

ProVal

A profiling float dedicated to the validation of ocean color data

E. Leymarie, C. Penkerc'h, V. Vellucci, C. Lerebourg,
D. Antoine, H. Claustre



ProVal – technical feature

- New Provor CTS₅ (NKE) + Osean acquisition Board

- High speed, bidirectional Iridium telemetry

Sensors:

- 2 sensors E_d-L_u

E_d : 380, 412, 443, 490, 510, 560, 665 nm + PAR

L_u : 380, 412, 443, 490, 510, 560, 665 nm

- Tilt and compass sensors

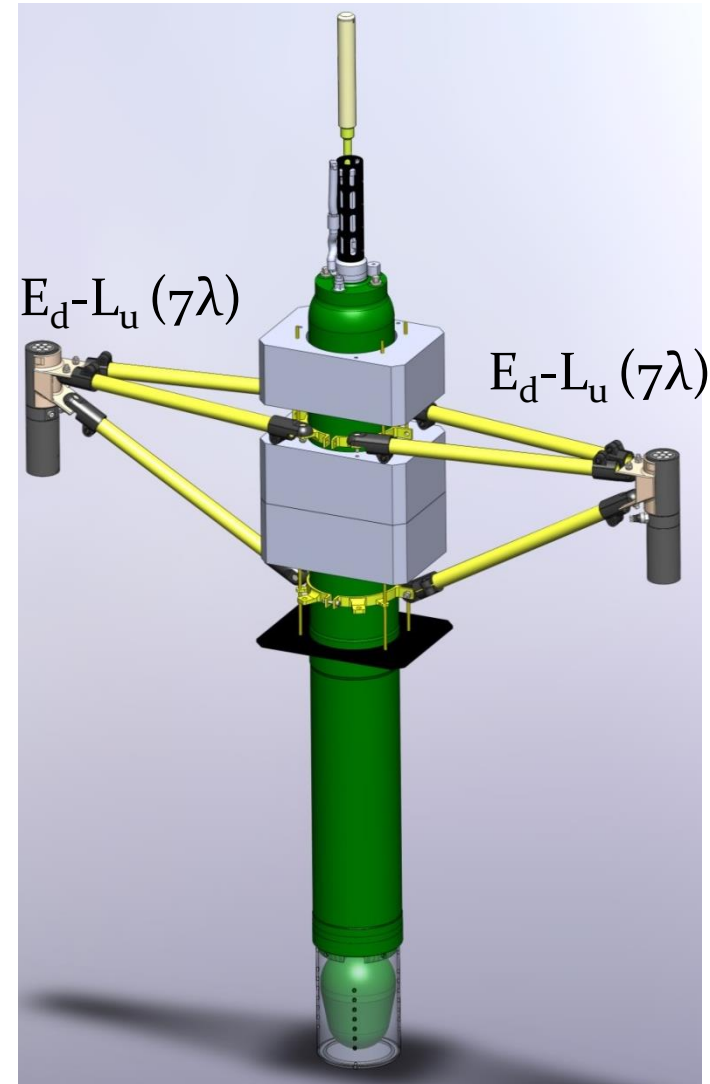
- Chla, backscattering, CDOM

- CTD

ProVal's original features:

- Sensors redundancy

- designed to minimize self-shading

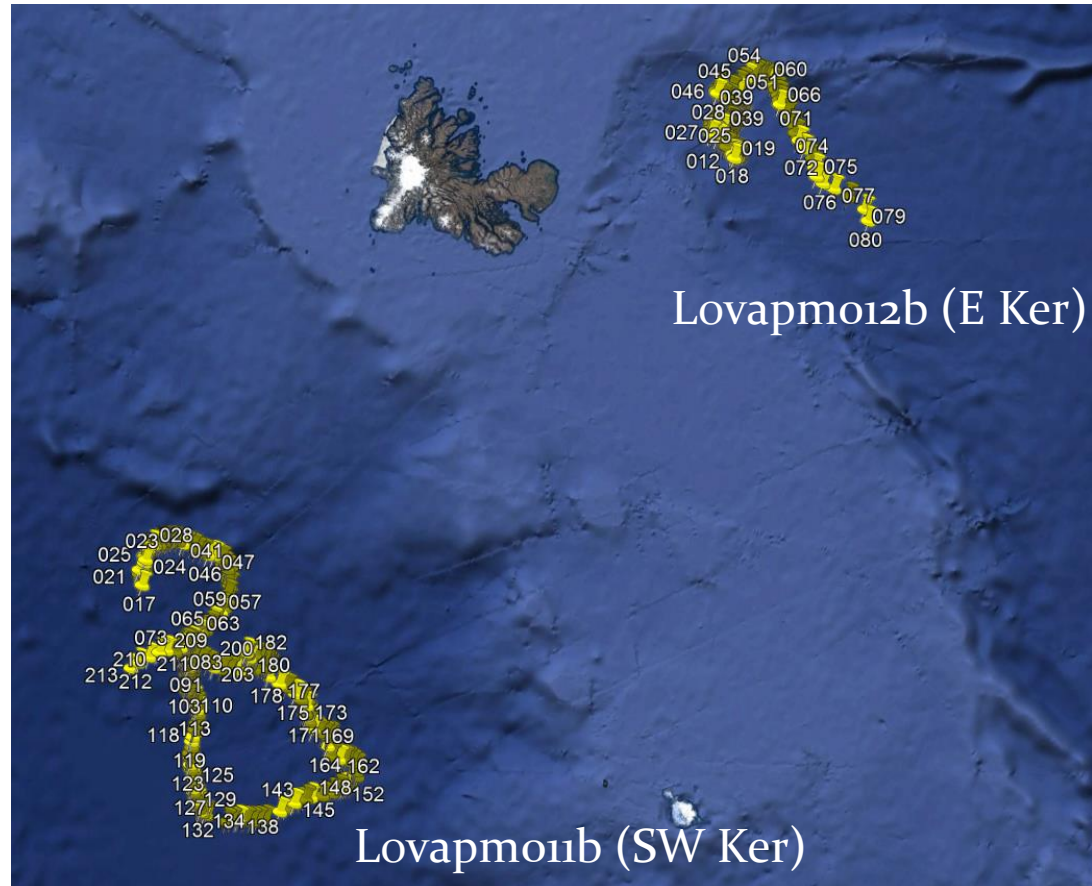
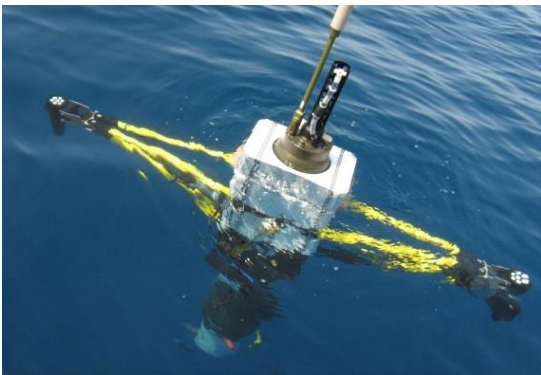


2 ProVal Deployed

Since oct 2016 – Kerguelen (Soclim)

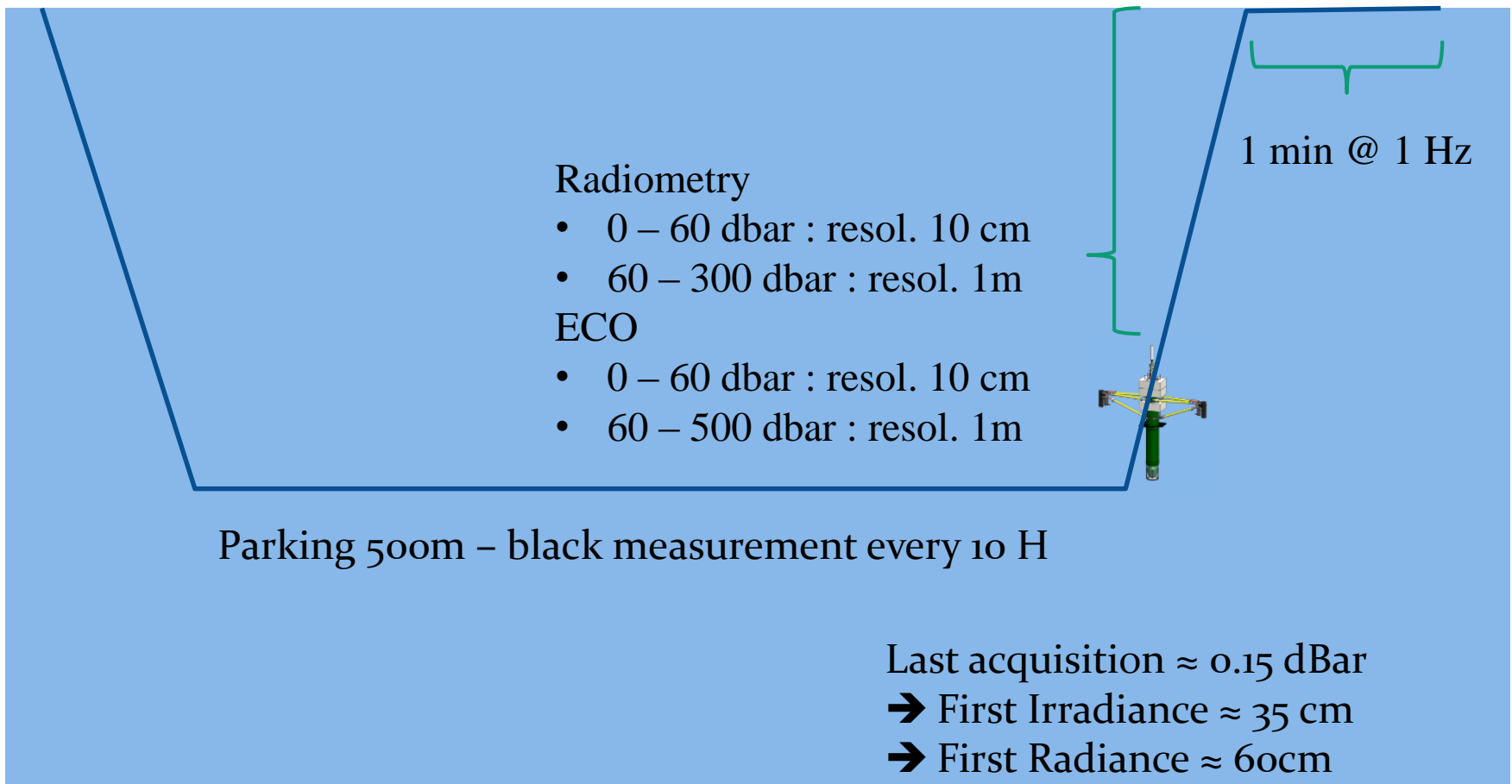
Lovapm011b : >200 profiles (SW Ker) **without Chla-bb-CDOM**

Lovapm012b : 68 profiles (E Ker) – **LOST in January**



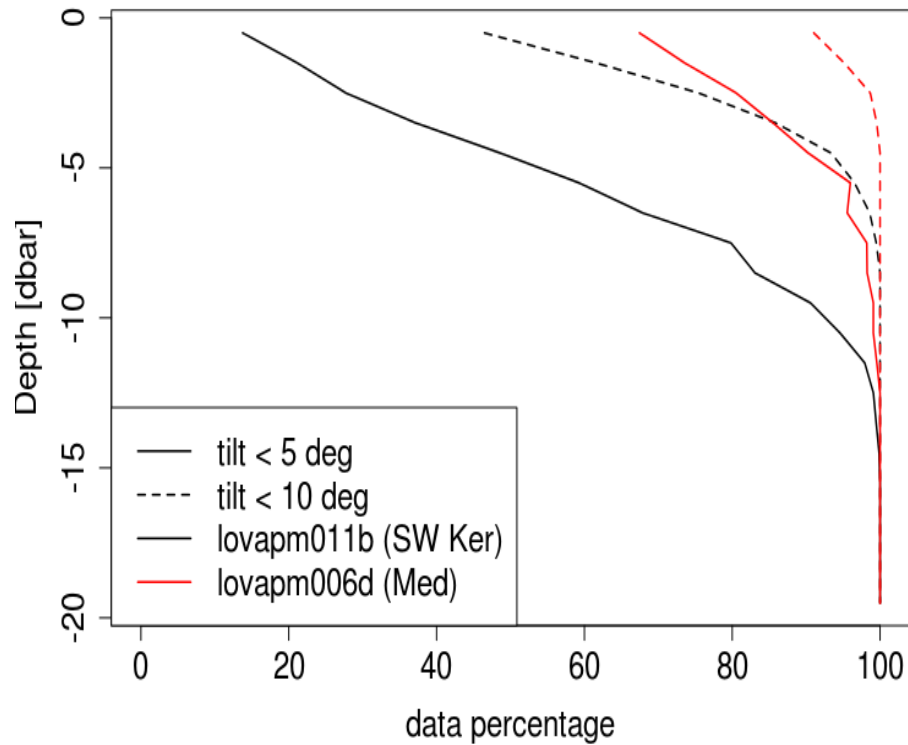
Data Acquisition

Daily cycle till 22/02/2017 then every 3 days

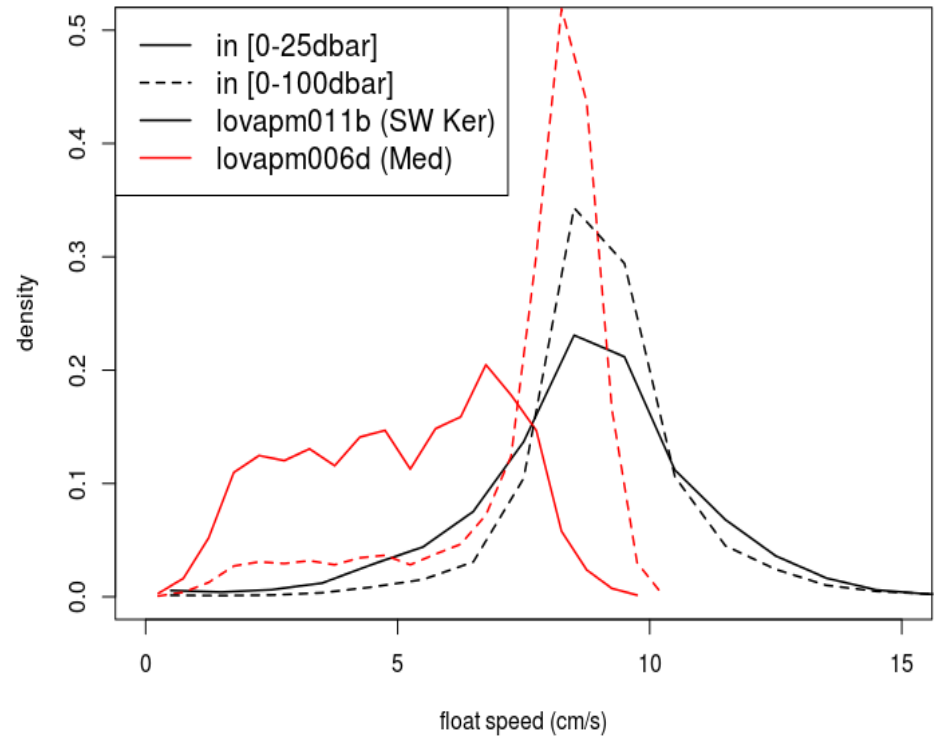


Float Tilt & Speed

Tilt



Float ascent speed distribution



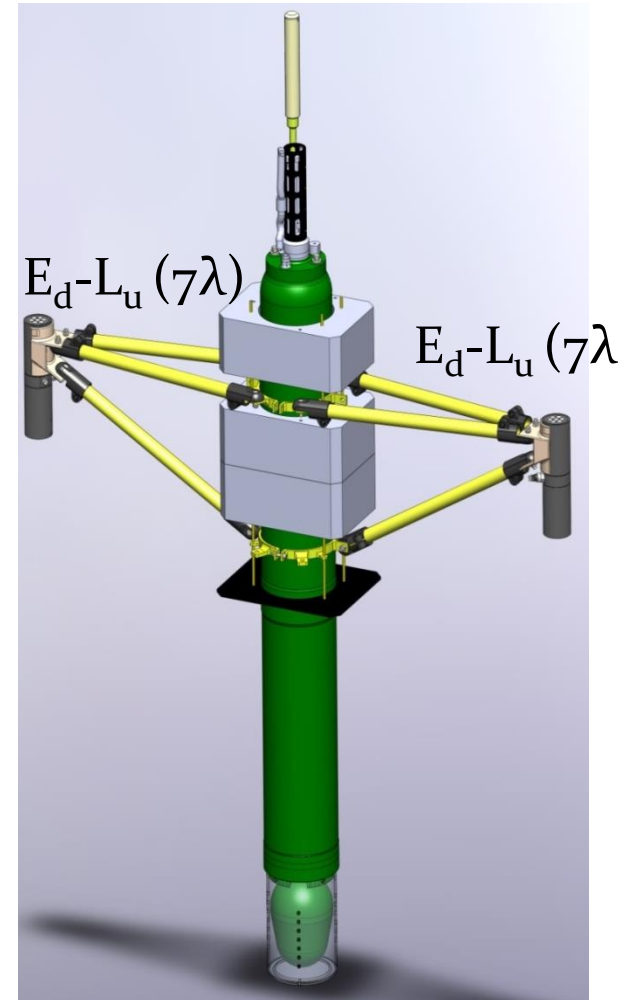
Sensor Relative Difference

- Irradiance : ~~380~~, ~~412~~, 443, 490, 510, 560, 665 nm + PAR
- Radiance : 380, 412, 443, 490, 510, 560, 665 nm (7)

$$SRD_S(z, t) = \frac{2 * [S_1(z, t_1) - S_2(z, t_2)]}{[S_1(z, t_1) + S_2(z, t_2)]}$$

With $Z=Z_1=Z_2$ et $\text{abs}(t_1-t_2) < 2s$

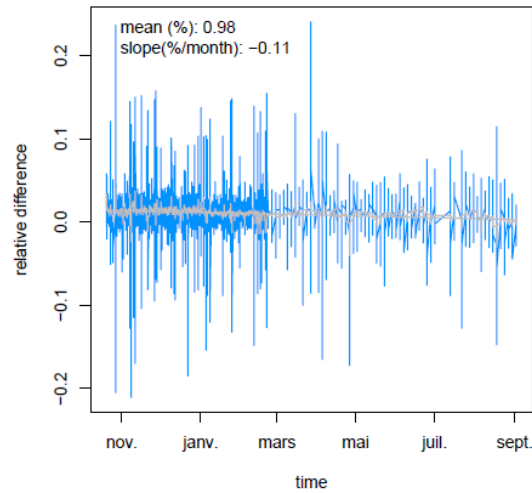
$S = E_d(\lambda)$ or $L_u(\lambda)$



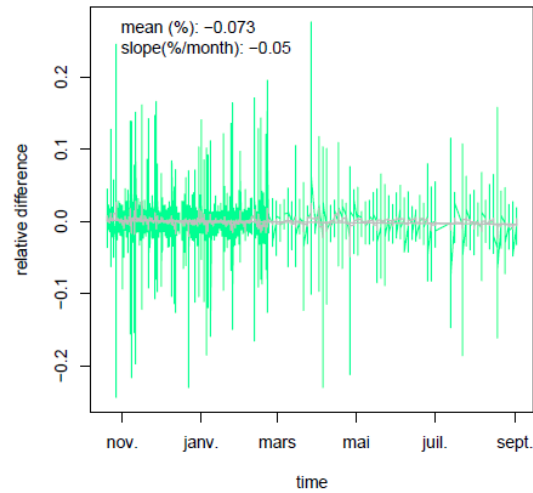
Sensor inter-comparison

float:lovapm011b, date:2016-10-20- 2017-09-02

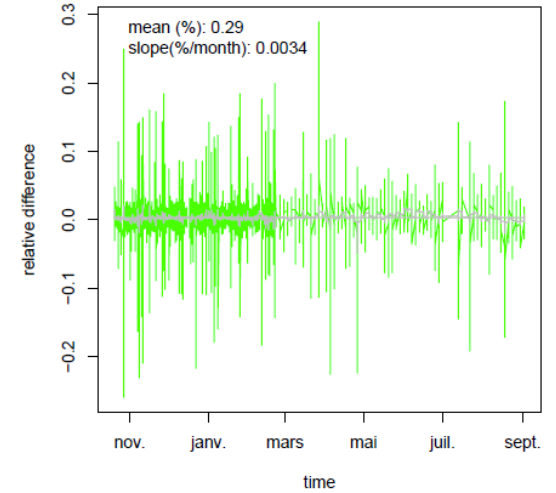
CompIRR443



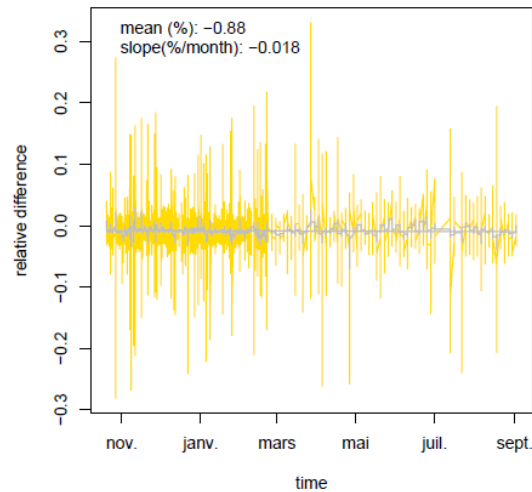
CompIRR490



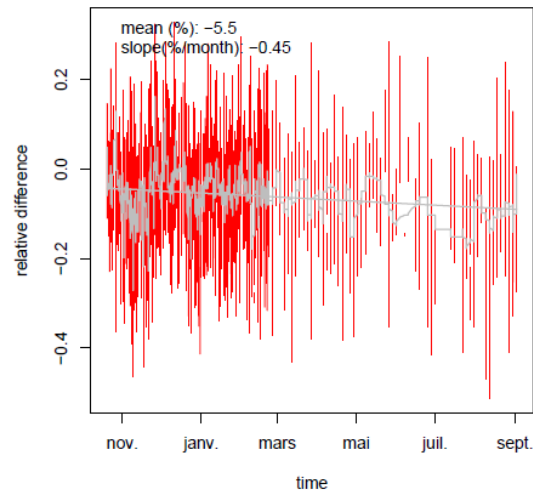
CompIRR510



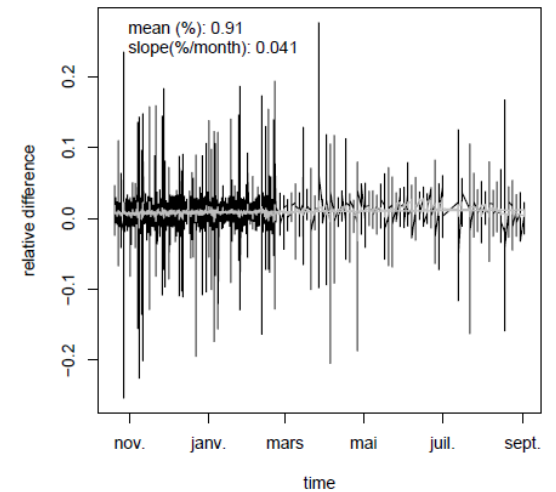
CompIRR560



CompIRR665



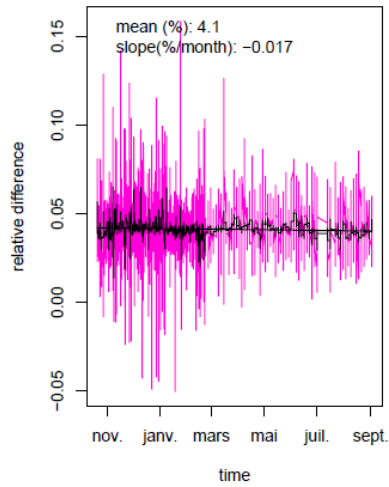
CompPAR



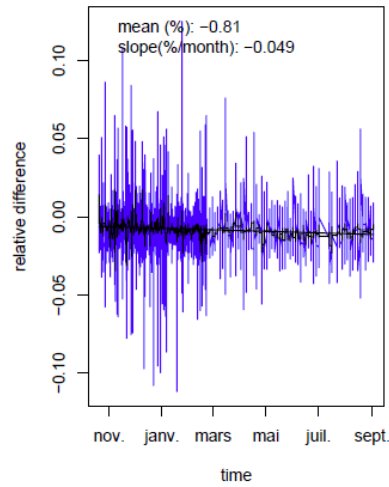
Sensor inter-comparison

float:lovapm011b, date:2016-10-20- 2017-09-02

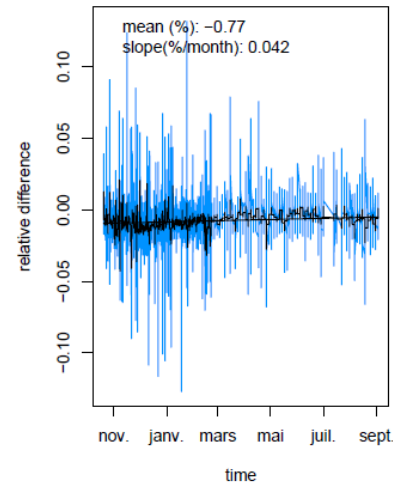
CompRAD380



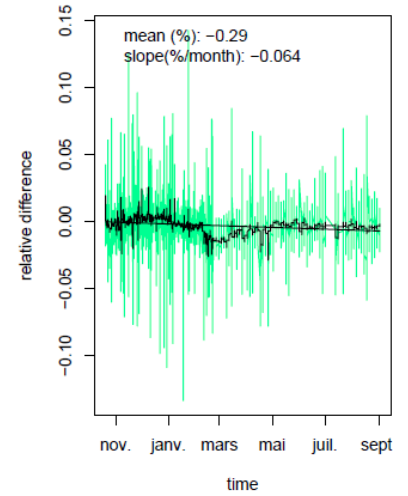
CompRAD412



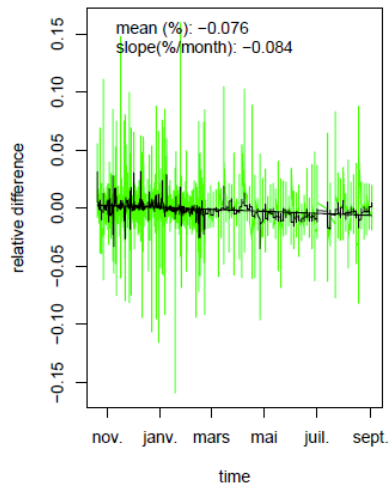
CompRAD443



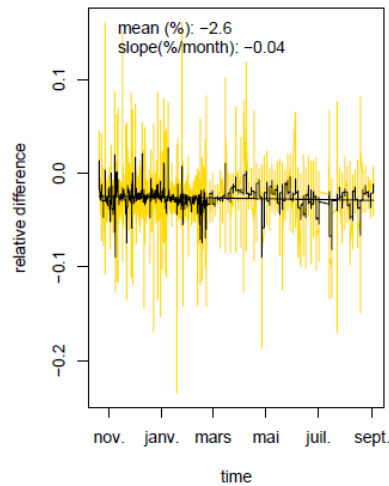
CompRAD490



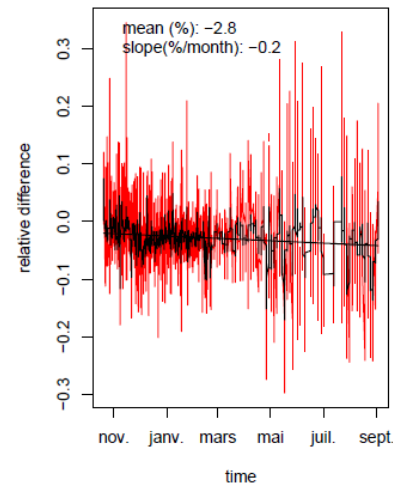
CompRAD510



CompRAD560

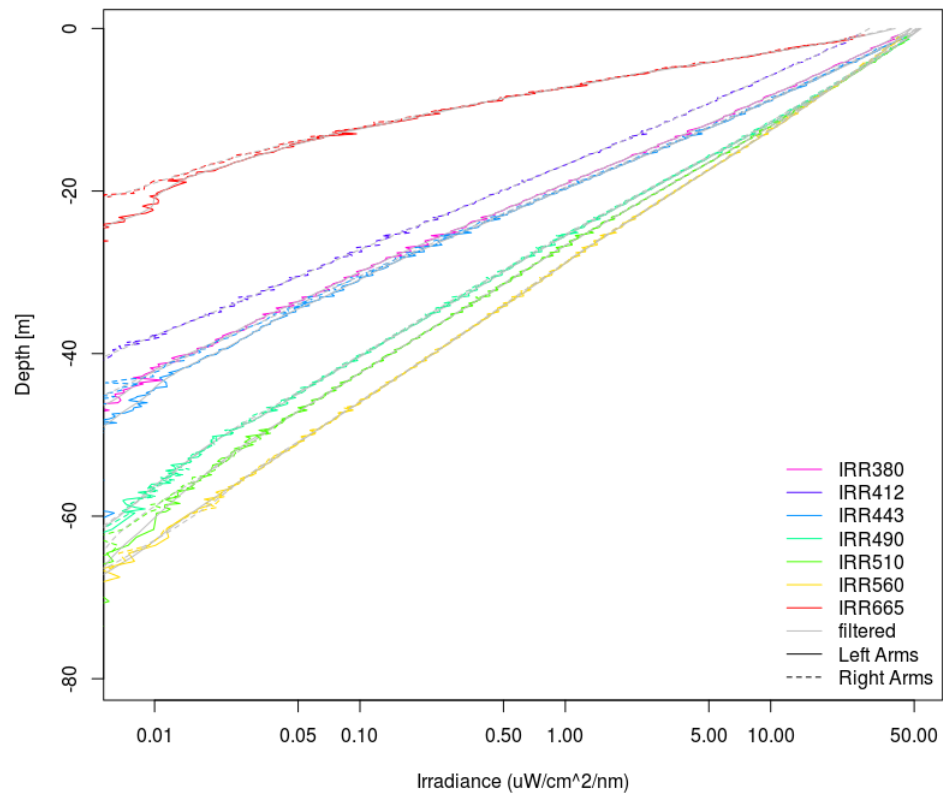


CompRAD665

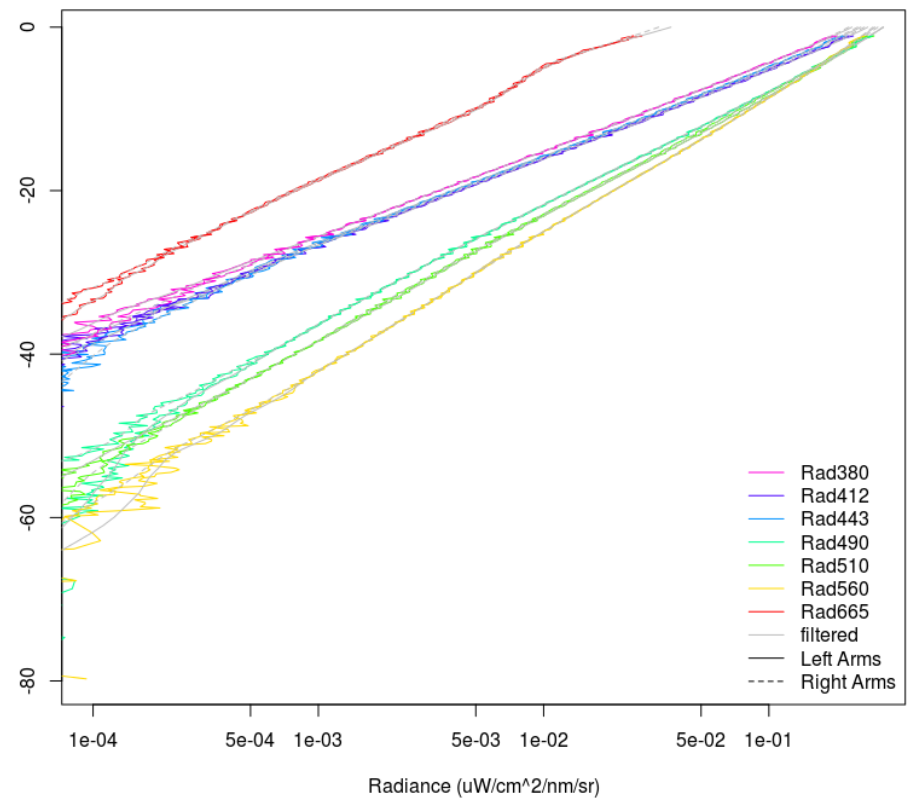


Data example

Irradiance ASCENT

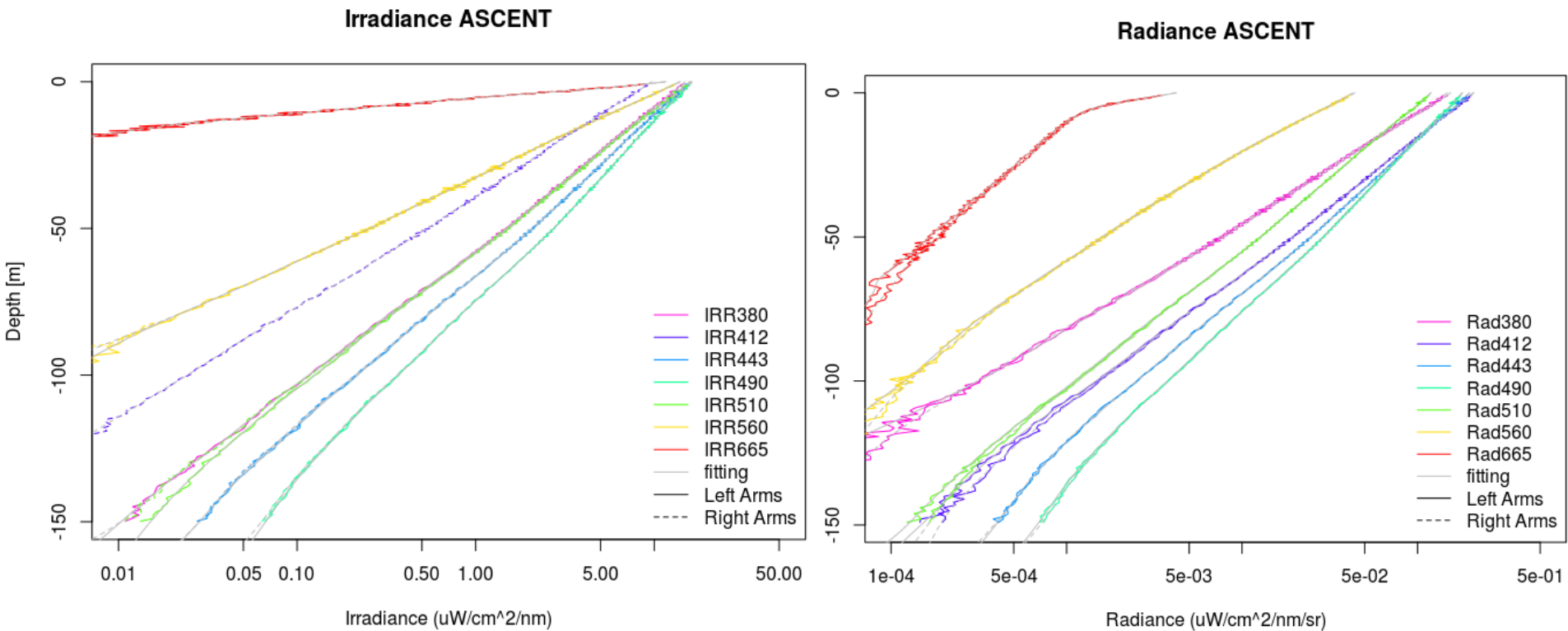


Radiance ASCENT



Lovapm012b (E Ker) -059, 2016-12-01

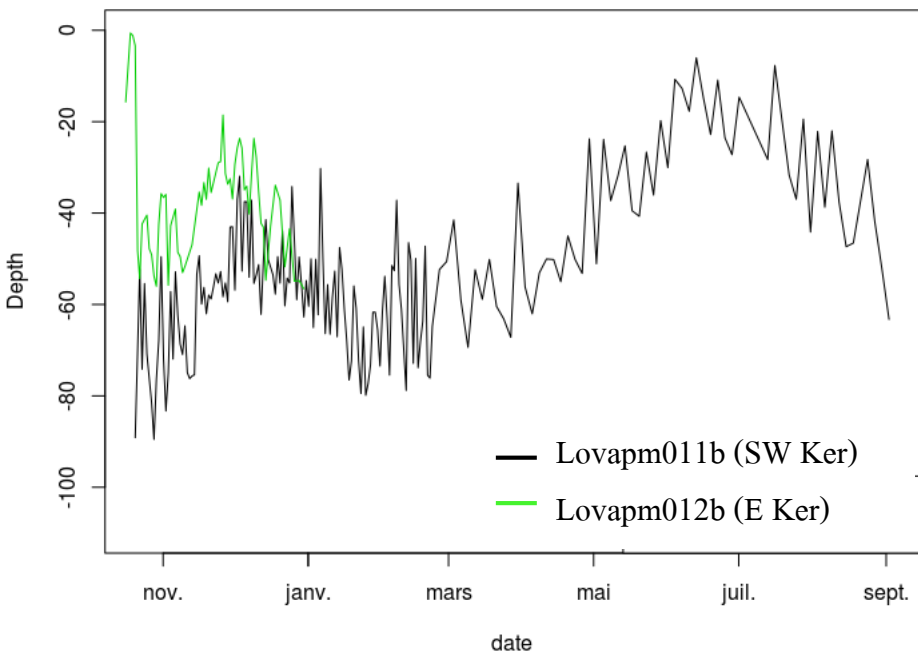
Data example



Profile example lovapm011b (SW Ker) 156, 2017-03-18

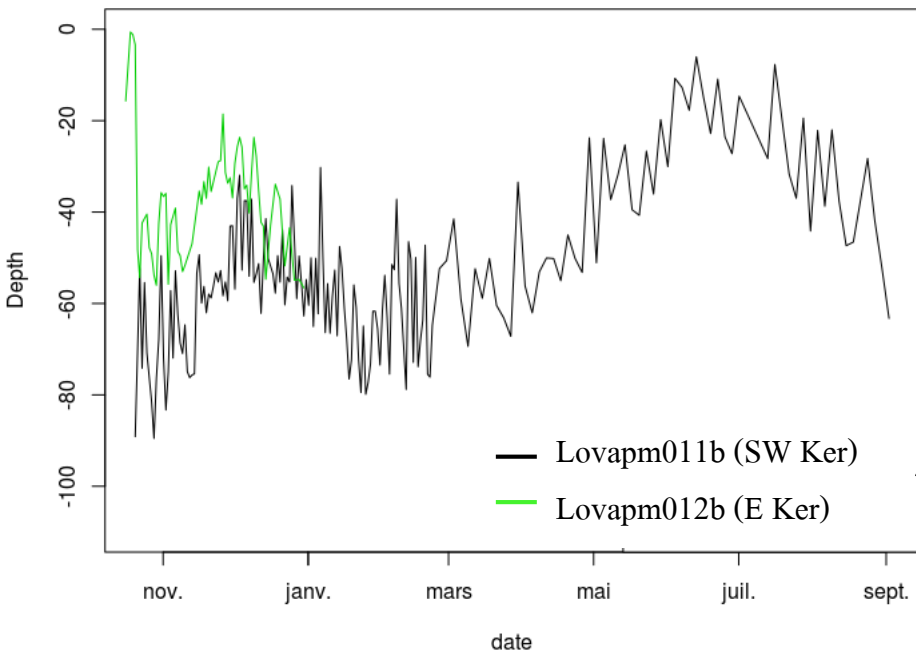
Light propagation at depth

Isolum PAR = $10 \mu\text{Mole photons}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$

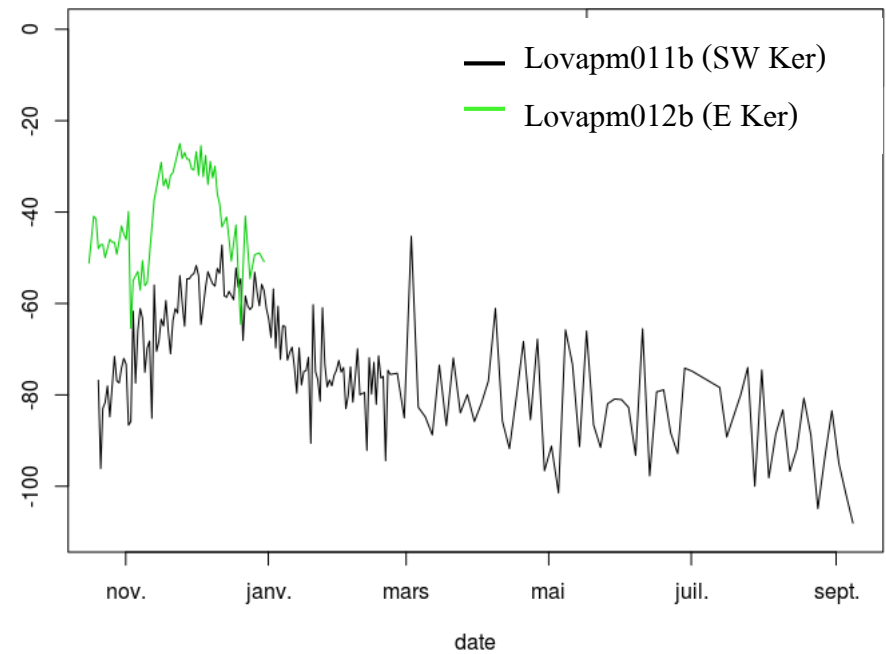


Light propagation at depth

Isolum PAR = $10 \mu\text{Mole photons}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$

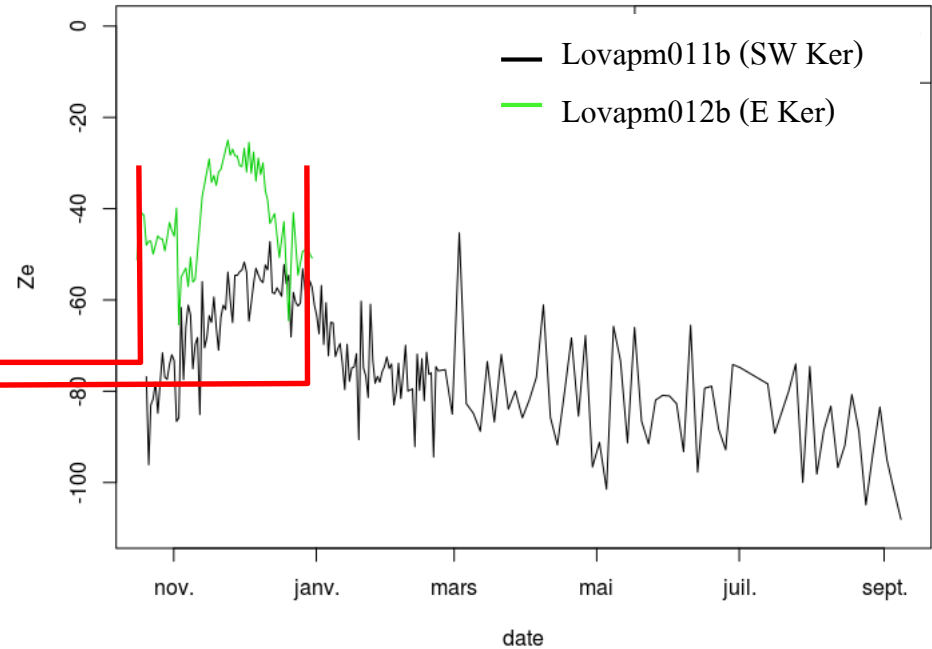


Euphotique depth (1%)

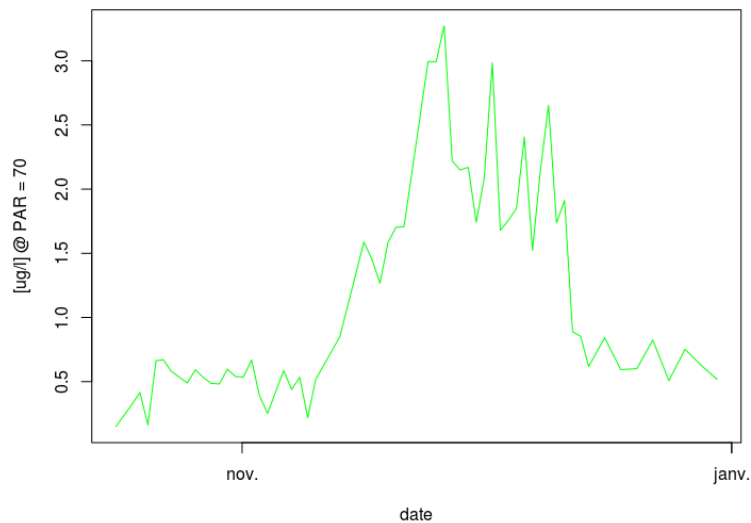


Light propagation at depth

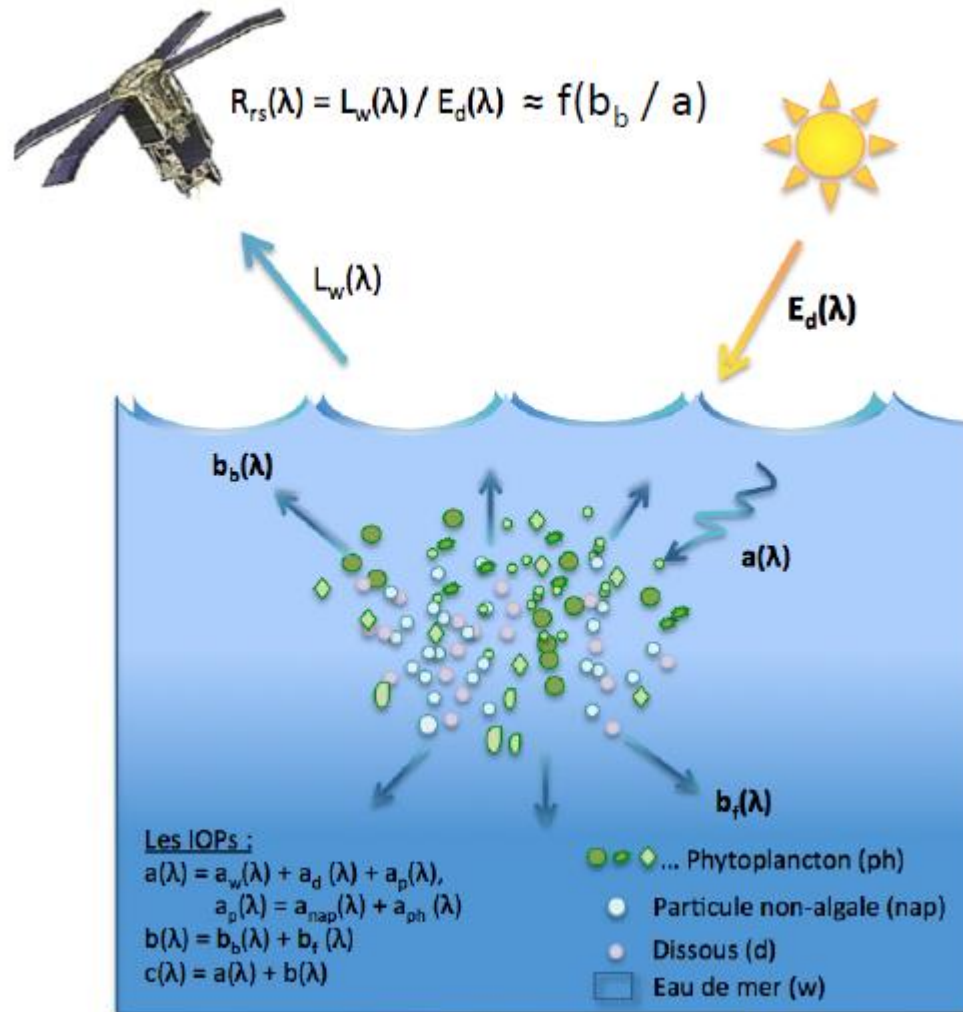
Euphotique depth (1%)



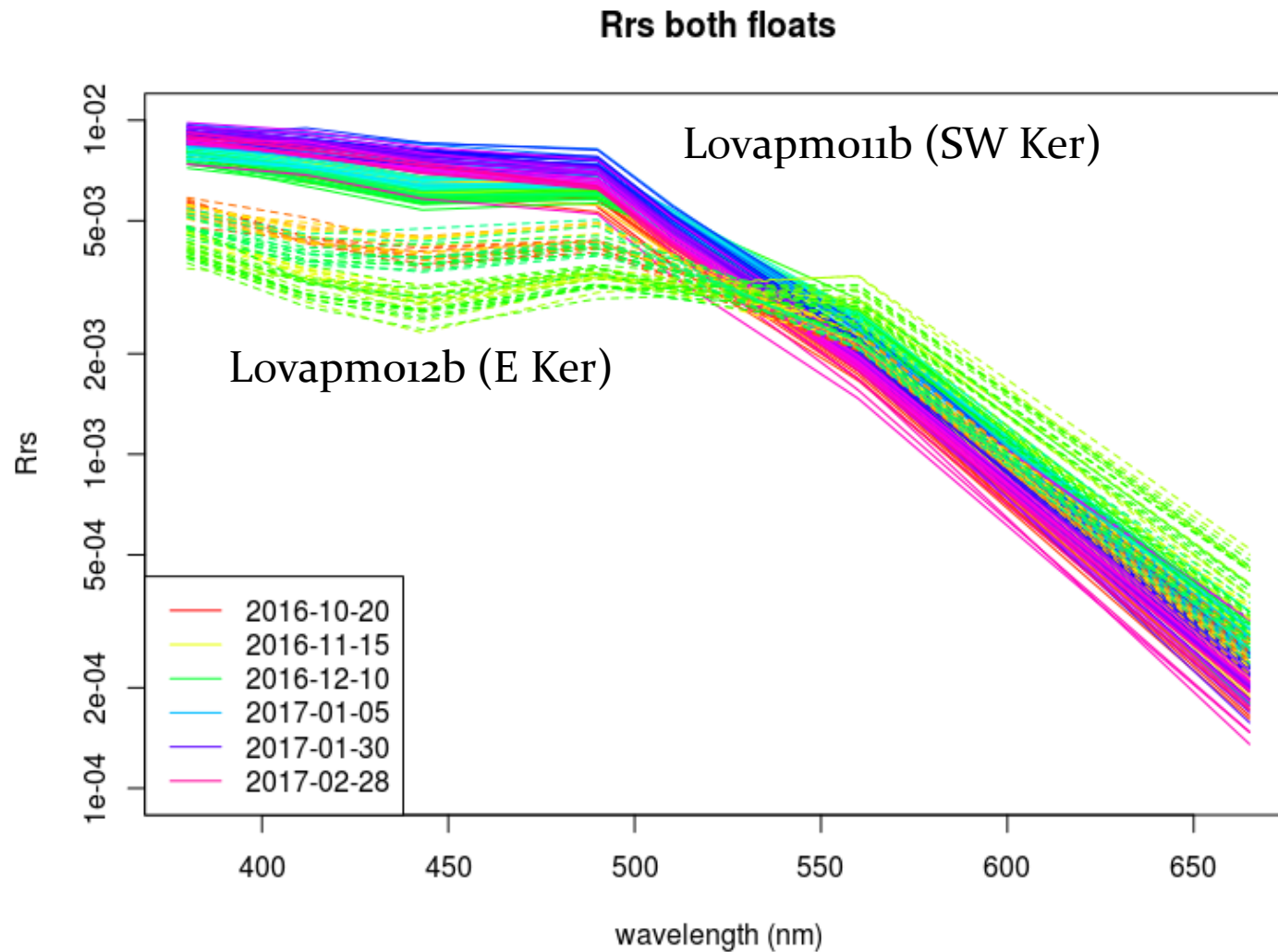
Chla (Fluo) lovapm012b (E Ker)



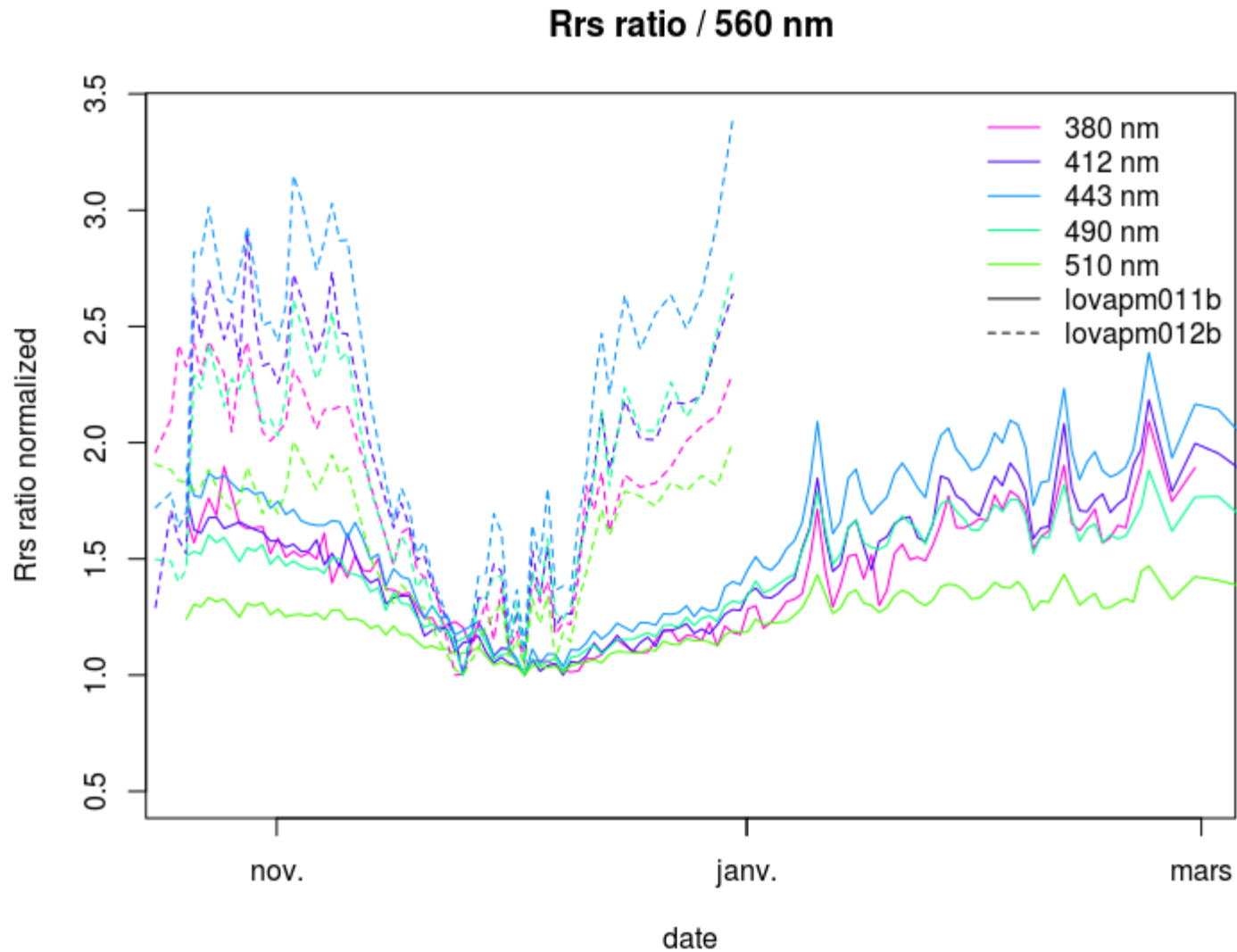
Remote Sensing Reflectance



Remote Sensing Reflectance

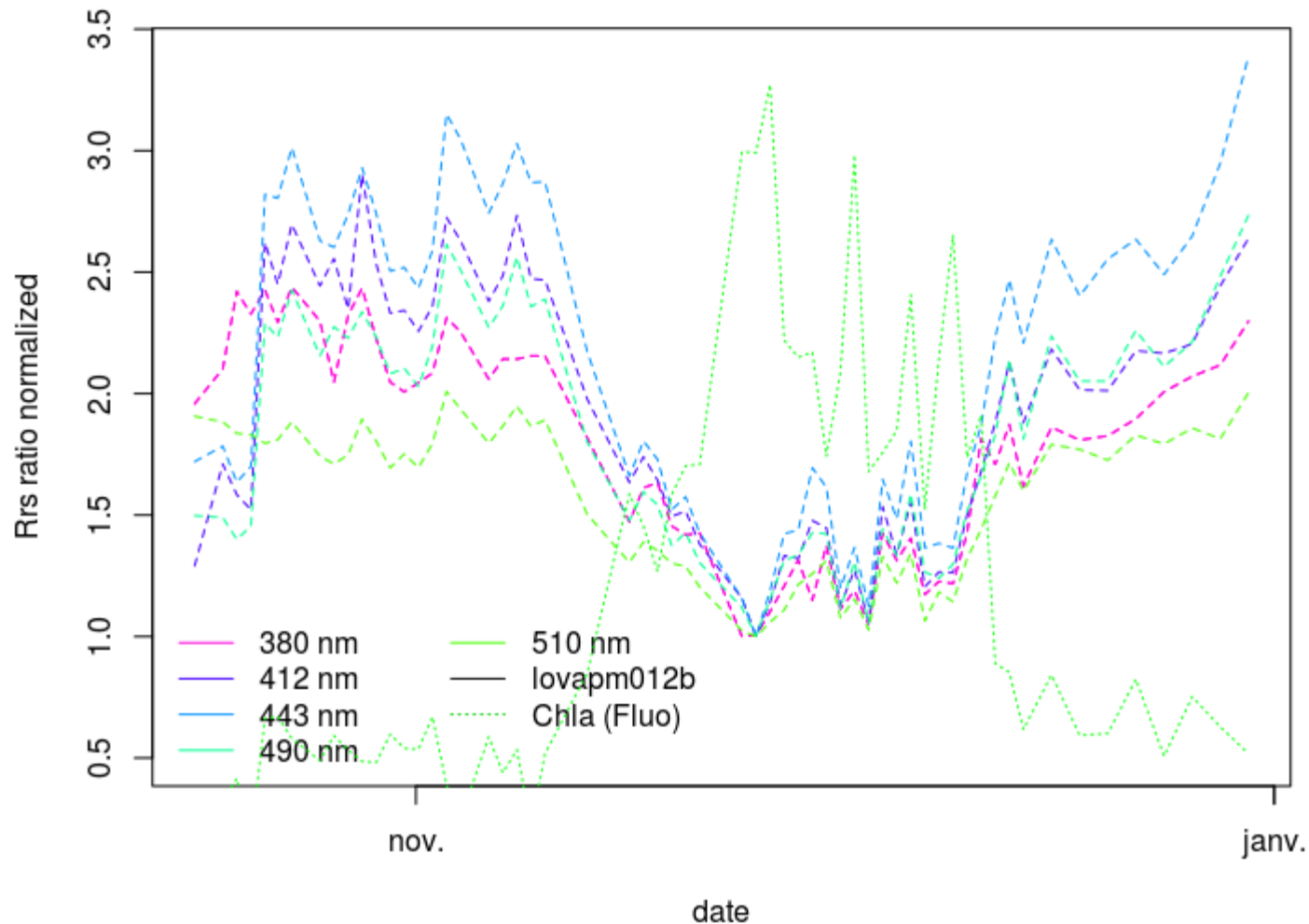


Remote Sensing Reflectance - Ratio



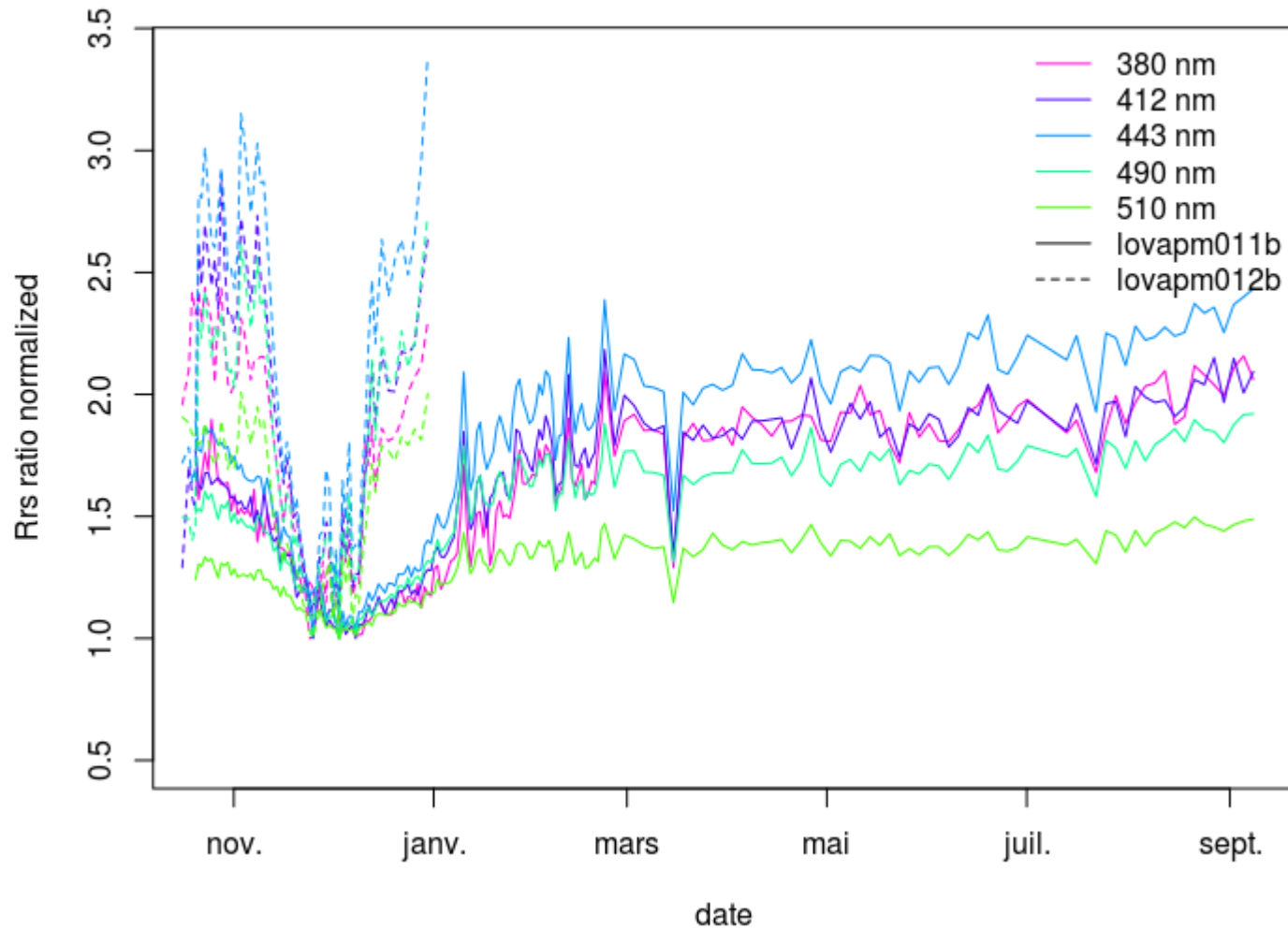
Remote Sensing Reflectance - Ratio

Rrs ratio / 560 nm and [Chla]



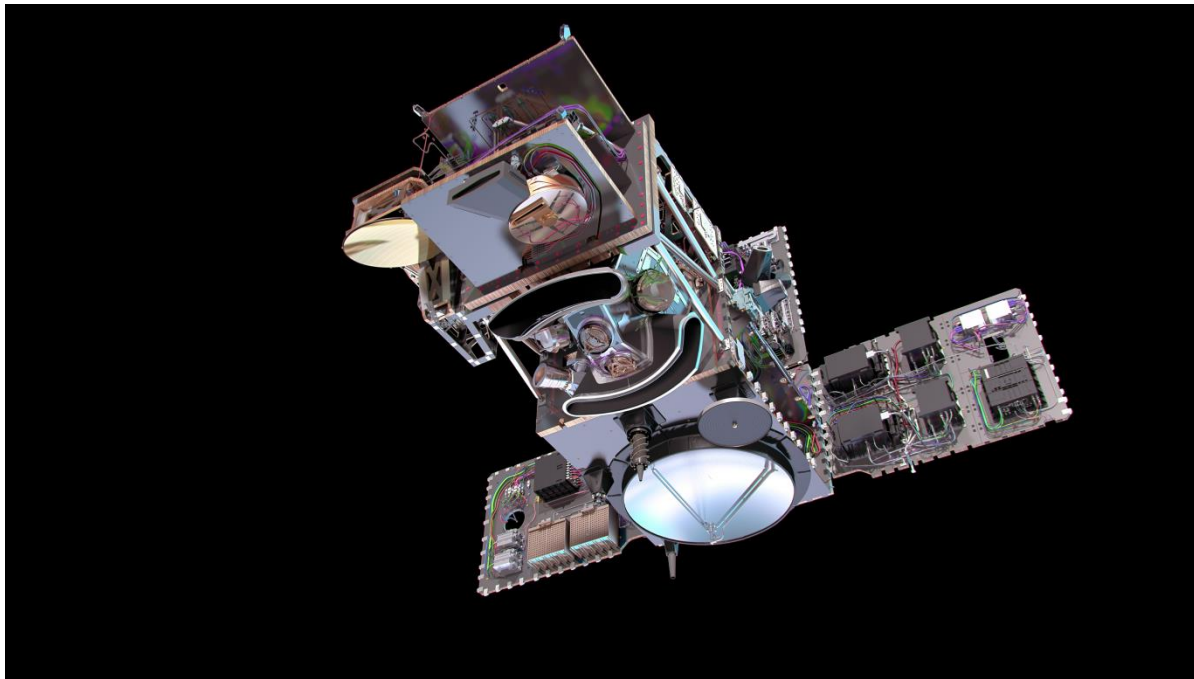
Remote Sensing Reflectance - Ratio

Rrs ratio / 560 nm



ProVal vs Satellite Comparison OLCI

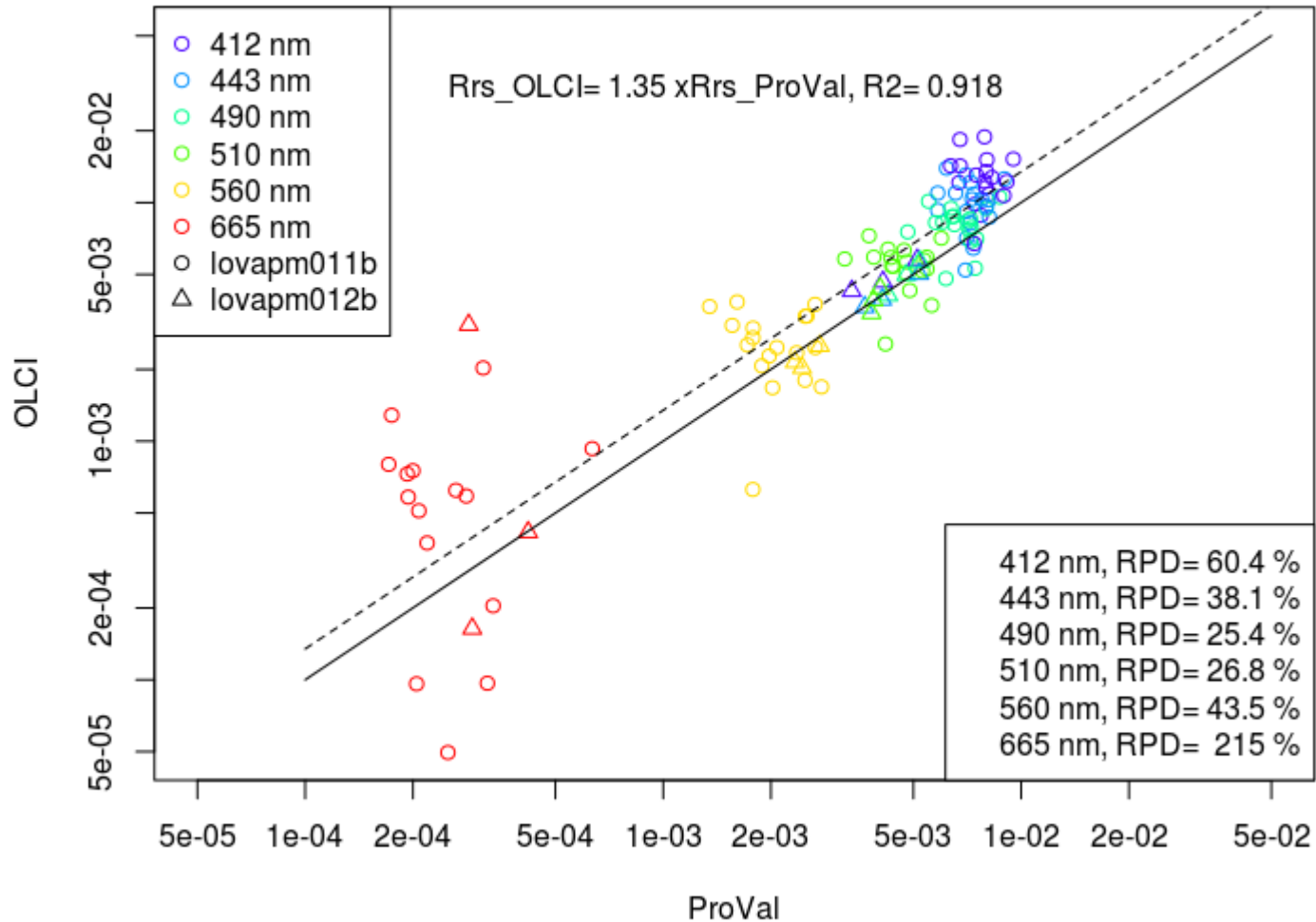
(Sentinel-3A : February 16th 2016)



ProVal vs Satellite

Rrs OLCI vs ProVal (Kerguelen 2016-2017)
N Matchup= 21

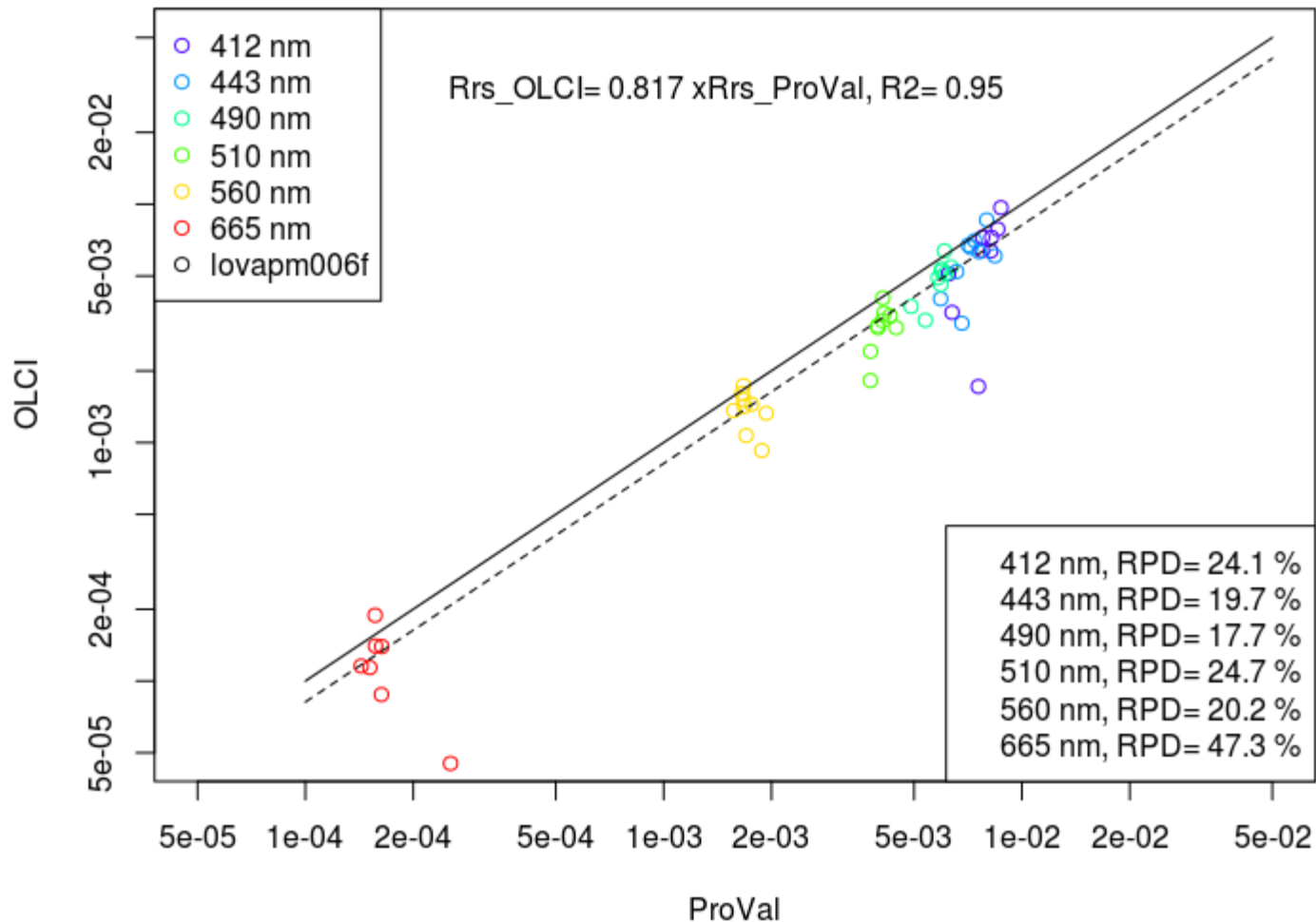
21/260 = 8 %



ProVal vs Satellite

Rrs OLCI vs ProVal (Med - Dyfamed)
N Matchup= 9

9/50 = 18 %



ProVal

- Publication “ProVal : An Argo profiler dedicated to high quality radiometric measurements” in prep.
- Data is available at the LOV (not yet from Argo)

Merci

