CoastColour Round Robin (CCRR): MERIS, MODIS and SeaWiFS Chlorophyll-a & and Total Suspended Matter algorithms performance

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Objectives

- General consensus on ocean colour algorithms and products in Case 1 waters BUT not in optically complex waters
- Goal: CoastColour Round Robin (CCRR) to compare algorithms performance in coastal waters & propose the optimal algorithms/products over these waters to users
- CCRR part1: comparison of the performances of 14 algorithms [CCRRv2.2 report]
- Now (CCRR part2): assess the performance of MERIS, MODIS and SeaWiFS algorithms for CHL and TSM retrieval on various coastal waters

Data and method

MERIS L1
(13 sites)

Standard MERIS

MERIS
$L2w_{MERST}$

CHL_{MERST}
TSM_{MERST}
RLw_{MERST}

MERIS CoastColour

MERIS
$L2w_{CC}$

$CHL_{CCpre1.0}$
$TSM_{CCpre1.0}$
$RLw_{CCpre1.0}$

In situ
RLw

Simulated
RLw

CHL , TSM, a_{dy}(443nm): Case 2 NN BOA (MEGS7.5) [using ODESA]
Algal1: OC4Me (Morel et al. 2007) [using ODESA]

CHL: OC3 and OC4 (O'Reilly et al., 1998, 2000), Clark (Clark et al., 1997)
TSM: MUMM (Nechad et al., 2010), Siswanto (Siswanto et al., 2012) and Clark (Clark et al., 1997)

In situ
CHL, TSM

In situ
CHL, TSM

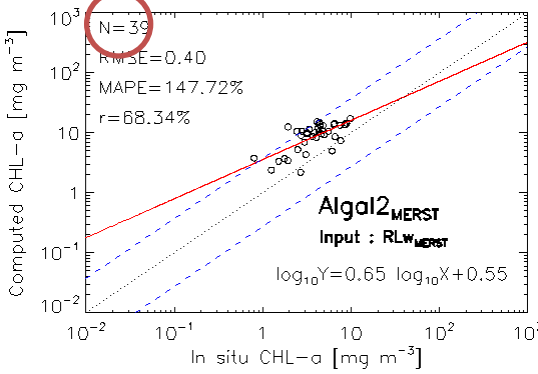
Simulated
CHL, TSM

- MERST: low number of CHL retrievals (max=74)
- OC4: better performance for CHL retrieval
- MERST: better retrieval of TSM at 39 locations (max=84)
- Case2NN: best TSM retrieval

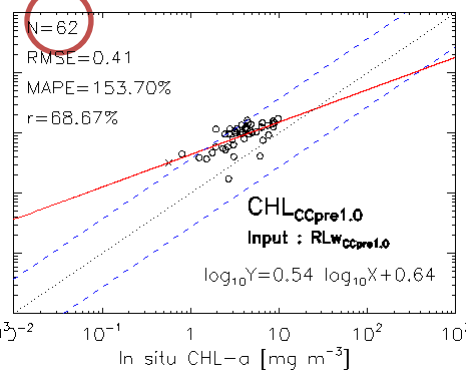
Results / Match-ups

CHL

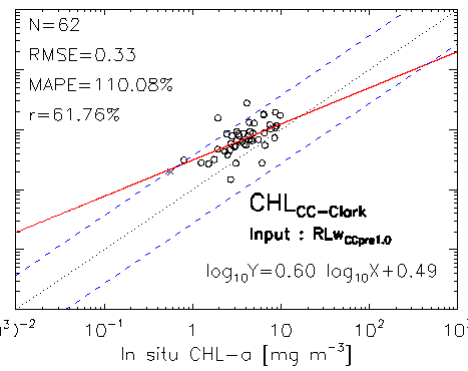
MERIS standard



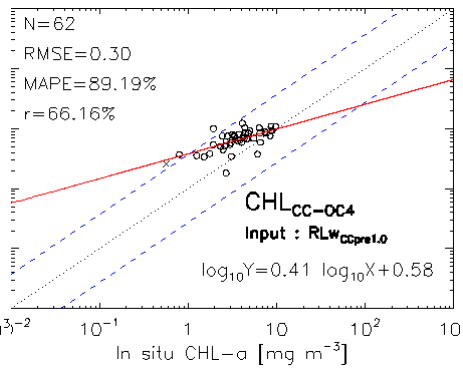
MERIS CoastColour



Clark

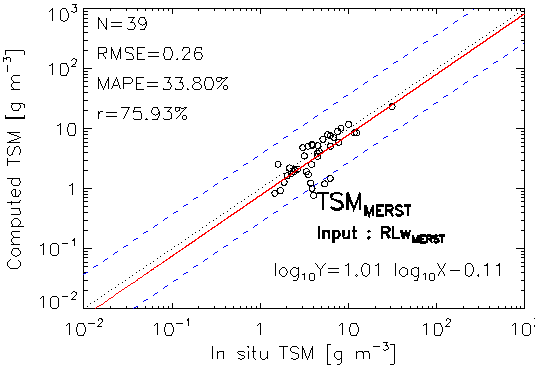


OC4

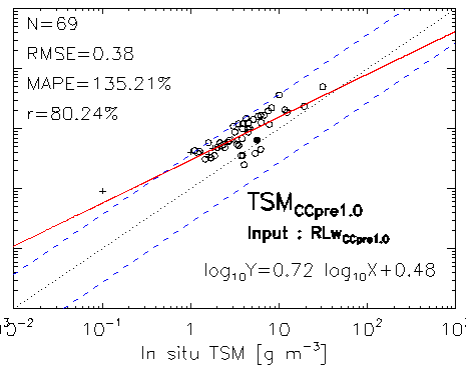


TSM

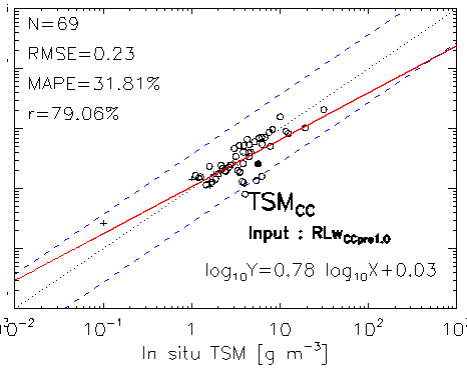
MERIS standard



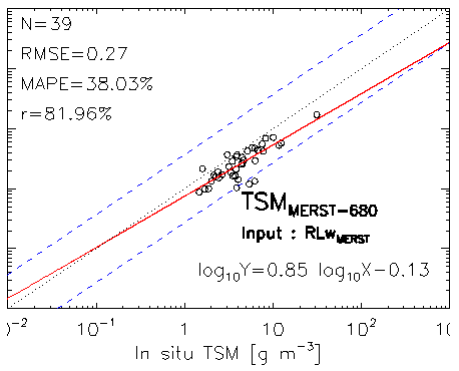
MERIS CoastColour



Case2NN



MUMM $RLw_{MERST}680$

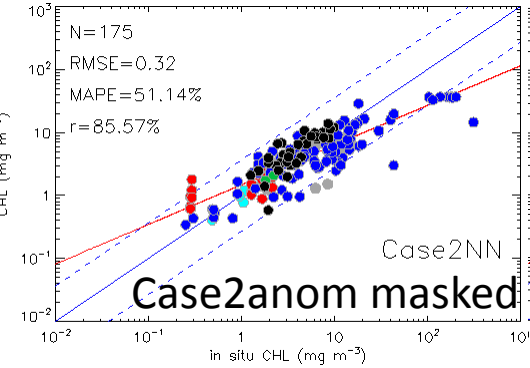


- Higher % of CHL retrieval, than for the match-up data (max=313)
- OC4: better performance for CHL retrieval, CHL < 20 µg/l
- % of TSM retrievals = 100% (max=192)
- Case2NN: best TSM estimations

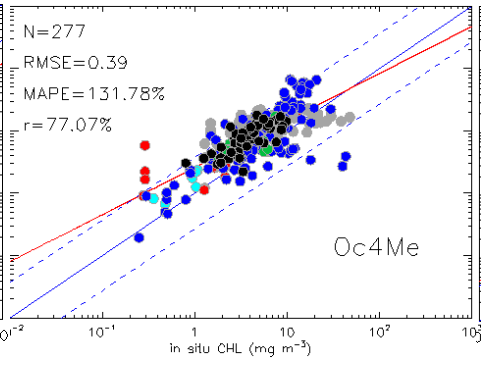
Results / In situ data

CHL

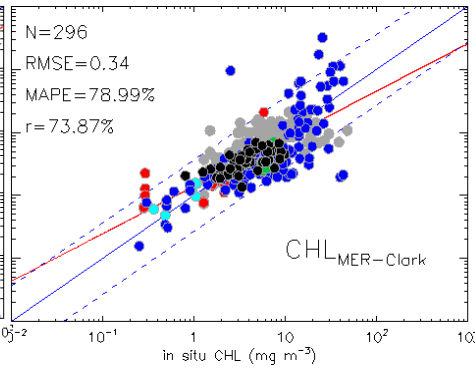
Case 2 NN



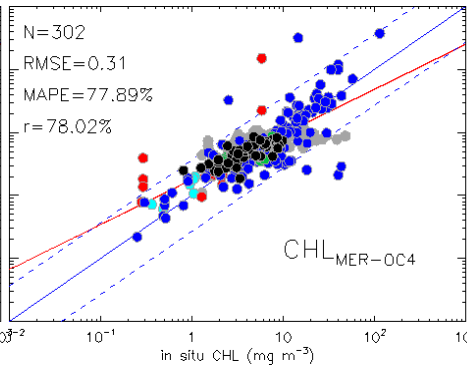
OC4Me



Clark

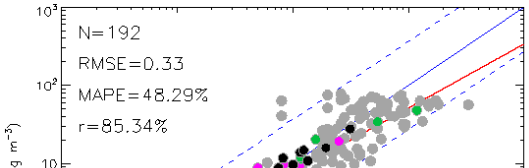


OC4

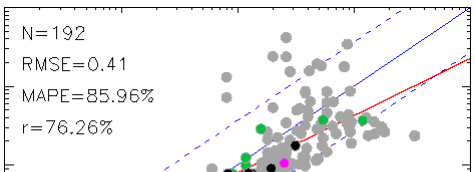


TSM

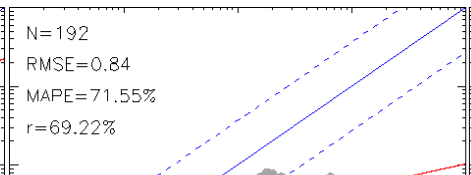
Case 2 NN



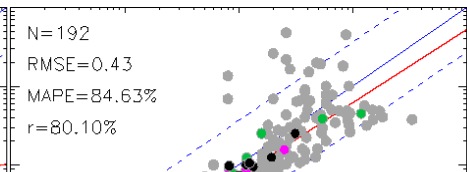
Siswanto



Clark



MUMM RLw680

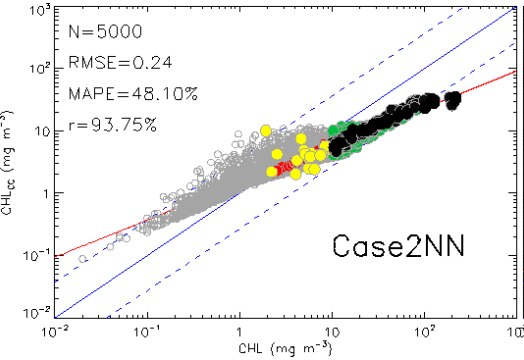


- Larger % of CHL retrieval (max=5000)
- Case2NN: best performance for CHL retrieval
- % of TSM retrieval = 100%(max=5000)
- Case2NN, MUMM775: best TSM estimations

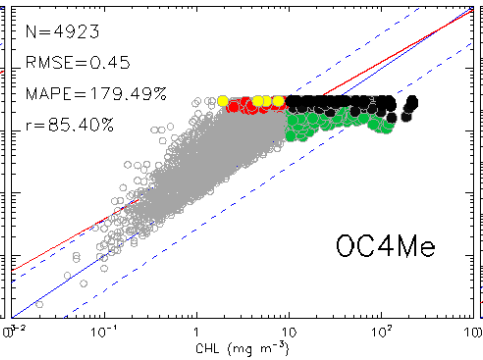
Results / Simulated data

CHL

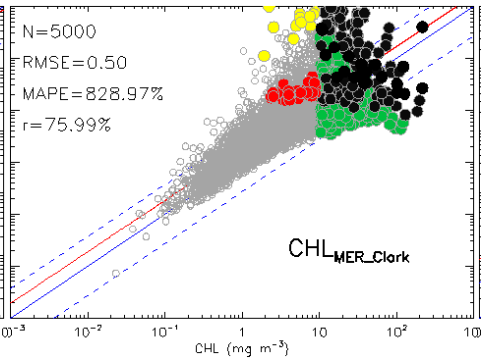
Case 2 NN



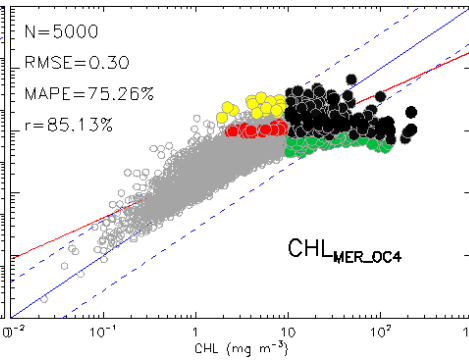
OC4Me



Clark

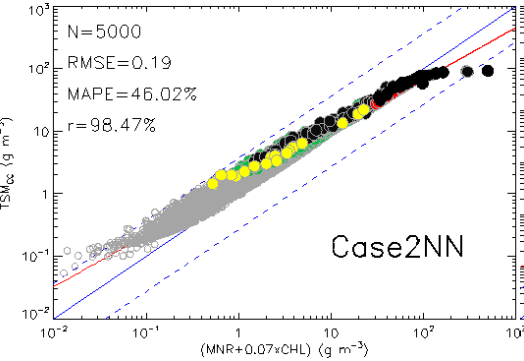


OC4

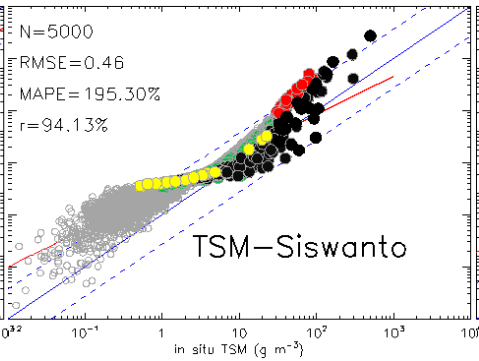


TSM

Case 2 NN



Siswanto



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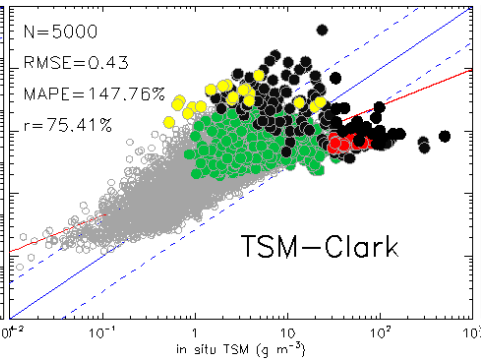
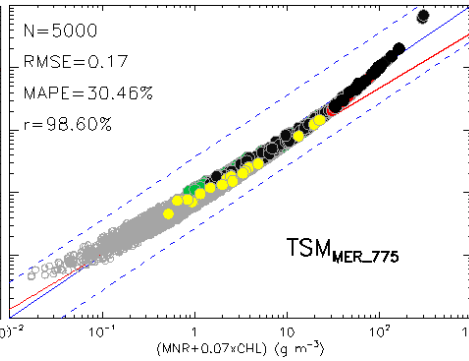


MUMM



Conclusions

CHL:

- Similar accuracy of CC and MERST, BUT lower number of retrievals by MERST
- MERST, CC and Case2NN: lower performance / match-up datasets than OC3, OC4, Clark
- Case2NN: lower performance / in situ datasets than OC3, OC4, Clark algorithms
- Case2NN: better performance / simulated dataset than standard MODIS and SeaWiFS algorithms

➔ **MODIS & SeaWiFS in-water algorithms generally show more robustness when dealing with satellite and in situ measurements , and associated errors and natural variability of optical properties (IOP)**

➔ **Accurate atmospheric correction of MERIS would help increase the accuracy of CHL estimations from Case2NN**

TSM:

- MERST performs better than CC
- Case2NN: best accuracy over the in situ and matchup datasets
- TSM-MUMM775: better accuracy over the simulated data, at high turbidity

➔ **MERST and Case2NN: less impacted by measurement errors/natural variability leading to a significantly better performance than for CHL retrieval**

References

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