

The Mediterranean Ocean Colour Level 3 Operational Multi-Sensor Processing



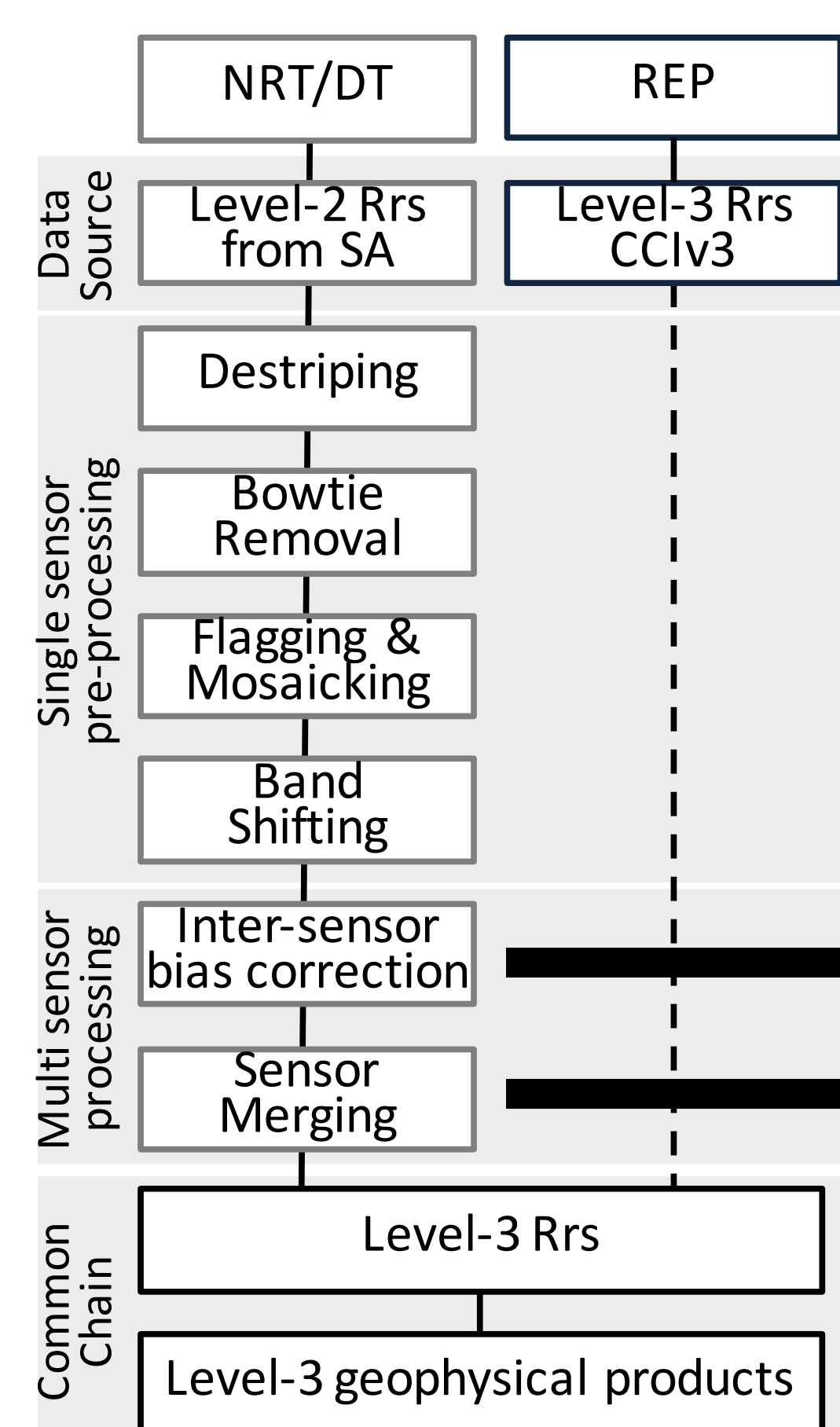
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The Processing Chain



Main steps **operationally** performed to enable single OC sensors to enter the **multi-sensor** processing applied to the **Mediterranean Sea** by OCTAC within **CMEMS**.

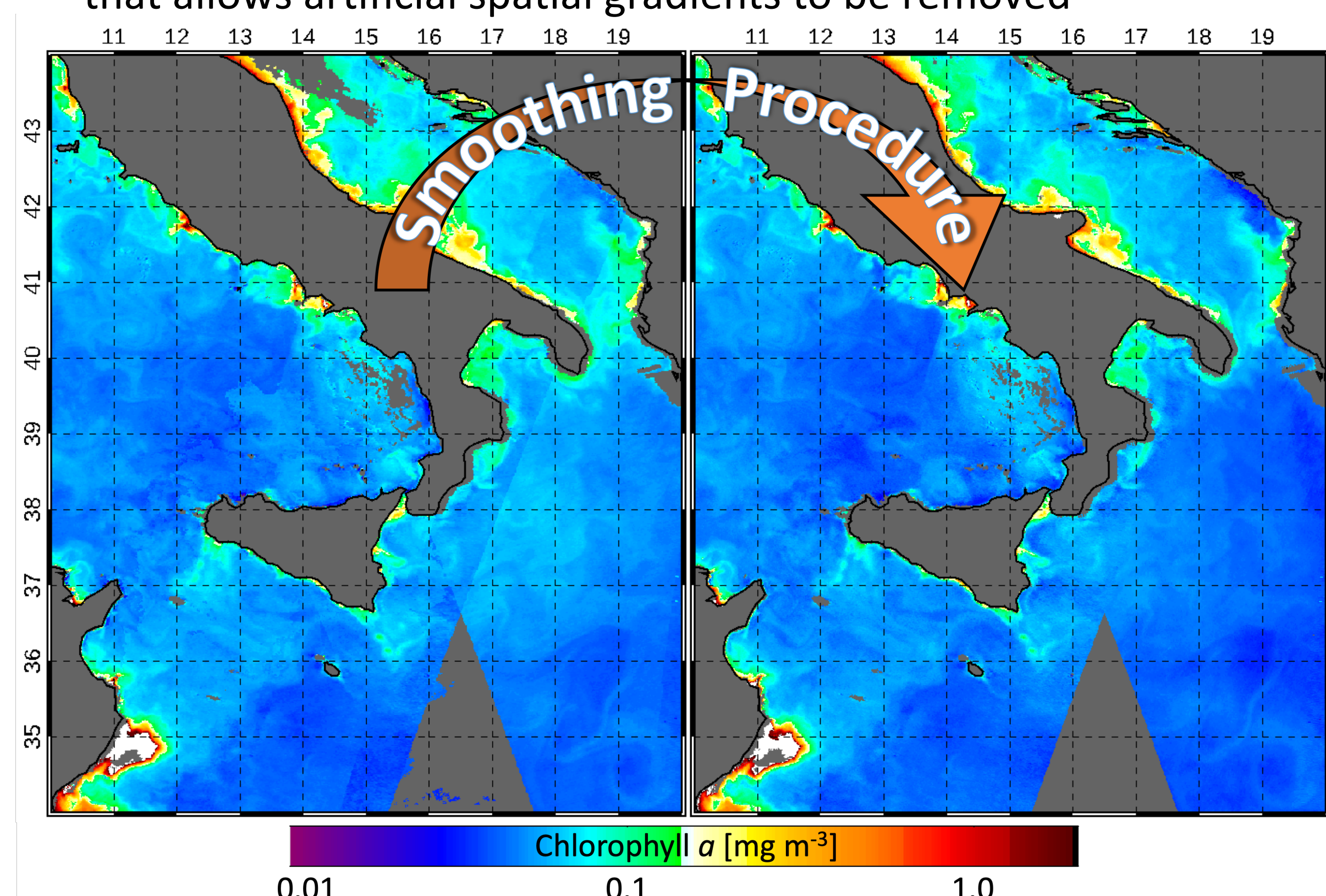
Inter-sensor bias correction

Steps to compute the Rrs **BIAS MAPS** for each **couples of OC sensors**

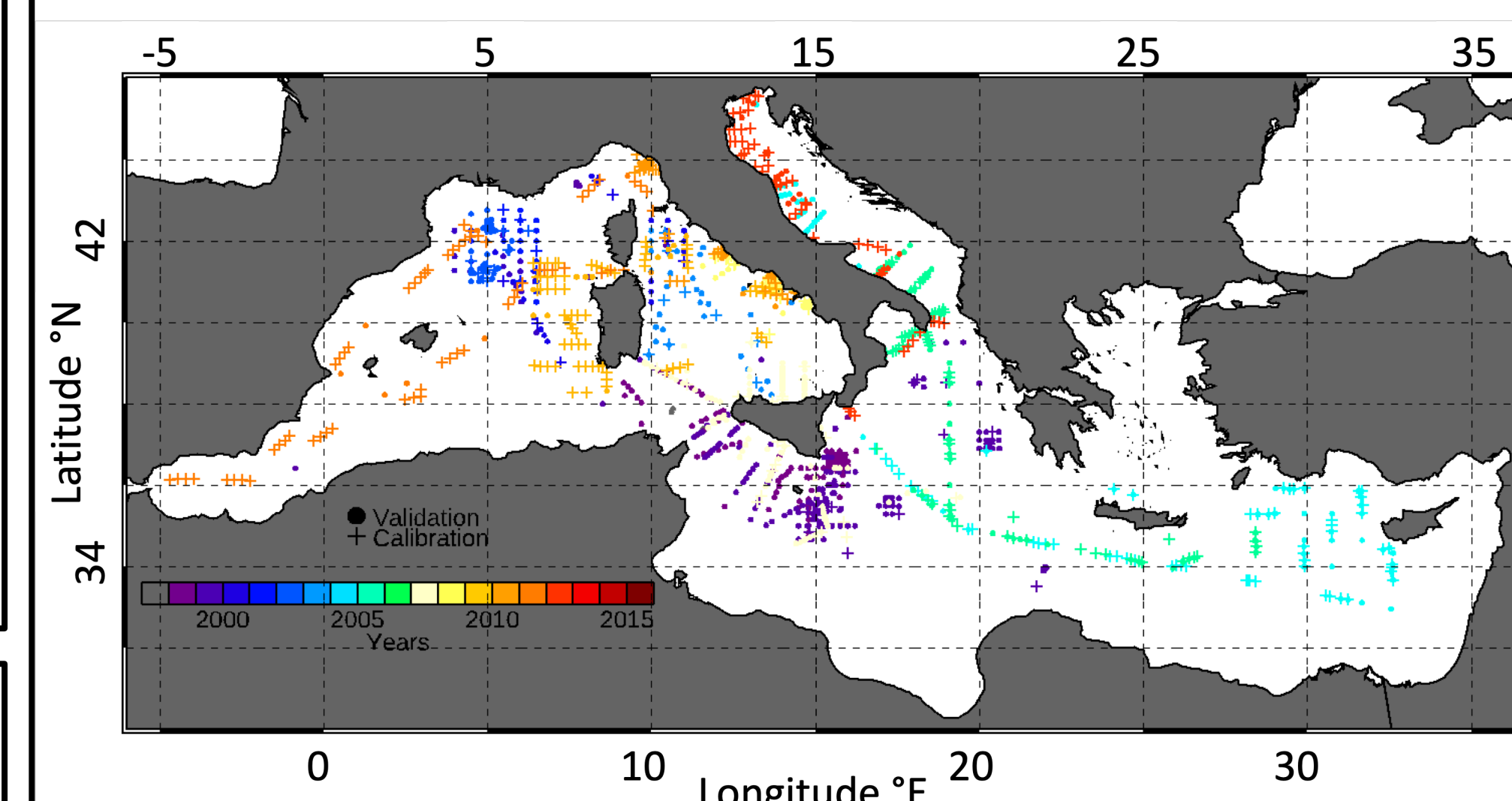
- Single Sensor Daily (± 3 days) Average time series (**SSDA**)
- **RATIO** between SSDAs time series (**RSSDA**)
- **CLIMATOLOGY** of the RSSDA (**CRSSDA**)
- Temporal & spatial **SMOOTHING** of the CRSSDA (**SCRSSDA**)
- Each sensor is bias corrected

Sensor Merging

Multi-sensor merging benefits of the **Smoothing Procedure** that allows artificial spatial gradients to be removed

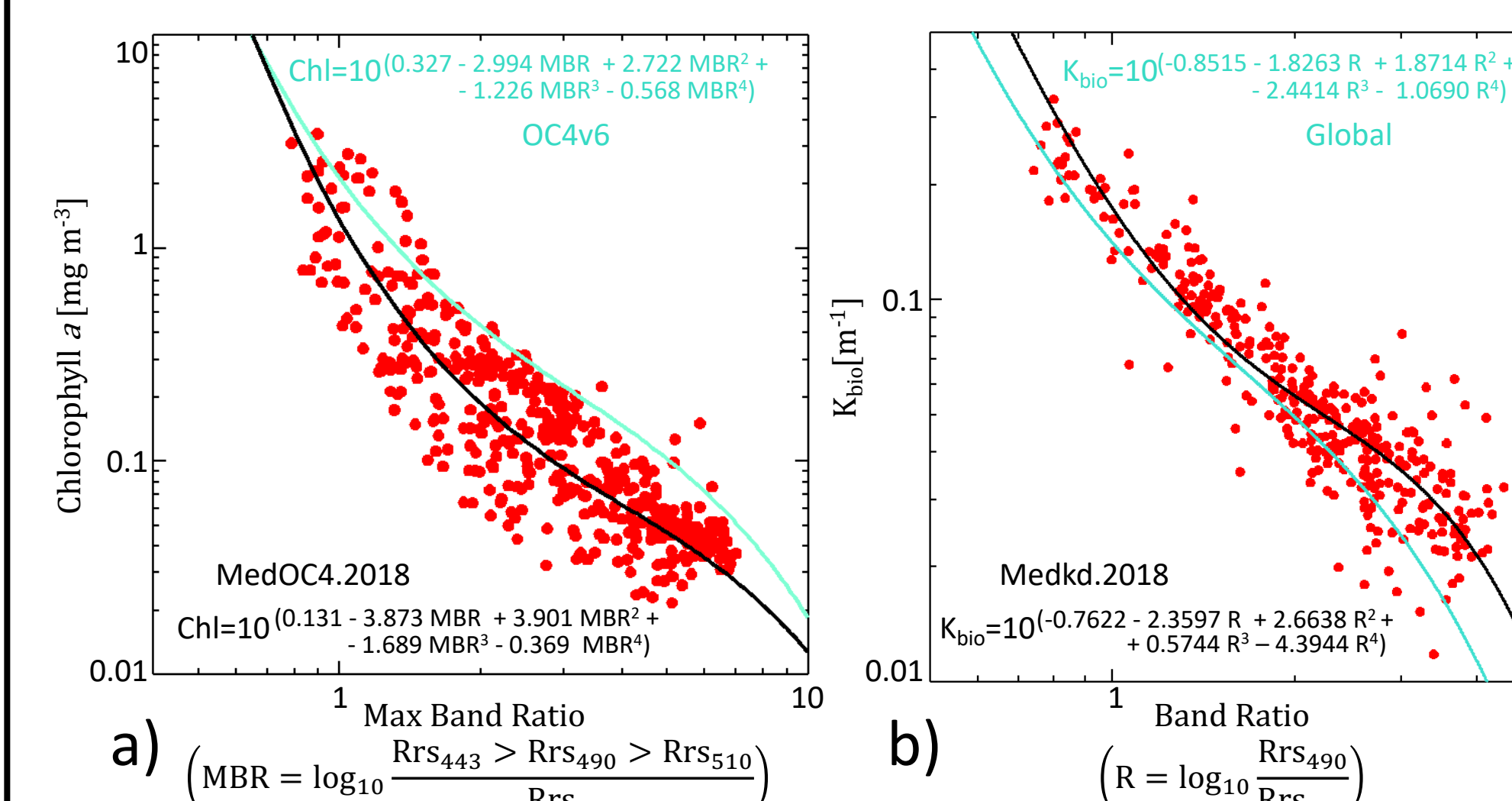


MedBiOp in situ dataset



MedBiOp in situ bio-optical dataset used:

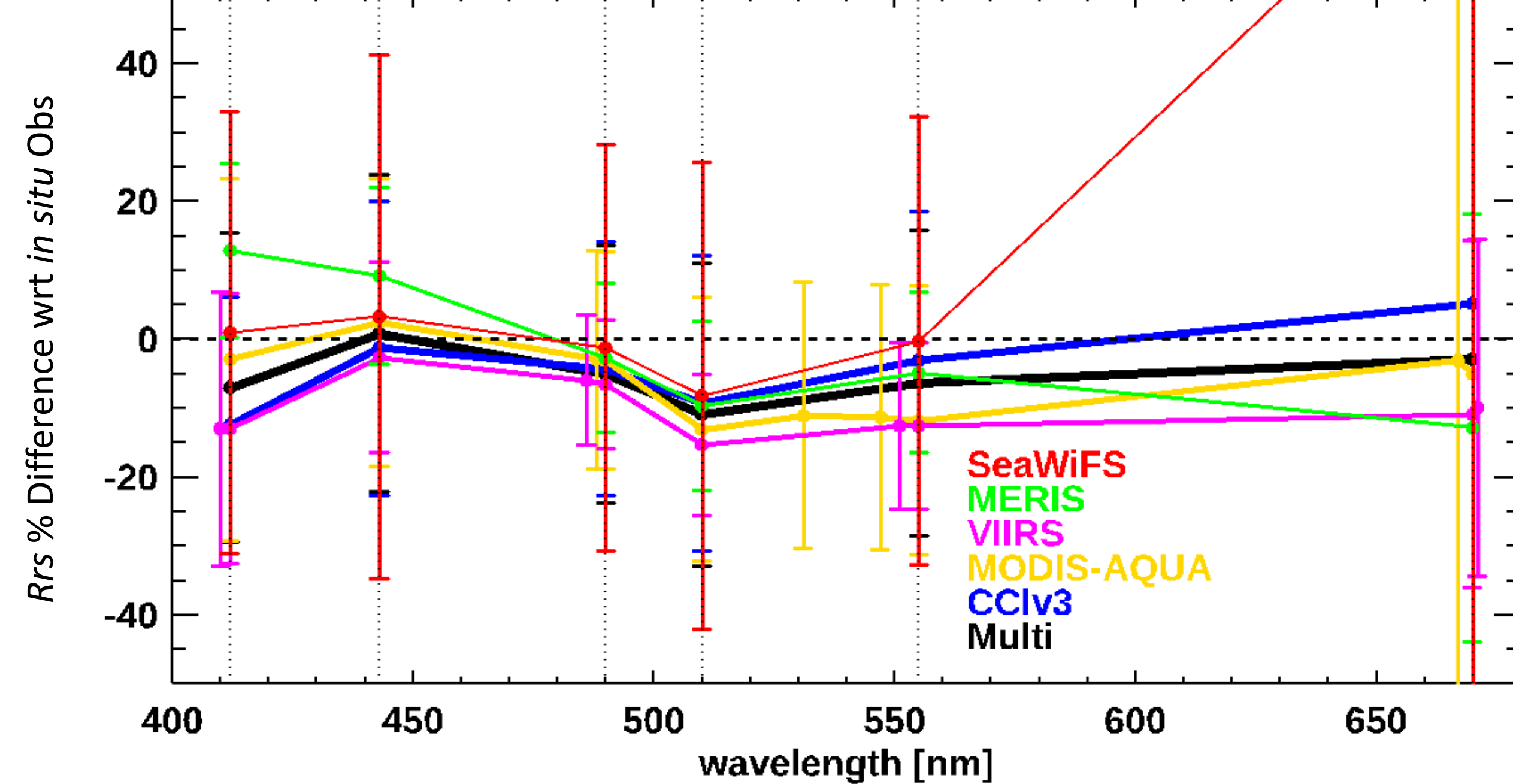
- to fine-tune the **algorithms** for the retrieval of:
 - a) phytoplankton chlorophyll, **Chl**
 - b) attenuation coefficient of light, **kd**
- to assess the **uncertainty** associated with them.



Level 3 product validation

Rrs

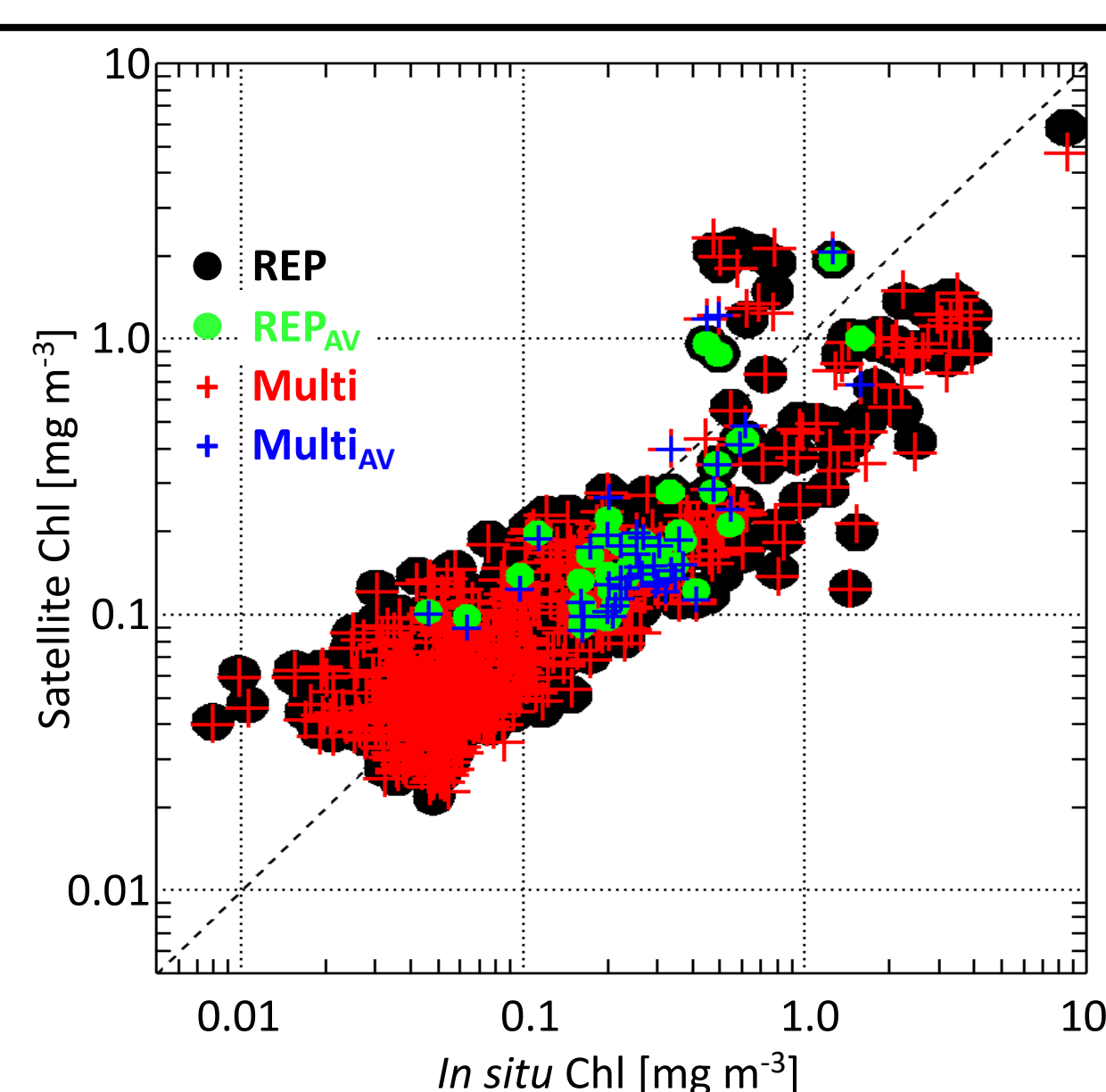
The satellite multi-sensor remote sensing Reflectance spectra better agree with the in situ observations than those of the single sensors



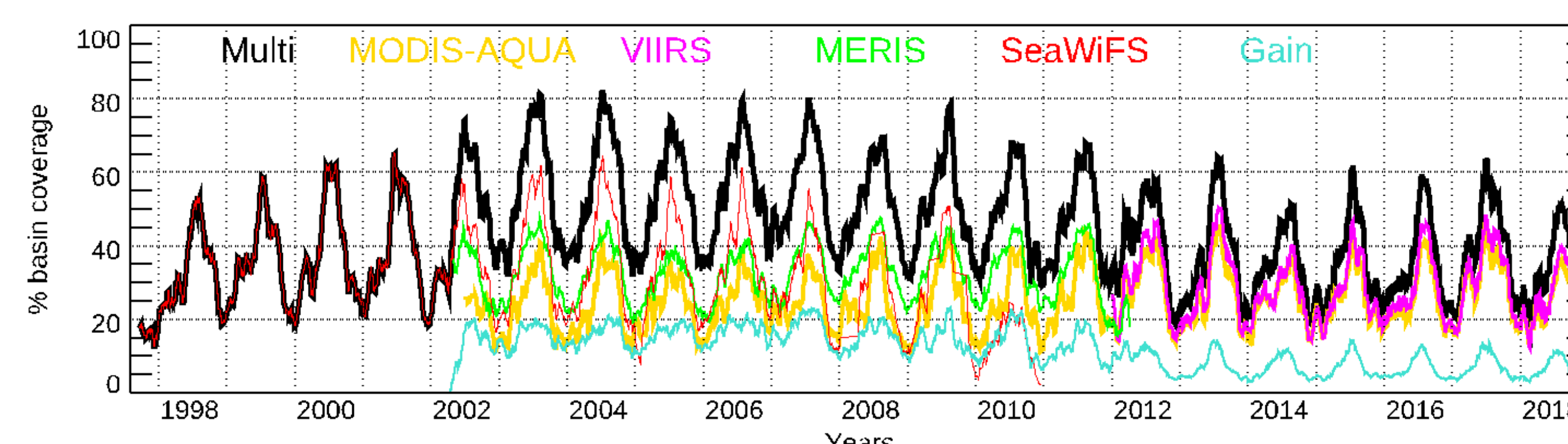
- Rrs₄₄₃ and Rrs₄₉₀ nm perform better than Rrs₄₁₂, Rrs₅₁₀ or Rrs₅₅₅ for all products
- Similar spectral behaviour by SeaWiFS, MODIS-AQUA and VIIRS → **I2gen**
- MERIS is the only one exhibiting a positive value at 412 and 443 nm → **POLYMER**
- All satellite data never exceed 15% wrt in situ observations (apart from SeaWiFS at 670 nm)

Chl

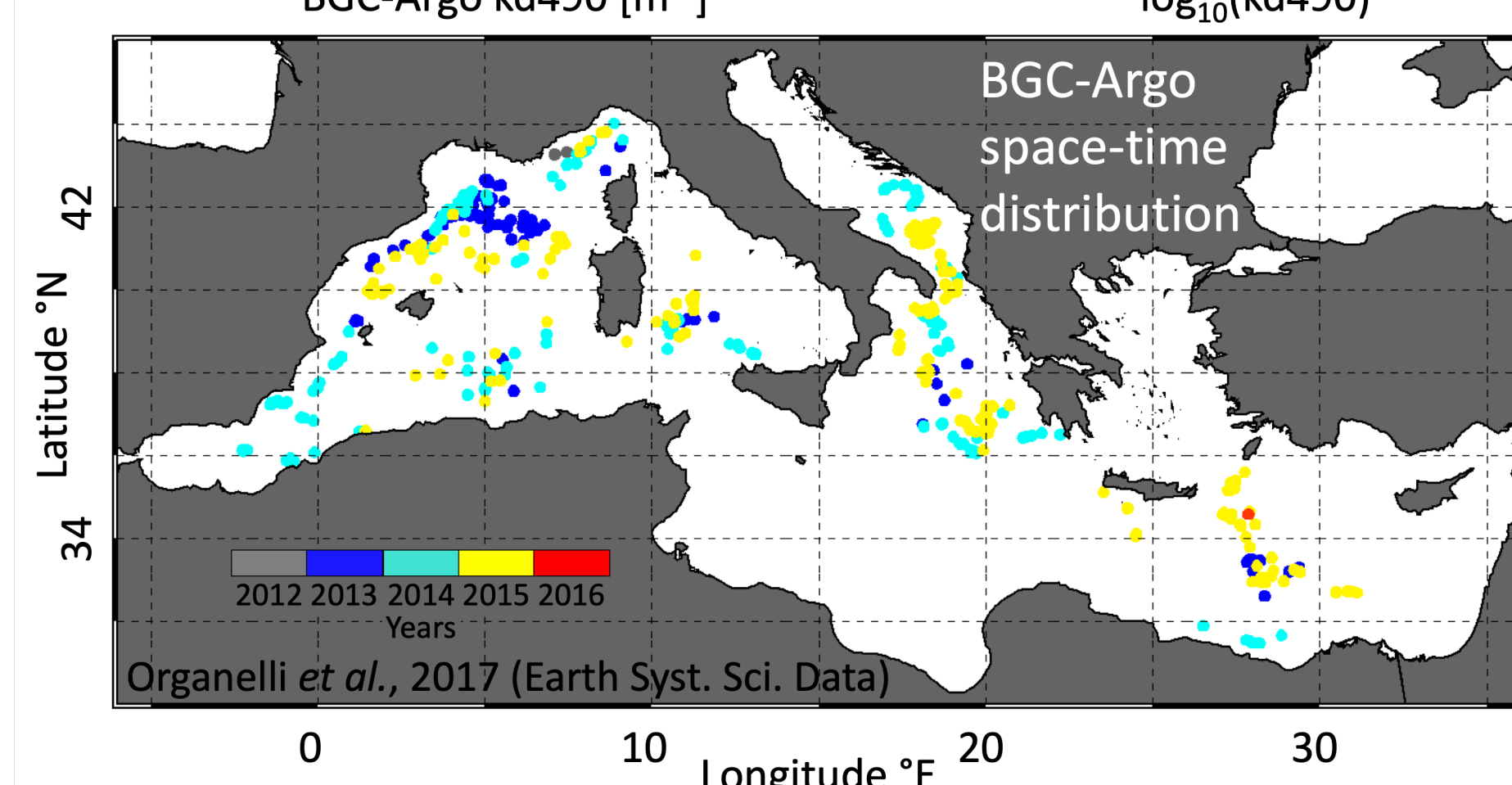
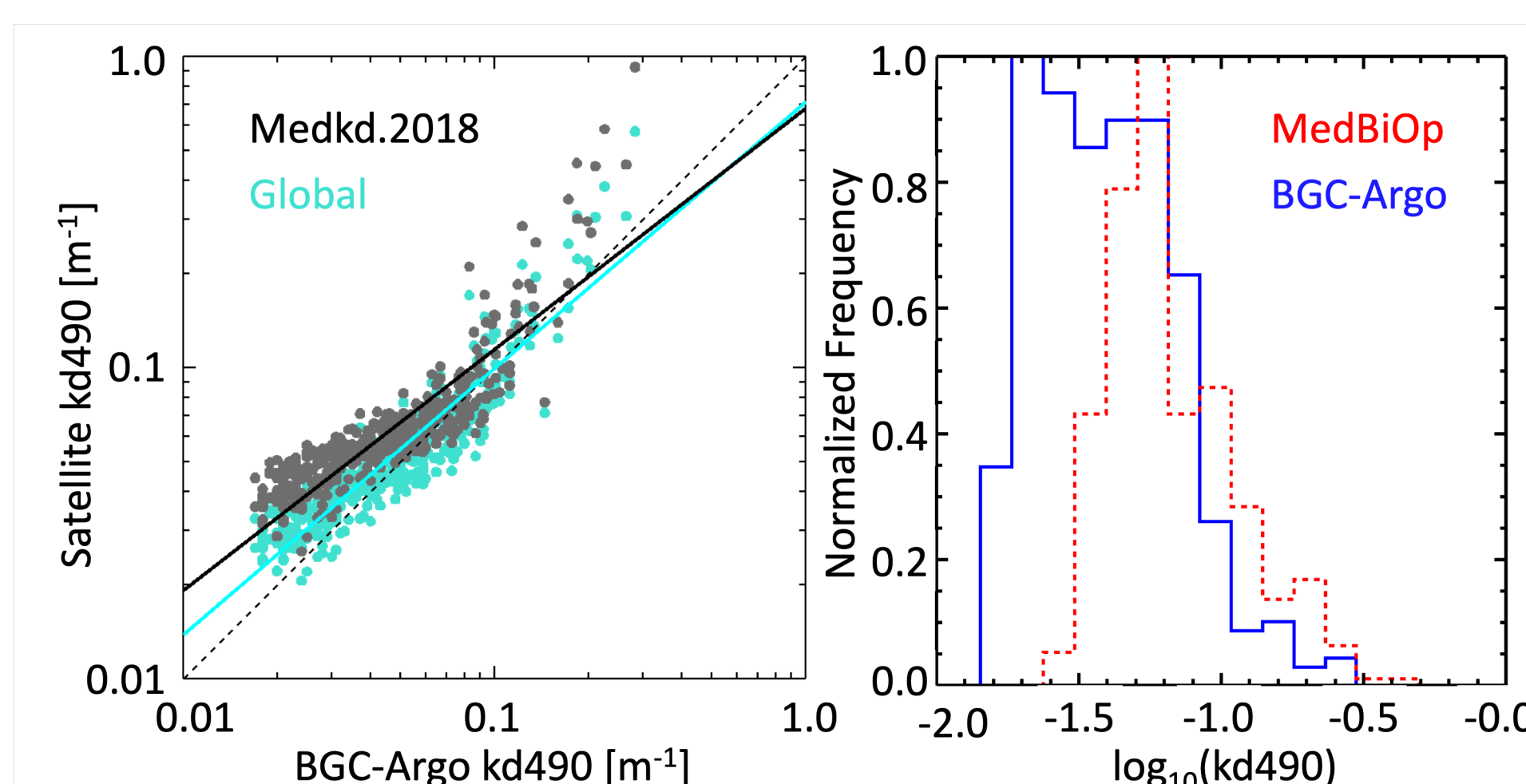
	REP	REPAV	Multi	MultiAV
Temporal range	1997 – 2015	2012 – 2015	1997 – 2015	2012 – 2015
Based on	CCl.v3 Rrs	CCl.v3 Rrs	This work	This work
Slope	0.737	1.052	0.752	1.184
Intercept	-0.306	-0.108	-0.309	-0.047
r²	0.75	0.57	0.74	0.50
RMSD	0.411	0.207	0.427	0.271
Bias	-0.093	-0.064	-0.098	-0.057
RPD	7	-18	3	-17
APD	47	43	47	48
N	710	44	710	44



Coverage



kd490



Conclusions

The **Multi-sensor** chain takes care of reducing the **inter-sensor bias** before data from different sensors are merged together via the efficient **smoothing** procedure

Here we demonstrate that the near-real time processing chain compares sufficiently well with the historical in situ datasets to be confidently used also for reprocessing the full data time series