ* Rrs

- 400  $R_{rs}(\lambda)$  matchups, 20 lakes
- Evaluating MEGS8.1, FUB, C2R Lakes, CoastColour, SCAPE-M, Polymer

CoastColour, 3x3 pixel window



Polymer, 3x3 pixel window



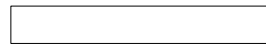




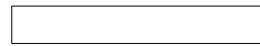
Slope



Correlation r

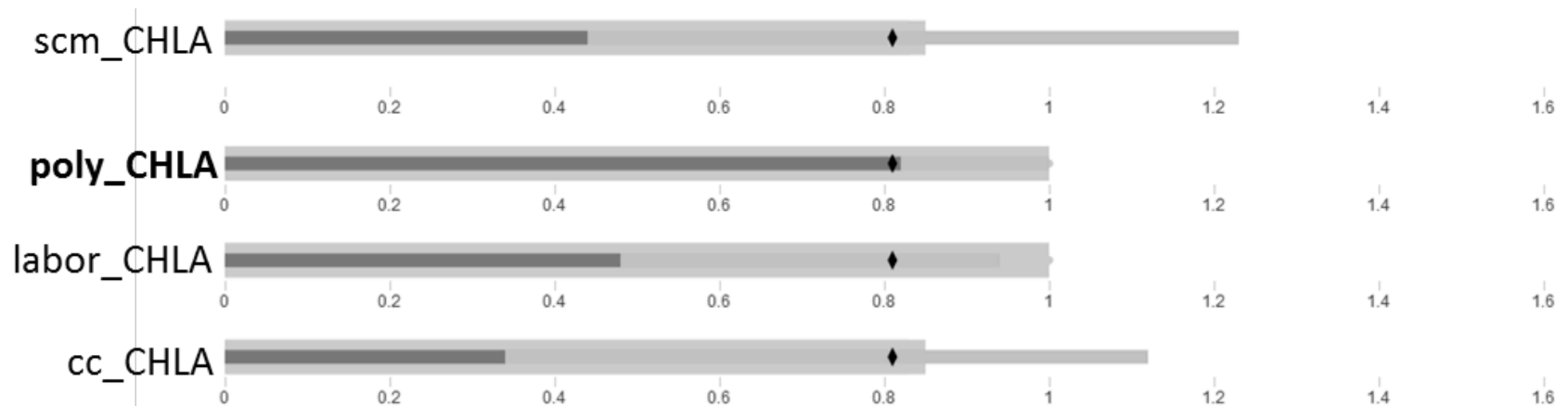


Normalised score



Normalised score

### OWT-guided blended Chla





Water type family	OWT guided Chla algorithms	OWT guided TSM algorithms	OWT guided CDOM algorithms	PC algorithms
1	3; 9; 10; 13	3; 5; 9; 11; 13	2; 3; 9; 13	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12;13
2	2; 8; 11; 12	2; 4; 6; 8; 12	4; 5; 6; 8; 10; 11; 12	
3	1; 4; 5; 6	1; 7; 10	1; 7	
4	7			

**Calimnos**— a dynamic processing chain for remote sensing of inland water quality

**PML** | Plymouth Marine Laboratory

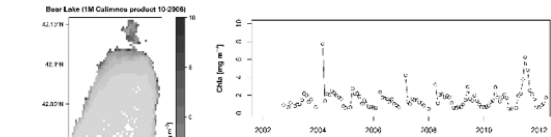


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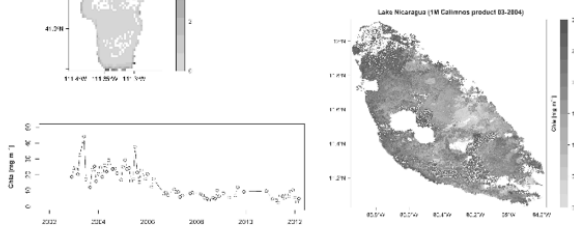


GloboLakes Sites

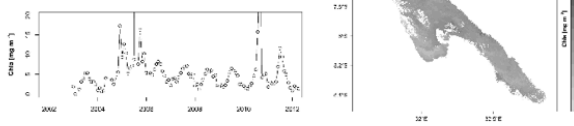
1. Bear Lake, USA



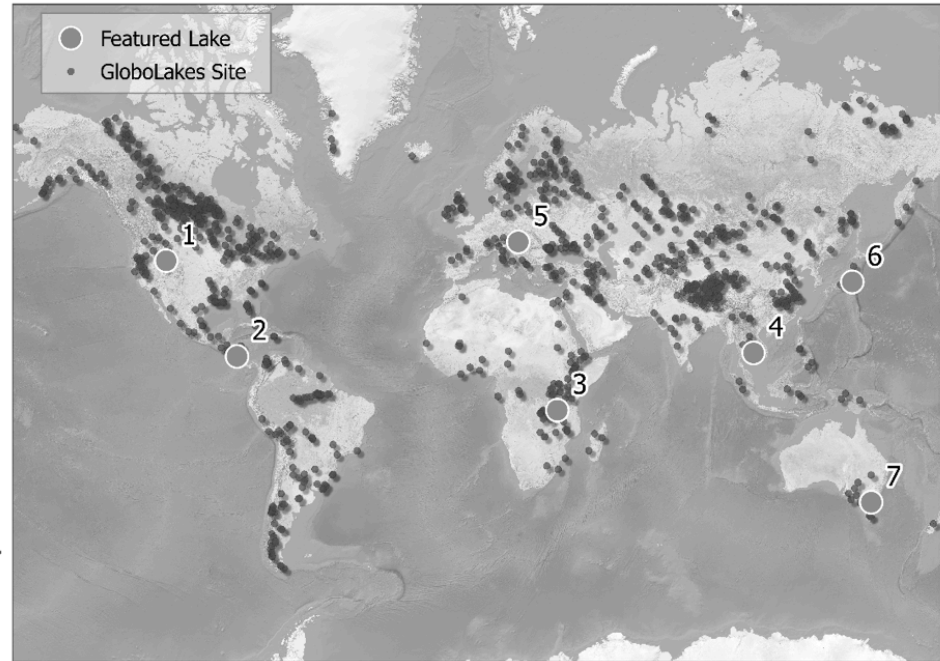
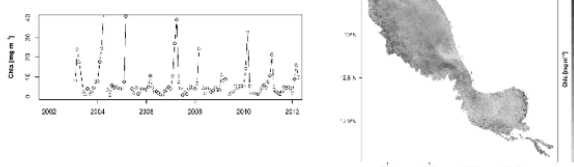
2. Lake Nicaragua, Nicaragua



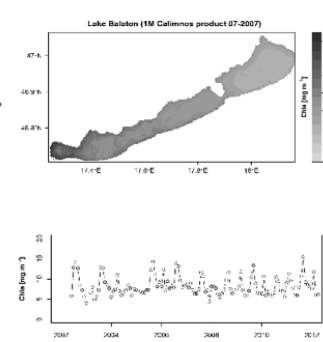
3. Lake Rukwa, Tanzania



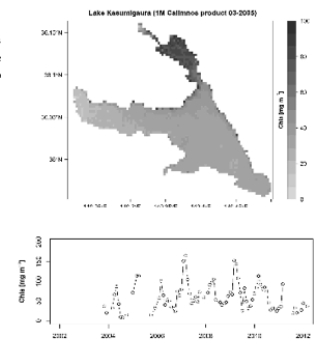
4. Tonle Sap Lake, Cambodia



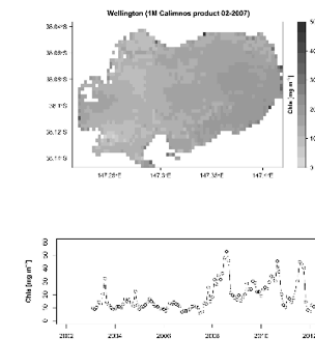
5. Lake Balaton, Hungary

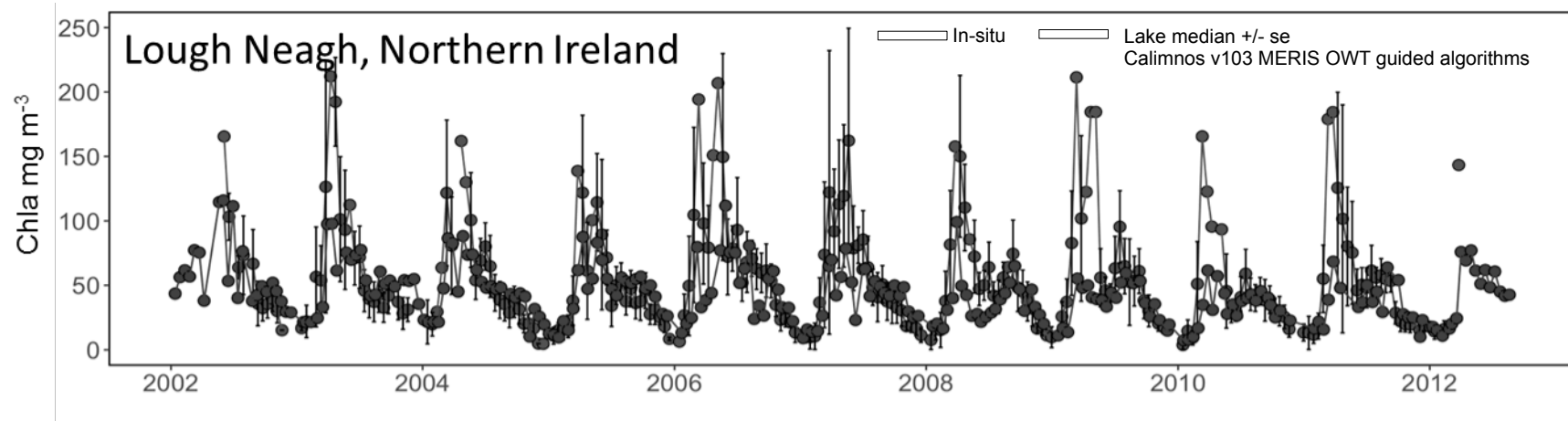
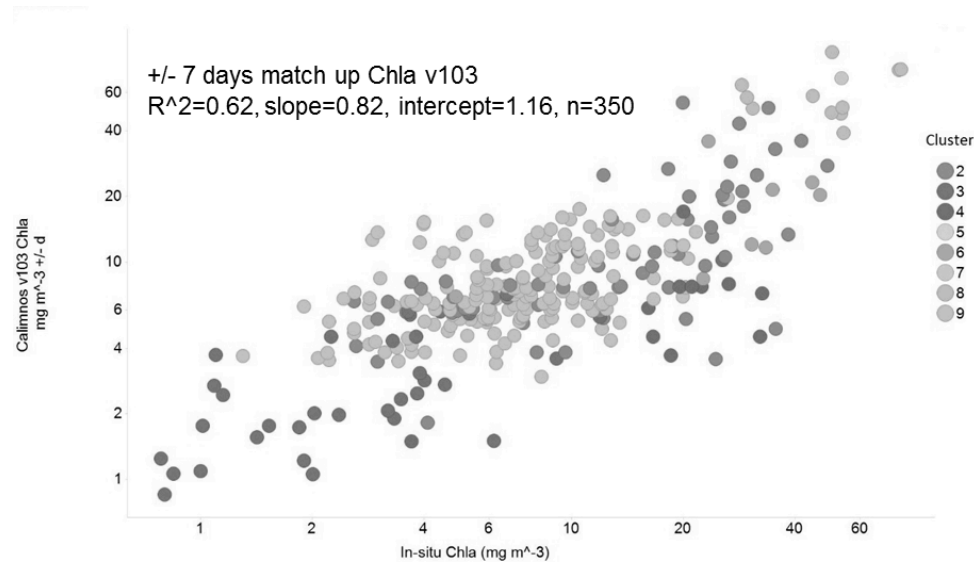


6. Lake Kasumigaura, Japan



7. Lake Wellington, Australia





## Main Funding:



## People:

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## All data providers



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