Ocean Colour Climate Change Initiative

ESA Ocean Colour Climate Change Initiative Latest Developments: version 5

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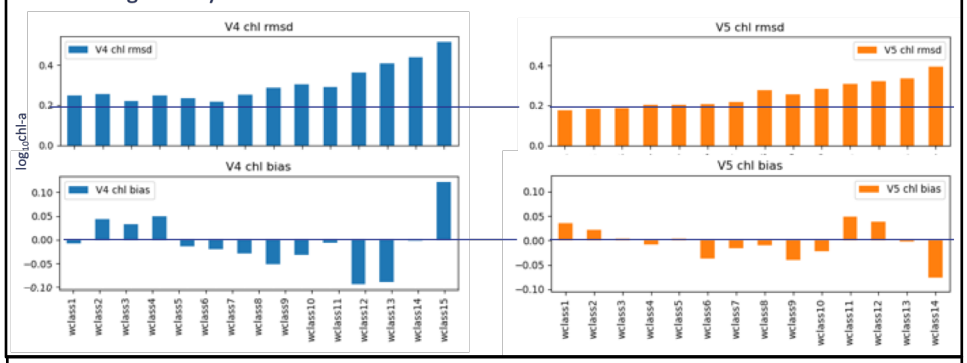
Results: Uncertainty characteristics of v5

- Uncertainties computed per water class
- V5 generally has lower chl-a rmsd
- V5 generally has lower chl-a bias

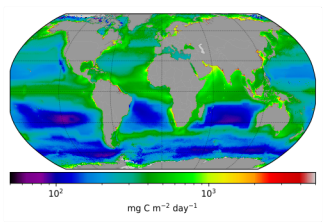


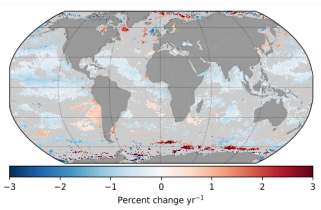
Results: global uncertainty characteristics of v5

- 15 June 2016

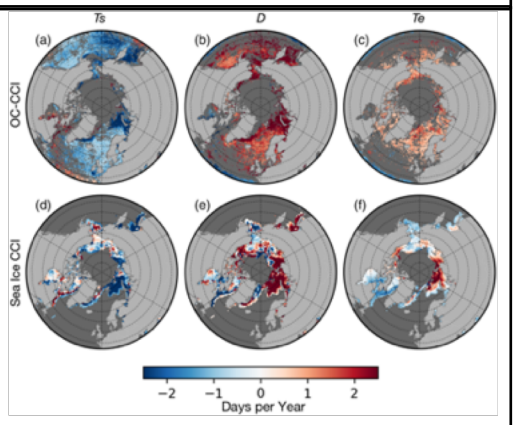
Version	Metric	N pixels	mean	median	Std dev
V4	log_{10}RMSD	2,409,323	0.26	0.25	0.04
V5	log_{10}RMSD	3,273,359	0.23	0.21	0.05
V4	log_{10}BIAS	2,409,323	-0.0014	-0.0029	0.04
V5	log_{10}BIAS	3,273,359	-0.012	-0.017	0.02

Some Applications





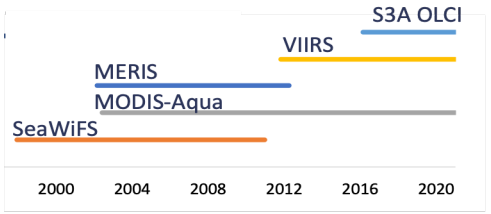
Marine Primary Production from OC-CCI
Kulk et al. 2020 (ESA CCI Fellowship)
https://doi.org/10.3390/rs12050826



Trends in Winter Light Environment Over the Arctic Ocean:
OC-CCI data show that winter conditions in high latitudes (seasonal ice cover + persistent cloud cover) are changing. Cloud-free and ice-free conditions are starting earlier in the year (T_s) and and ending (T_e) later in the year. The difference (T_e-T_s), a measure of duration of light conditions favourable for phytoplankton growth, is increasing. Results compared with Sea Ice cover (Sea Ice CCI).
Jönsson et al. 2020 (ESA BICEP Project, Simons Project)
https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020GL089037

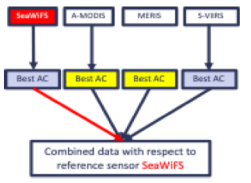
OC CCI 2020: Inter-sensor biases

- Sensors have finite lives
- Sensors launched as "one-offs" (but a step change with Sentinel 3 and VIIRS)
- Each sensor has part coverage daily
- Clouds mask the signal
- Need inter-sensor bias correction with respect to "reference" sensor
- Some sensors don't overlap with primary reference!



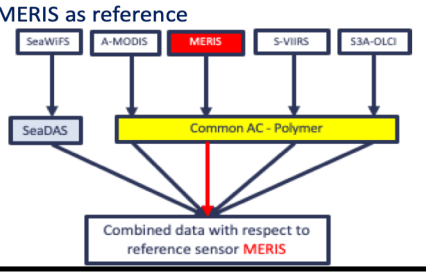
Version 2, 3 and 4

- SeaWiFS, A-MODIS, MERIS, S-VIIRS
- SeaWiFS as reference

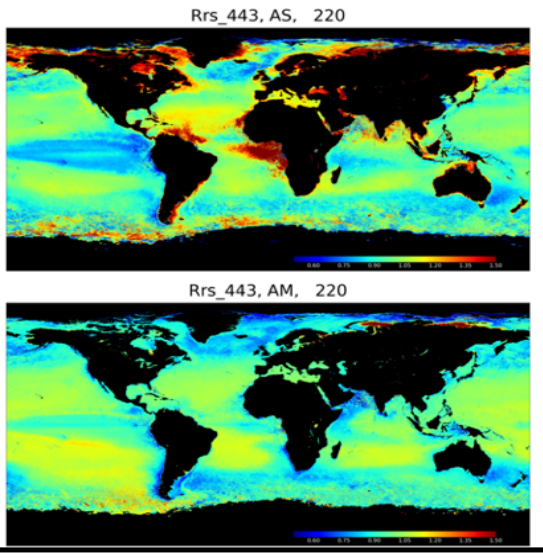


Version 5

- SeaWiFS, A-MODIS, MERIS, S-VIIRS, S3A-OLCI
- MERIS as reference



Inter-sensor bias maps: A-MODIS

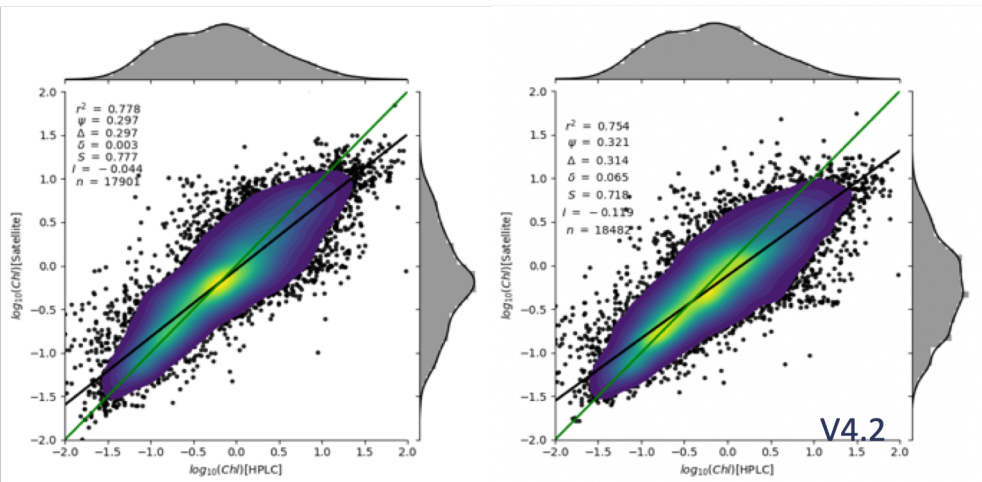


Version 3.1 A-MODIS/SeaWiFS Different atmospheric corrections

Version 5 A-MODIS/MERIS common atmospheric corrections

Uncertainty characteristics of v5

- Plot of V5 and V4.2 chl-a vs in situ chl-a -Stats better in V5



Conclusions

- OC CCI v5 data are a major change from v4
  - Common atmospheric correction (except for SeaWiFS)
  - MERIS as a reference sensor presaging OLCI as the main sensor in the future
  - Contains Sentinel 3A OLCI
- Preliminary results suggest an improvement in uncertainty characteristics
- Expected increase in coverage due to Polymer AC and OLCI

Future

- OC record is now 23 years contiguous
  - Maybe possible to differentiate climate change signals within 5-10 years?
- OC CCI data are researched in ESA CCI but produced in the Copernicus Climate Change Service
- How will this be affected by a "no-deal" outcome of Brexit?