Journées Nationales Glider

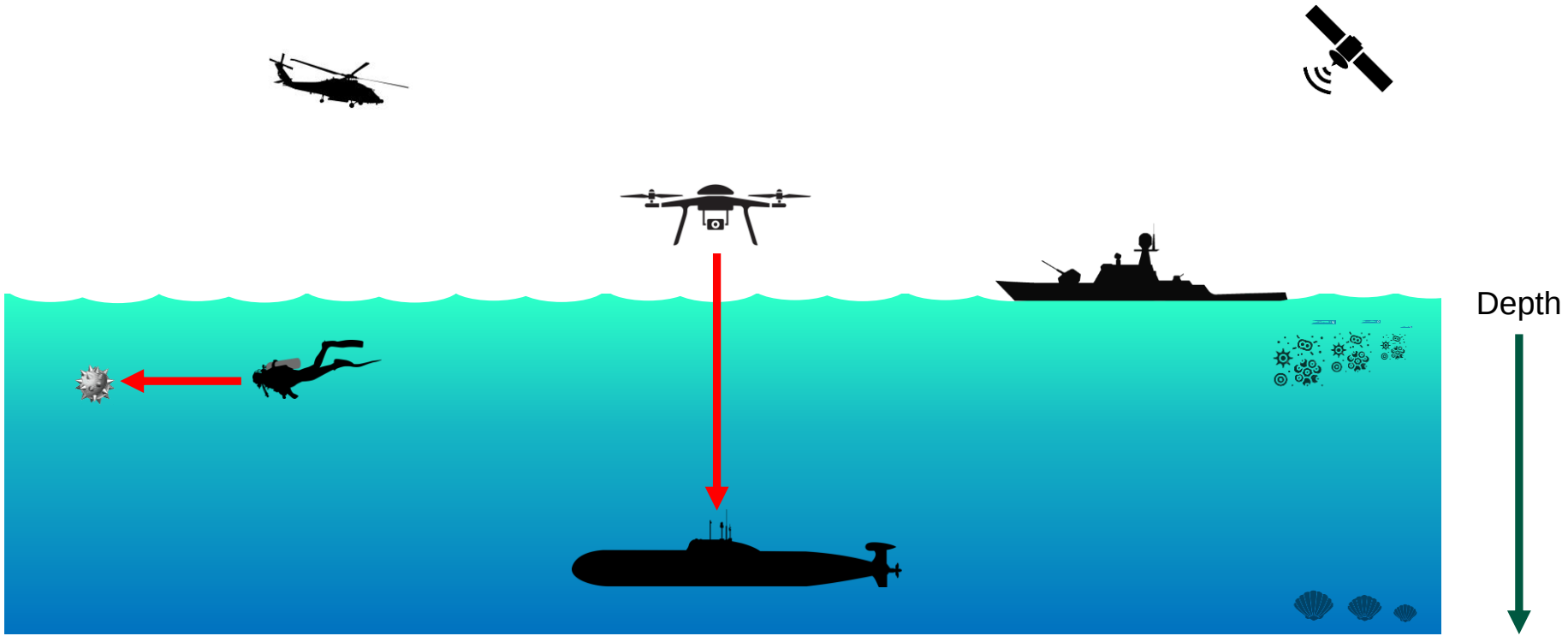
Un SEAEXPLORER mesure la transparence de l'eau

Frédéric Jourdin, Sabrina Homrani, Emma de Nodrest,
Orens Pasqueron de Fommervault, François Bourrin, Claire Bougeault

7 décembre 2023

photo F. Jourdin : février 2021 à bord de la Thalassa dans le golfe de Gascogne, en attendant la récupération du SEAEXPLORER

The aim : water transparency



The key parameter : Secchi disk disappearance depth

Remote Sensing of Environment 169 (2015) 139–149

Contents lists available at ScienceDirect

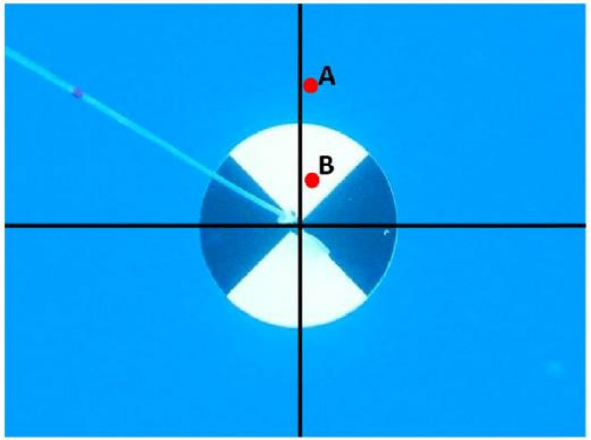
Remote Sensing of Environment

journal homepage: www.elsevier.com/locate/rse

Secchi disk depth: A new theory and mechanistic model for underwater visibility

ZhongPing Lee [a,*], Shaoling Shang [b,*], Chuanmin Hu [c], Keping Du [d], Alan Weidemann [e], Weilin Hou [e], Junfang Lin [a], Gong Lin [b]

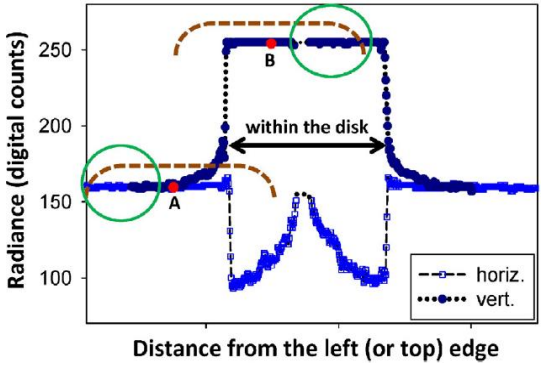
[a] School for the Environment, University of Massachusetts Boston, Boston, MA 02125, United States
[b] State Key Laboratory of Marine Environmental Science, Xiamen University, Xiamen 361005, China
[c] College of Marine Science, University of South Florida, St. Petersburg, FL 33701, United States
[d] State Key Laboratory of Remote Sensing Science, Beijing Normal University, Beijing 100875, China
[e] Naval Research Laboratory, Stennis Space Center, MS 39529, United States



Furthermore, it is found that the logarithm term on the right side of Eq. (33) is within a narrow range (2.38 ± 0.03) for such a wide range of waters, which indicates that, as a rule of thumb, Secchi disk depth in water approximates

$$Z_{SD} \sim \frac{1}{K_d^{tr}}. \quad (36)$$

Interestingly, this is similar with the penetration depth for ocean color remote sensing (Gordon & Mcluney, 1975).



K_{PAR} and the Secchi depth

Journal of *Marine Science and Engineering*

MDPI

Article

A New Algorithm to Estimate Diffuse Attenuation Coefficient from Secchi Disk Depth

Alejandra Castillo-Ramírez [1,2], Eduardo Santamaría-del-Ángel [1,*], Adriana González-Silvera [1], Robert Frouin [3], María-Teresa Sebastiá-Frasquet [4], Jing Tan [3], Jorge Lopez-Calderon [1], Laura Sánchez-Velasco [5] and Luis Enríquez-Paredes [1]

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2 Alumni PhD postgraduate program in Coastal Oceanography, Facultad de Ciencias Marinas, Universidad Autónoma de Baja California, Ensenada 22860, Baja California, Mexico
3 Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA 92037, USA; rfrouin@ucsd.edu (R.F.); jit079@ucsd.edu (J.T.)
4 Institut d'Investigació per a la Gestió Integrada de Zones Costaneres (IGIC), Universitat Politècnica de València (UPV), 46730 Grau de Gandia, Spain; mtsebastia@hma.upv.es
5 Departamento de Plancton y Ecología Marina, Instituto Politécnico Nacional, Centro Interdisciplinario de Ciencias Marinas (IPN-CICIMAR), La Paz 23096, Baja California Sur, Mexico; lsvelasc@gmail.com
* Correspondence: santamaria@uabc.edu.mx

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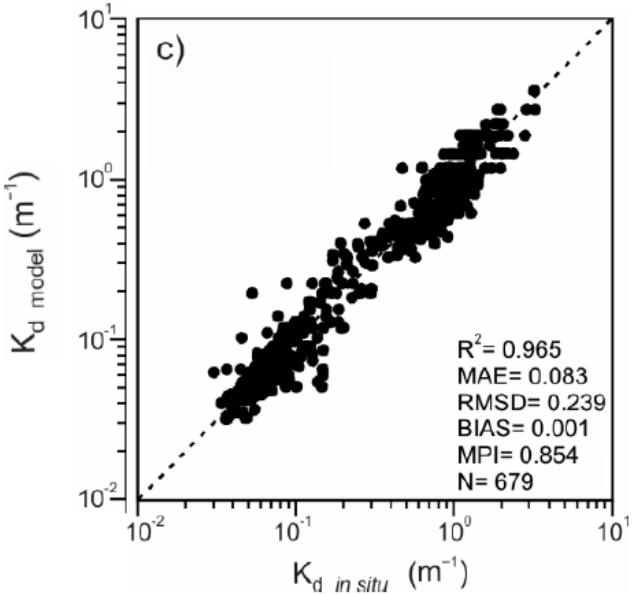
check for updates

$$Z_{SD} \approx 0.5 \cdot K_{PAR}^{-1.4}$$

$$Z_{SD} \geq 5.37 \text{ m}$$



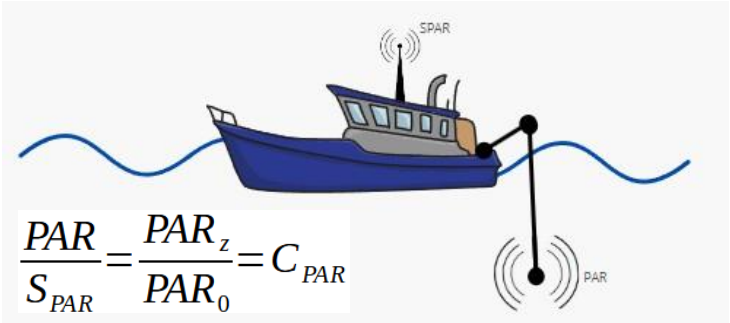
The MELANGE-ROEC survey

Glider PAR profiles

Seabird
OCR-504

Irradiance PAR, 380, 490, 532 nm profiles onboard the glider SEAEXPLORER

Ship CPAR profiles

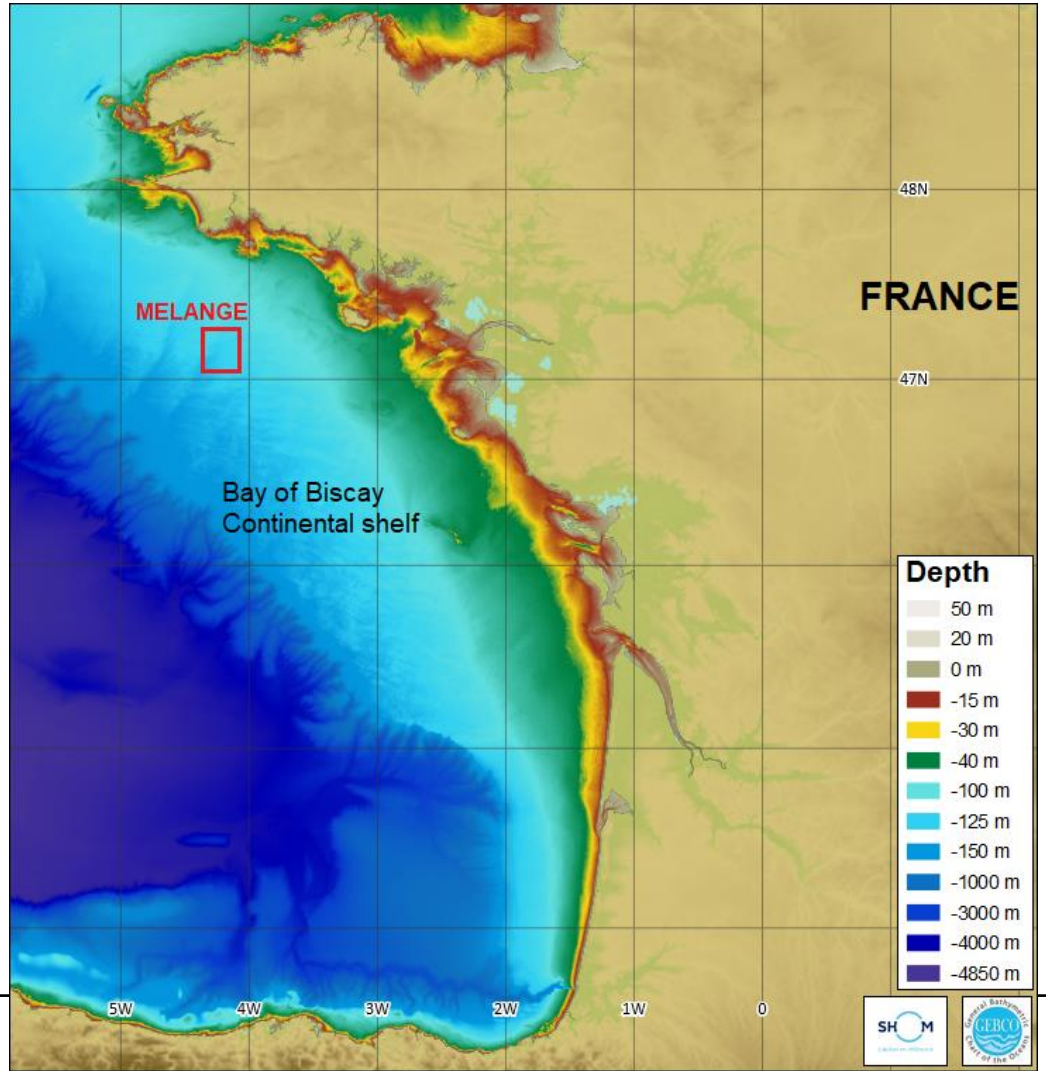


Irradiance PAR and SPAR profiles onboard the NRV La Thalassa

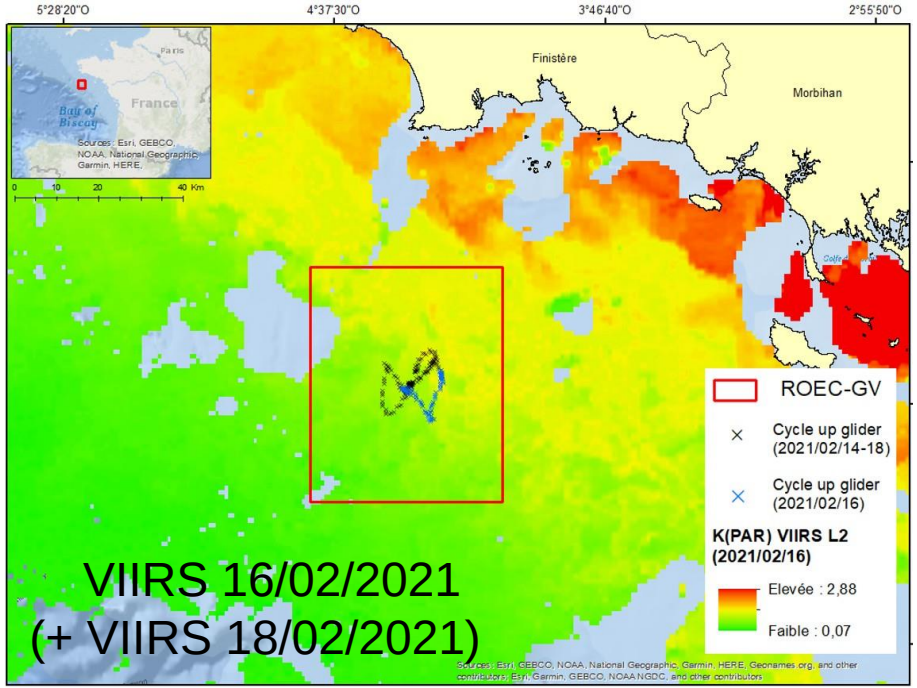
MELANGE-ROEC

Bay of Biscay

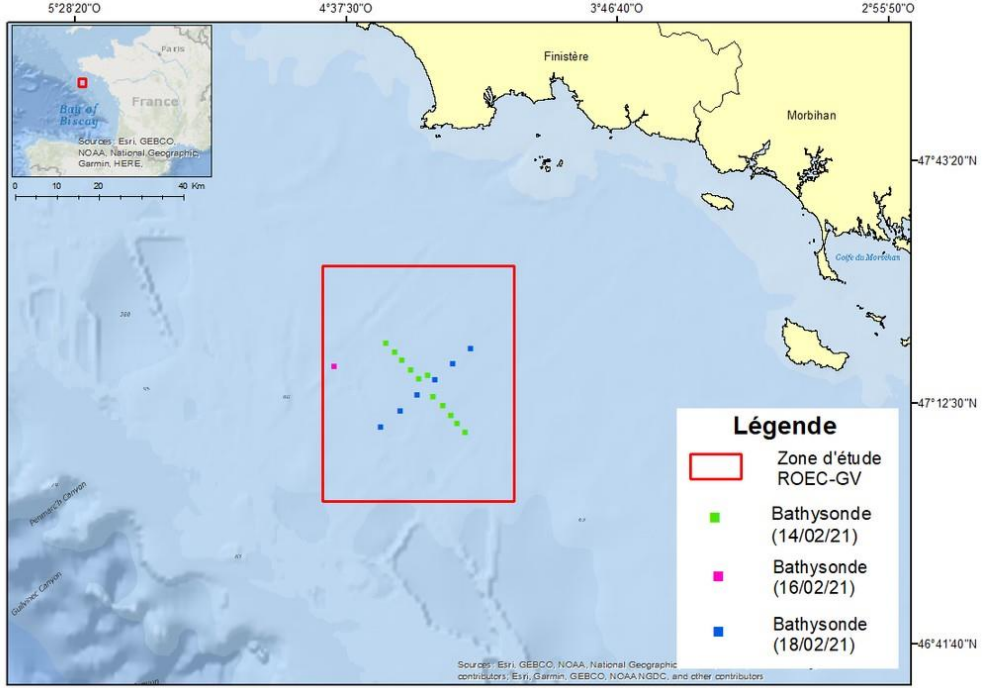
February 13-19, 2021



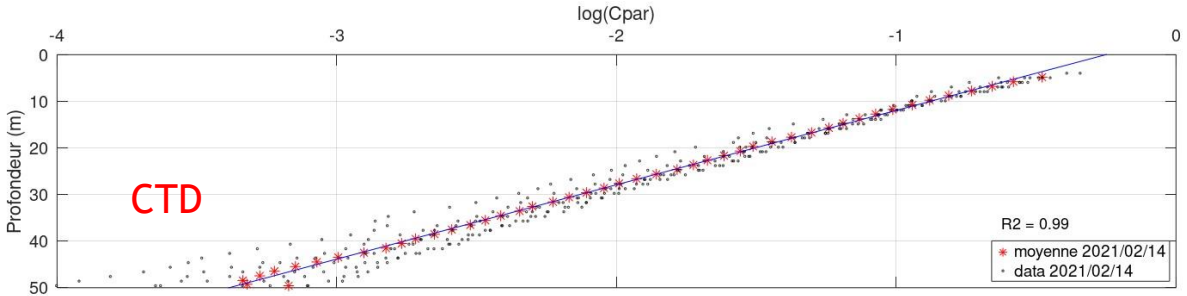
MELANGE-ROEC survey (February 13-19, 2021)

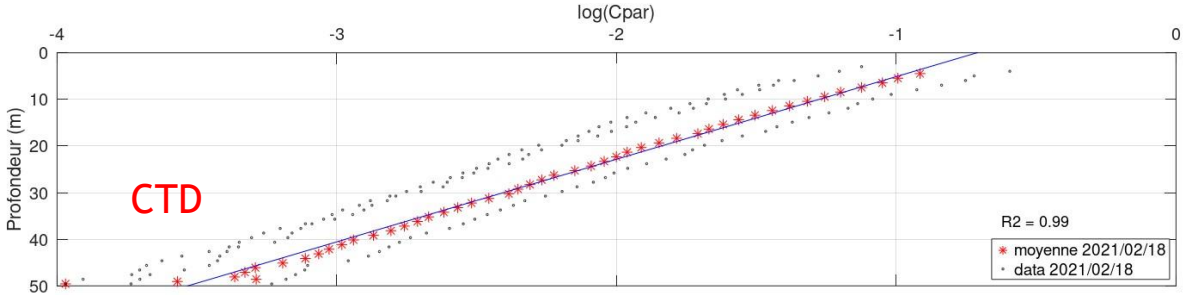


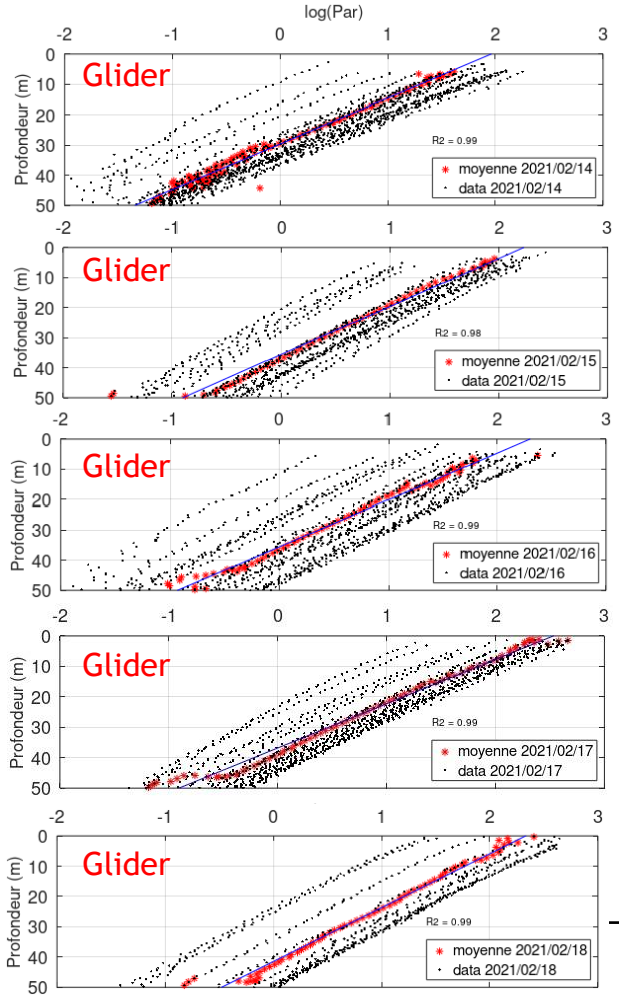
VIIRS 16/02/2021
(+ VIIRS 18/02/2021)



Glider versus CTD casts







Mean relative error = **11 %**

14 February = **13 %**

18 February = **8 %**

Emma de Nodrest, 2022, MSc internship

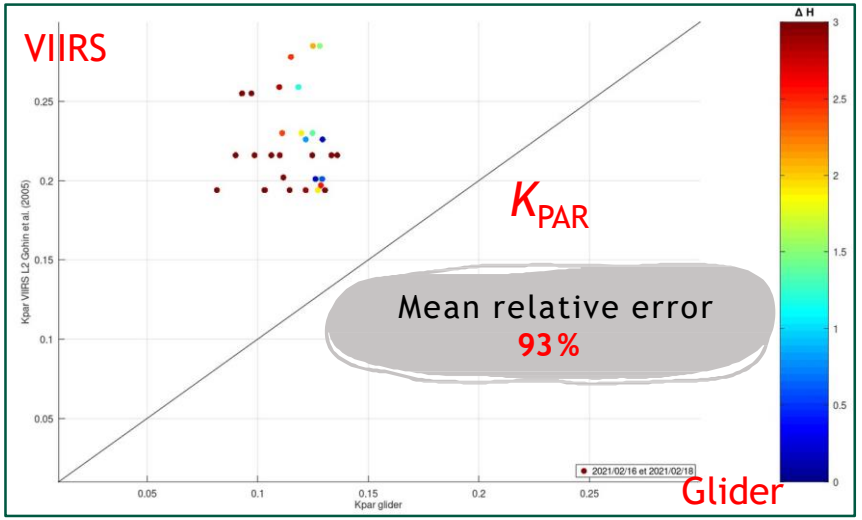
Matchups MELANGE-ROEC

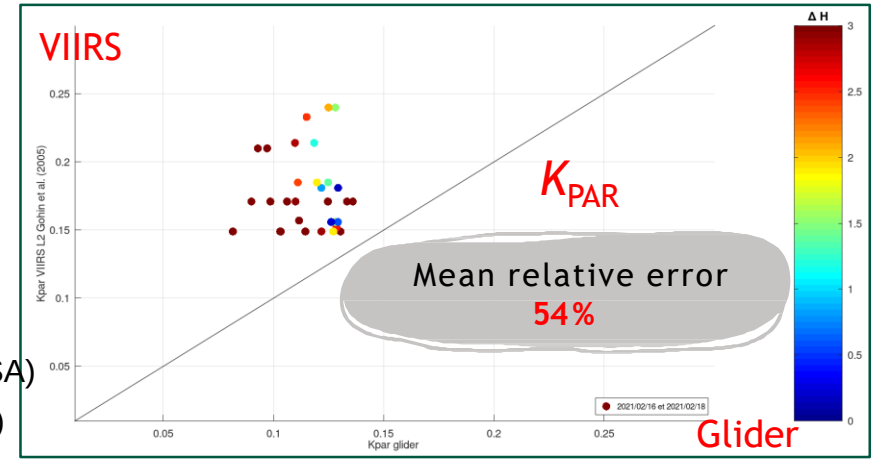
Updating Gohin et al. (2005) for clear waters

$$K_{PAR} = 0.06 + 0.05 \times [SPIM] + 0.05 \times [Chla]^{0.75}$$

$$K_{PAR} = 0.015 + 0.05 [SPIM] + 0.05 [Chla]^{0.75}$$

Mason et al. (2016)





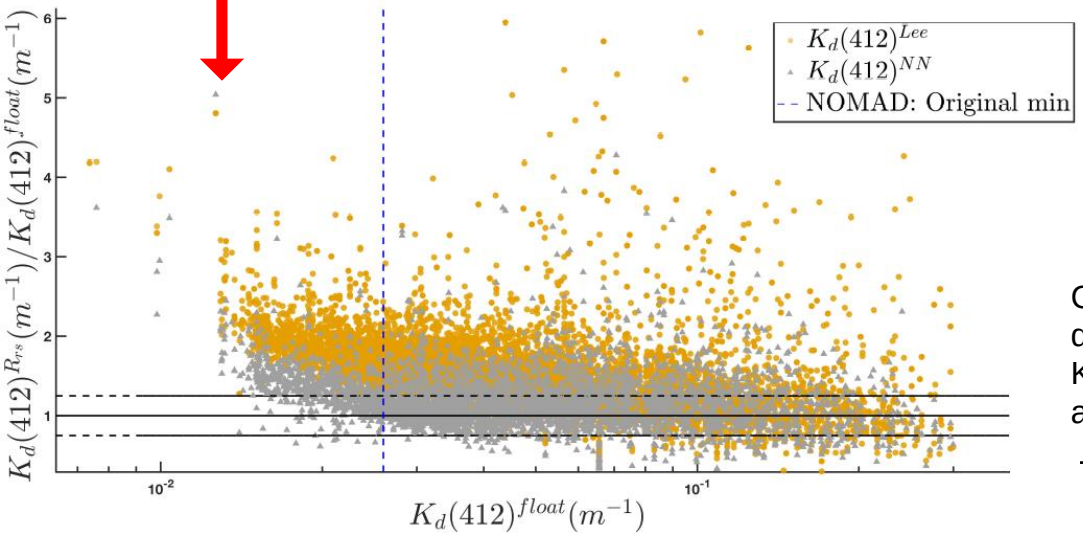
De Nodrest et al 2022, *Proceedings OCEANS* Hampton Roads (USA)

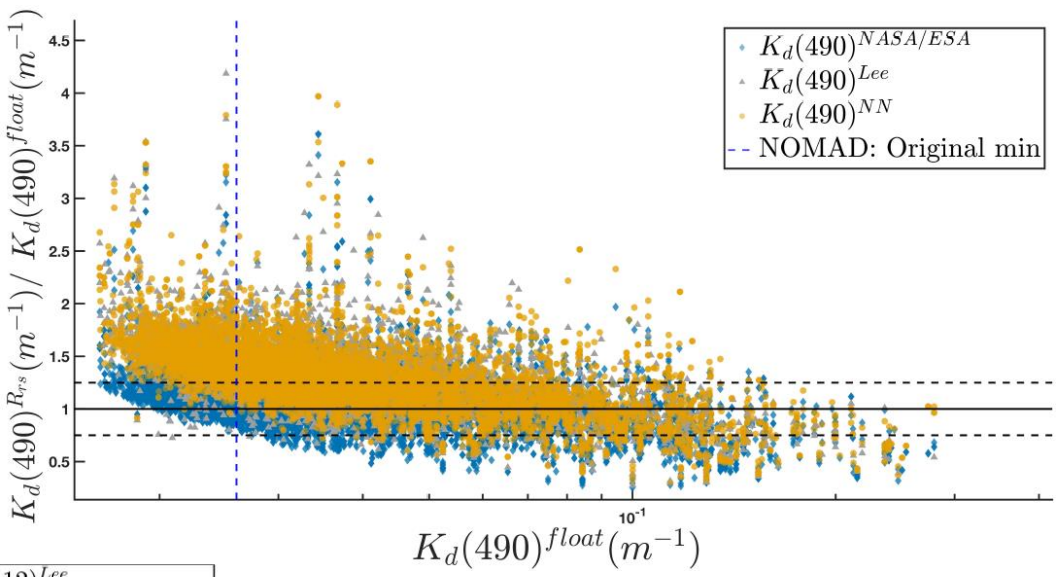
Homrani et al 2022, *Poster+video OCEANS* Hampton Roads (USA)

Begouen Demeaux and Boss,
Remote Sensing,
September 2022.

=> Using BGC-Argo floats

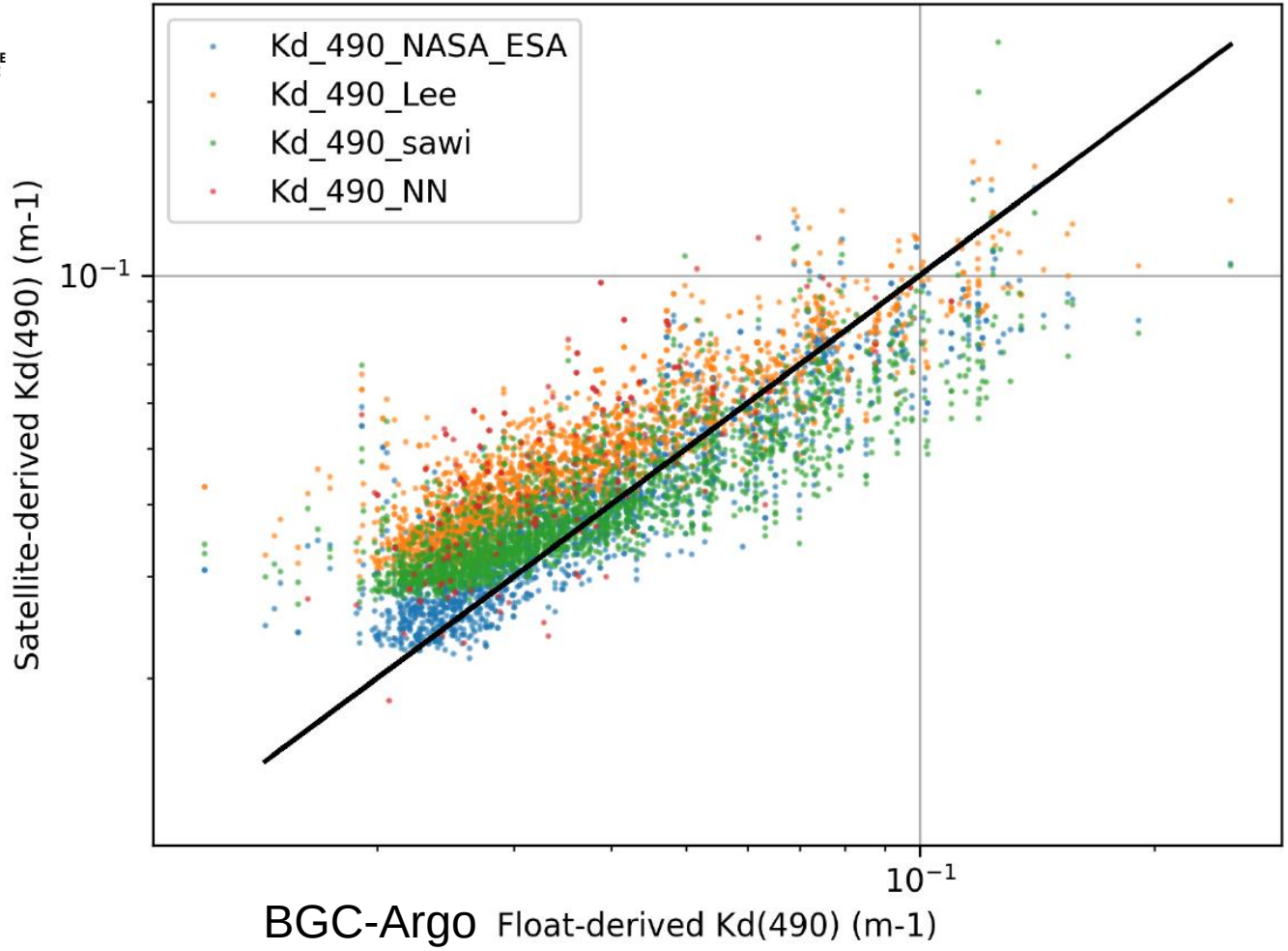
80m versus 40m Secchi!





Comparison of satellite-derived and float-derived Kd(490) for the MODIS-Aqua, MODISTerra, VIIRS-JPSS, VIIRS-SNPP, OLCI-S3A and OLCI-S3B sensors

Comparison of satellite-derived and float-derived Kd(412) for the two MODIS and the two OLCI sensors



Appli Secchisat©

WEMSWOT survey onboard NRV Atalante

Gulf of Lion
Balearic Sea

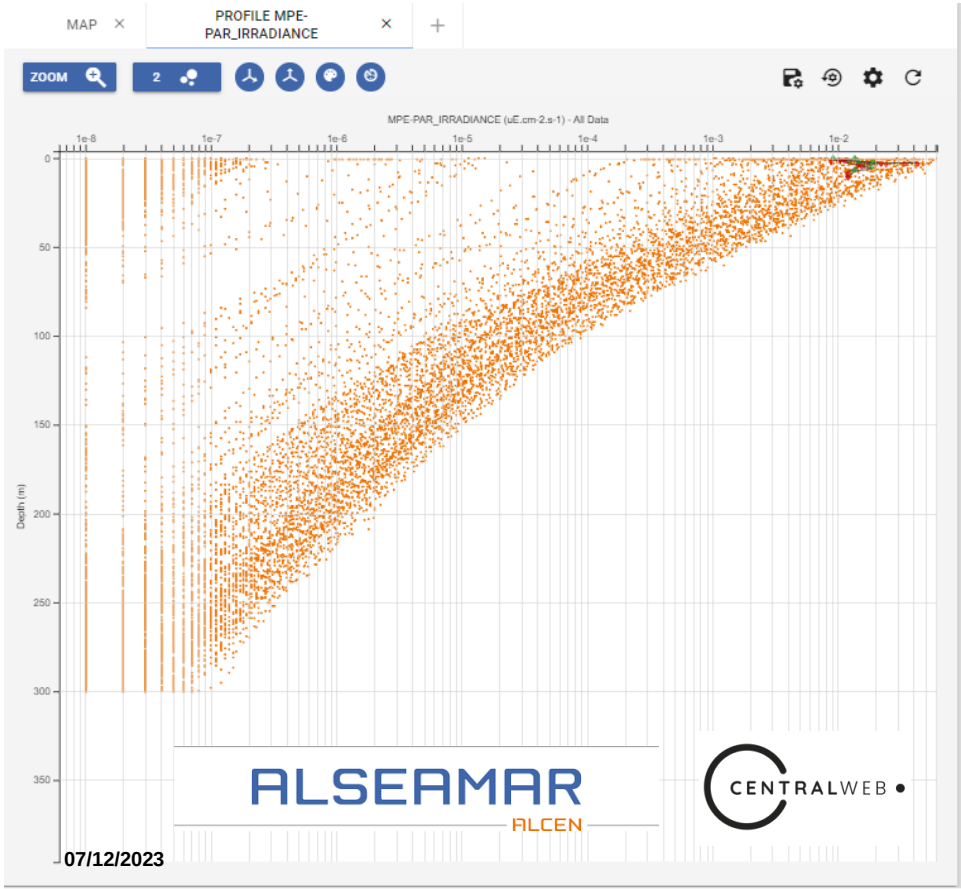
April 5-12, 2023

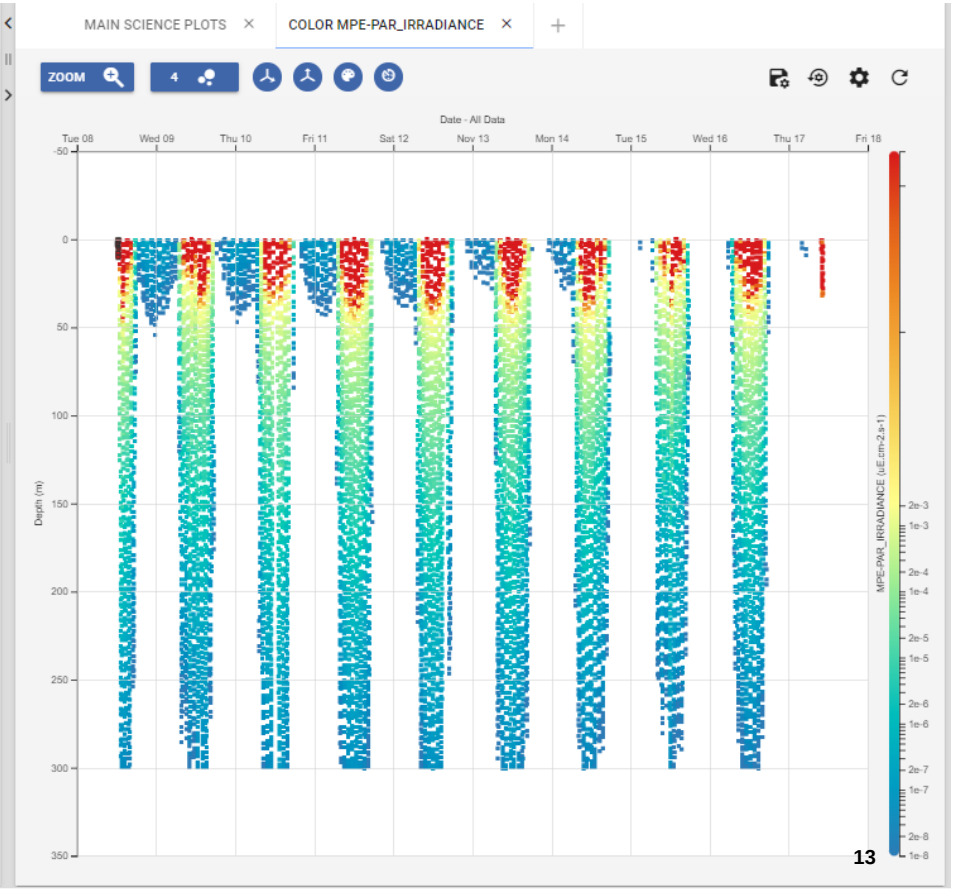
Biospherical MPE-PAR
>10 orders of magnitude

ALSEAMAR
ALCEN

DGA

Tests in February 2023 (MED) during WEMSWOT



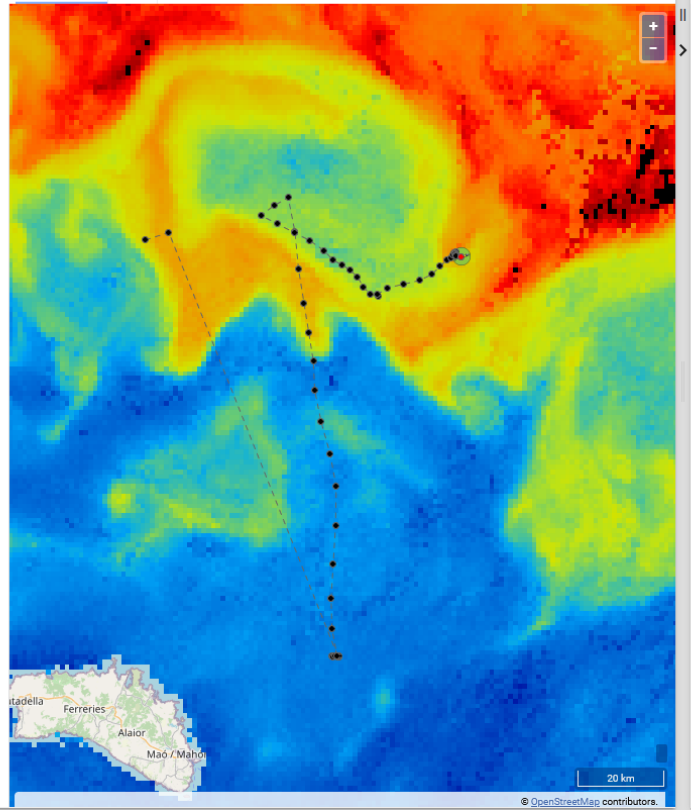


GLIMPSE ALSEAMAR — ALSEAMAR ALCEN — 15:17:34 UTC — Jourdin Frederic

SEA087_M040 — BACK TO MAP

Glider Status	Mission start date	Mission end date	Mission duration	Distance traveled [km]	Last Connection	Last Cycle	Last Position	Last Battery Level [V]
Disconnected	05/04/2023	12/04/2023	7.0 Days	284.57 km	12/04/2023 13:28	76	40° 55' 12" N 5° 02' 17" E	28.4

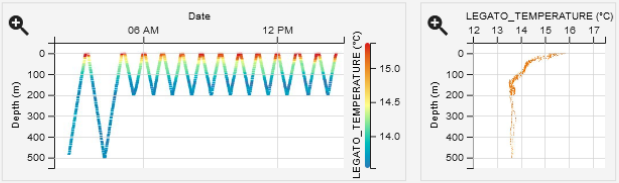
MAP



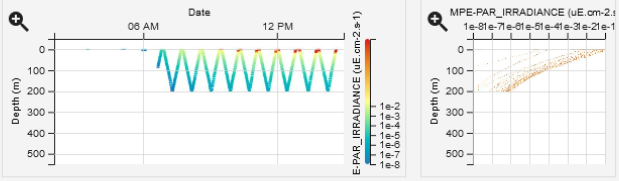
MAIN SCIENCE PLOTS

LAST 12 HOURS | LAST 24 HOURS | ALL DATA

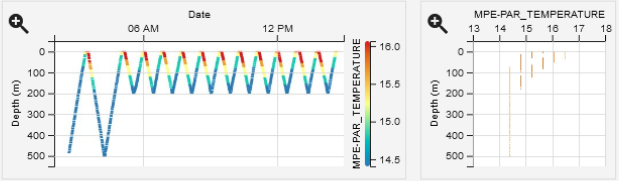
LEGATO_TEMPERATURE



MPE-PAR_IRRADIANCE



MPE-PAR_TEMPERATURE



PAR_SURFACE

SEA087_M040

MRS

Cycle	Battery [V]	Date	Latitude	Longitude
76	28.4	12/04/2023 13:28:49 UTC	40° 55' 12" N	5° 02' 17" E

NAV

Heading [°]	Zb [m]	Zt [m]	Altitude [m]	Pu [mm]	Pd [mm]	Bu [ml]	Bd [ml]	Rate
302	200	2	30	1017	-1017	1015	-1015	1

COMPUTED

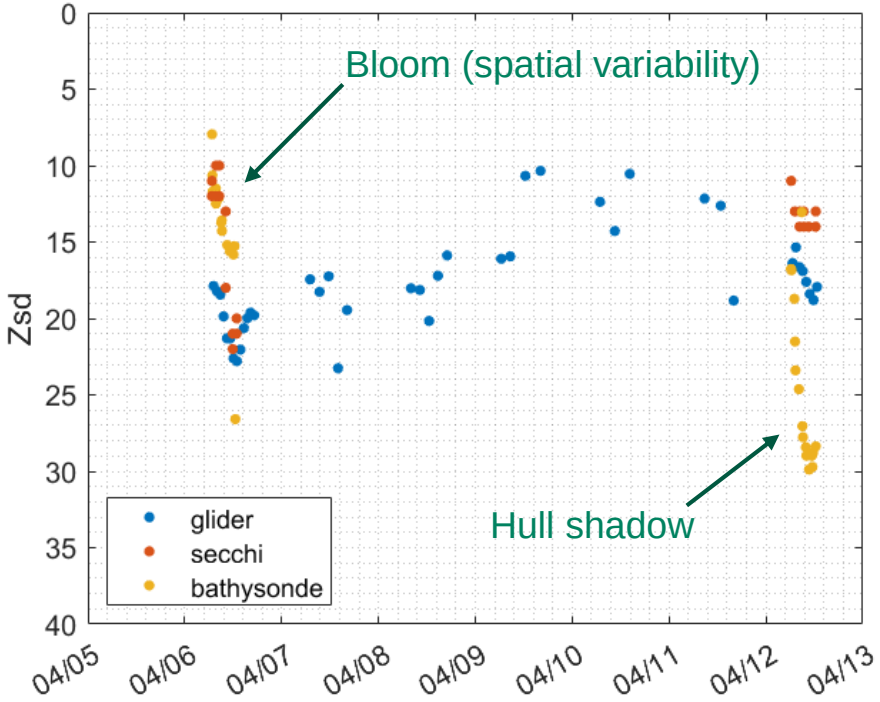
Distance [m]	Flight Time [h:m]	COG [°]	SOG [m/s]	Drift [°]	Mission Duration
-	-	-	-	-	7.0 Days

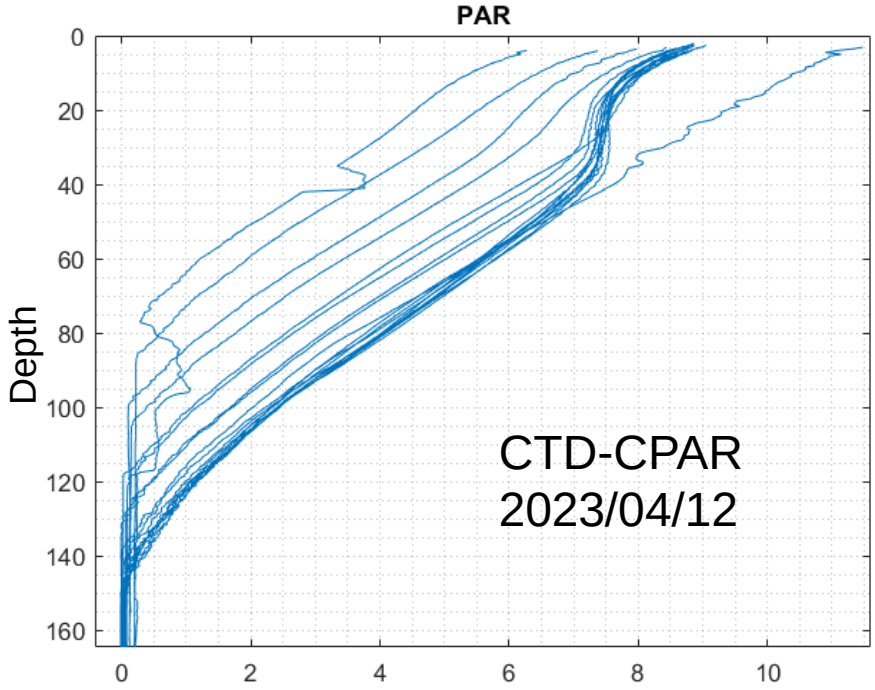
Show more Nmea +

12/04/2023 13:28

WEMSWOT survey April, 2023

WEMSWOT survey (April, 2023)





ALSEAMAR
ALCEN

Achat de gliders

Financement : Projet CPER ObsOcéan (Région Bretagne)

Financement pour l'acquisition de matériels dans le cadre du projet CPER ObsOcéan dont l'objectif est le maintien et le renforcement du rôle de la région Bretagne et de ses partenaires dans l'observation in situ de l'océan global, surface-fond, du large à la côte, de la large échelle à la haute résolution via une consolidation des observations et des systèmes d'observations de l'océan coordonnés en Bretagne (ROEC-ILICO).

ROEC : Réseau d'Observation pour l'Environnement Côtier

ILICO : l'Infrastructure de Recherche Littorale et Côtière

Achat de gliders

Marché public

- Achat de 2 gliders
- Achat de différents capteurs
- Prestation pilotage
- Maintenance et formation

→ Titulaire : ALSEAMAR

Achat de gliders

Capteurs du glider océano

- CTD pompée GPCTD + O2 SBE43F
- ADCP Nortek AD2CP
- Triplet CDOM, Chloro A et Backscattering WETLabs FLBBCD
- PAR Biospherical MPE-PAR

Achat de gliders

Capteurs du glider acoustique

- CTD non-pompée RBR Legato
- Antenne acoustique passive AGLIMMS

Achat de gliders

Livraison

Premier trimestre 2024

Recette

Deuxième trimestre 2024

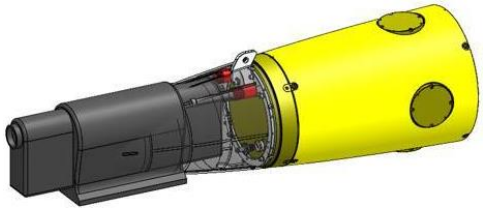
Campagne

Troisième trimestre 2024

De la transparence… à la bioluminescence…

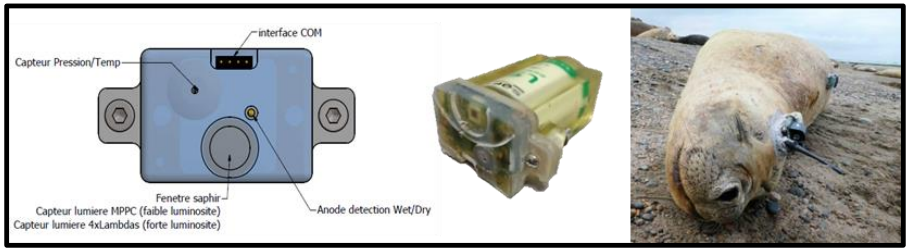
ANR BIOLUMOPS 2024-2026
Séverine Martini

Seabird UBAT



nose of SEAEXPLORER

+ CEMSOR2

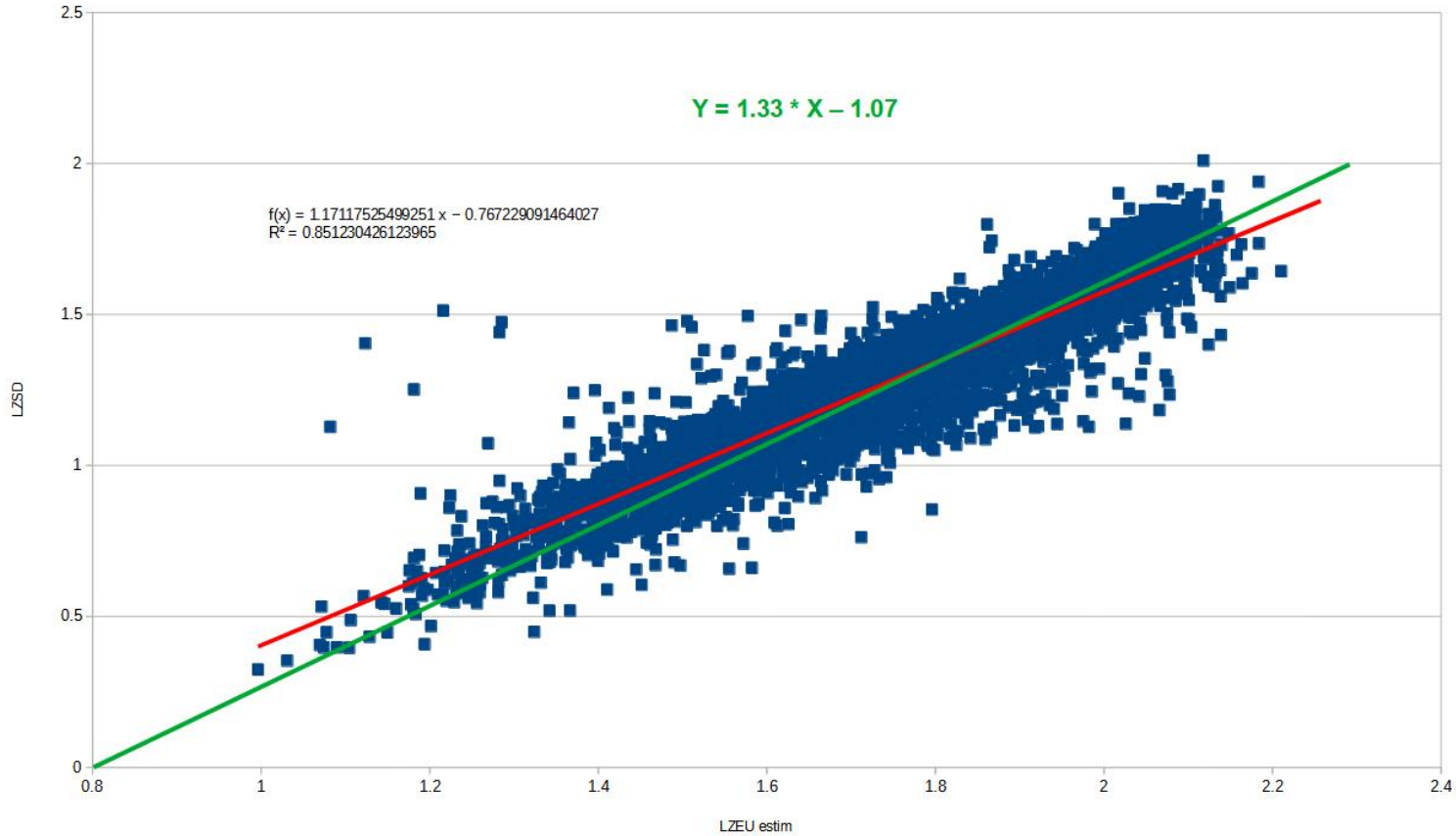


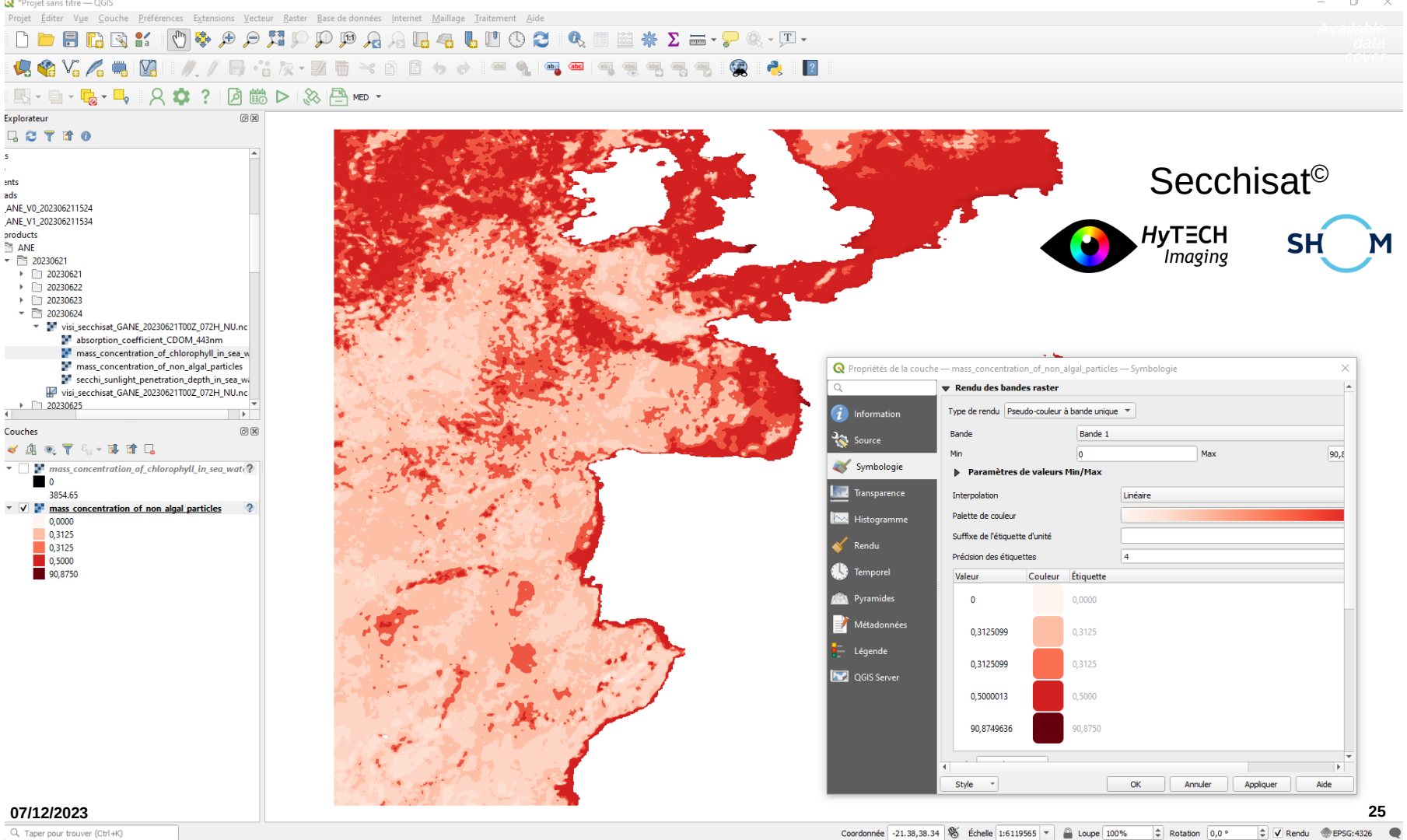
RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

SHOM
300 ans d'hydrographie

MERCI !

Backup slides


Y = 1.33 * X – 1.07
f(x) = 1.17117525499251 x − 0.767229091464027
R² = 0.851230426123965
LZSD
LZEU estim
2.5
2
1.5
1
0.5
0
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4


Projet Éditer Vue Couche Préférences Extensions Vecteur Raster Base de données Internet Maillage Traitement Aide
Explorateur
ANE_V0_202306211524
ANE_V1_202306211534
products
ANE
20230621
20230621
20230622
20230623
20230624
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mass_concentration_of_non_algal_particles
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20230625
Couches
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mass_concentration_of non algal particles
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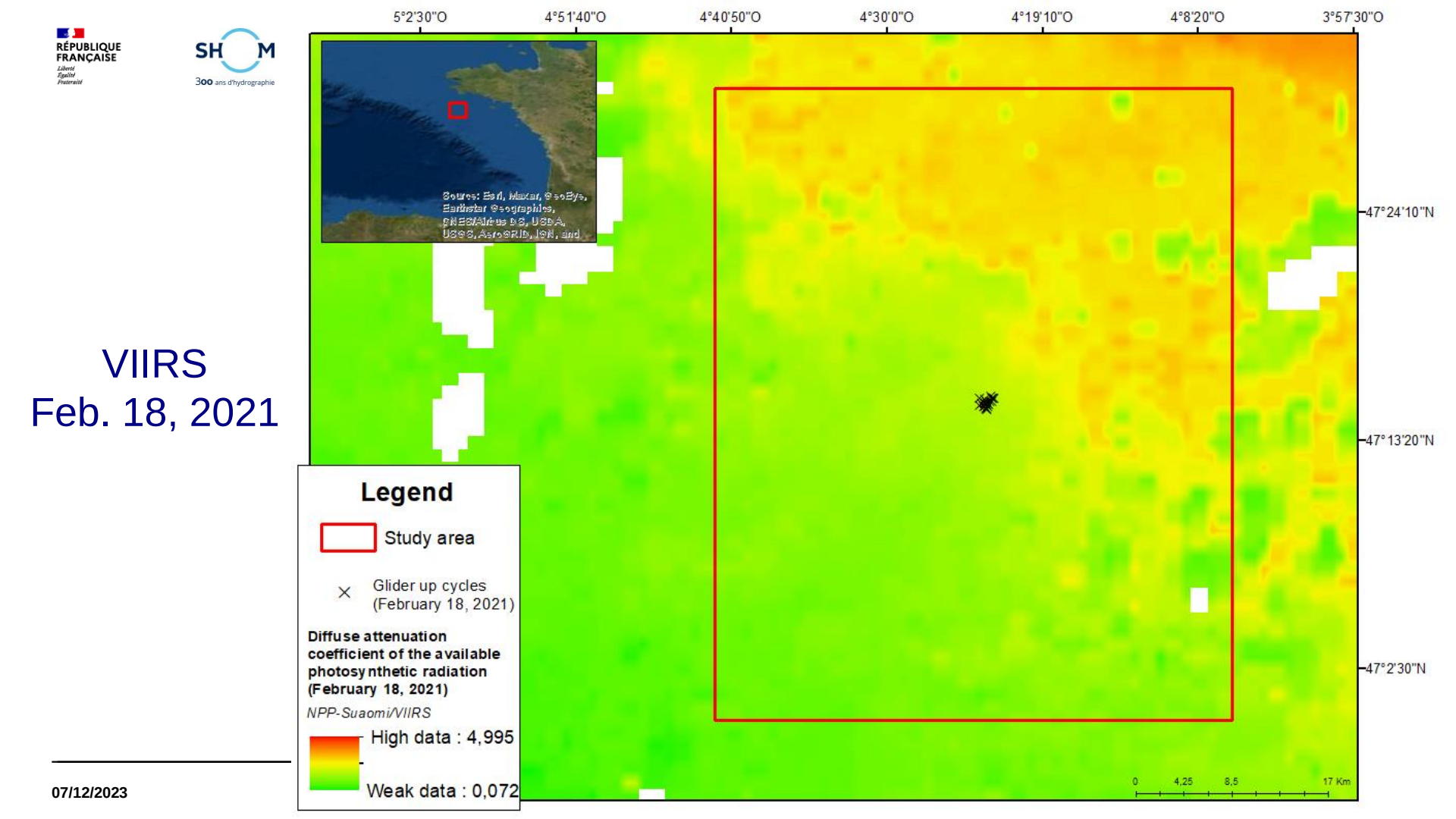
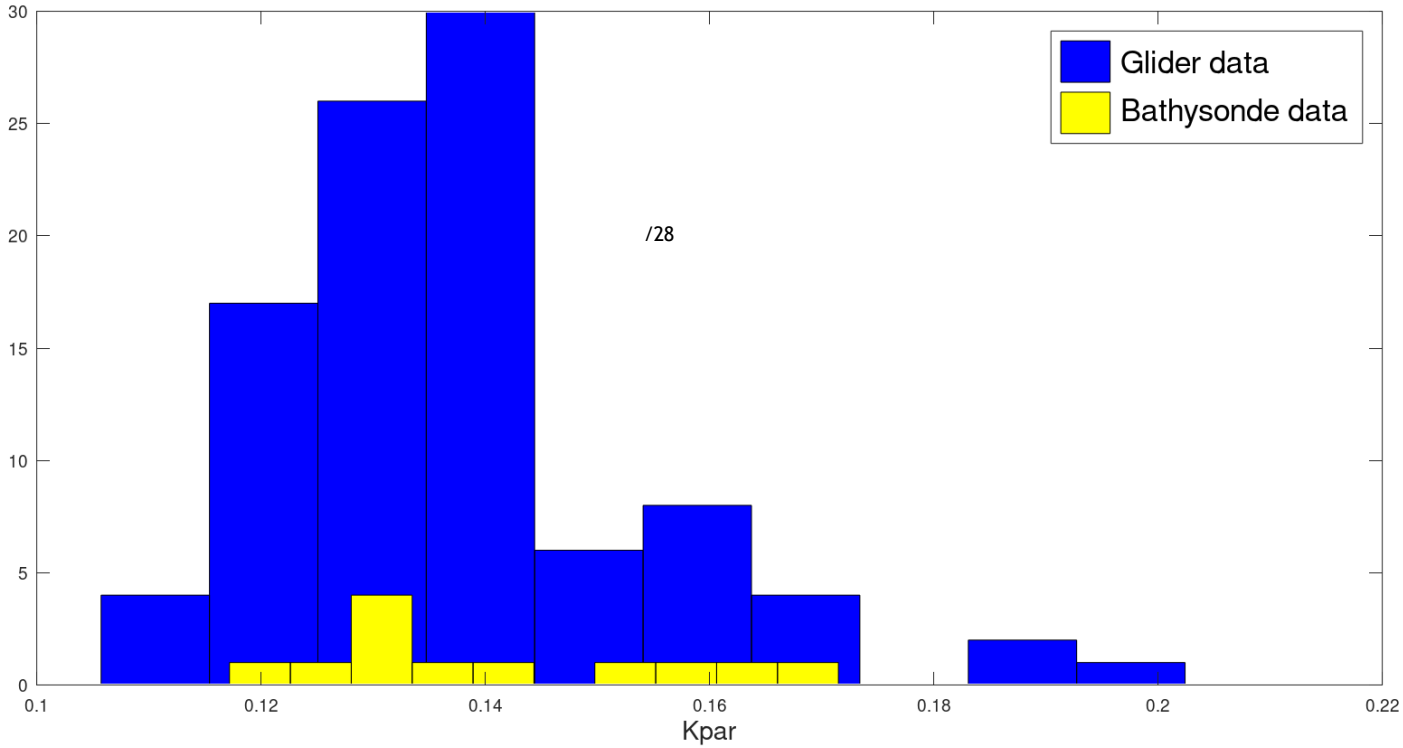
0,3125
0,3125
0,5000
90,8750
Secchisat©
HyTECH Imaging
SHOM
Propriétés de la couche — mass_concentration_of_non_algal_particles — Symbologie
Information
Source
Symbologie
Transparence
Histogramme
Rendu
Temporel
Pyramides
Métadonnées
Légende
QGIS Server
Rendu des bandes raster
Type de rendu Pseudo-couleur à bande unique
Bande Bande 1
Min 0
Max
Paramètres de valeurs Min/Max
Interpolation Linéaire
Palette de couleur
Suffixe de l'étiquette d'unité
Précision des étiquettes 4
Valeur Couleur Étiquette
0 0,0000
0,3125099 0,3125
0,3125099 0,3125
0,5000013 0,5000
90,8749636 90,8750
Style
OK
Annuler
Appliquer
Aide
Taper pour trouver (Ctrl+K)
Coordonnée -21.38,38.34
Échelle 1:6119565
Loupe 100%
Rotation 0,0 °
Rendu
EPSG:4326



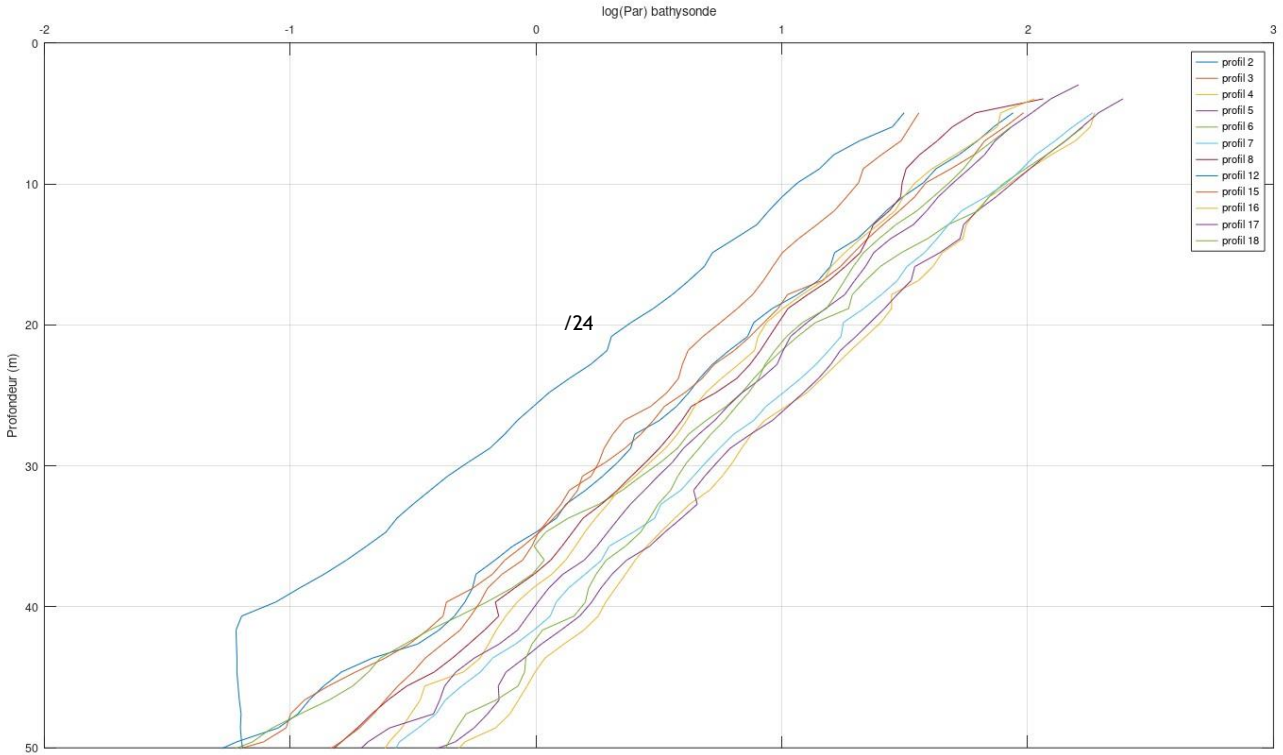
VIIRS
Feb. 18, 2021

- Histogramme de la répartition des données

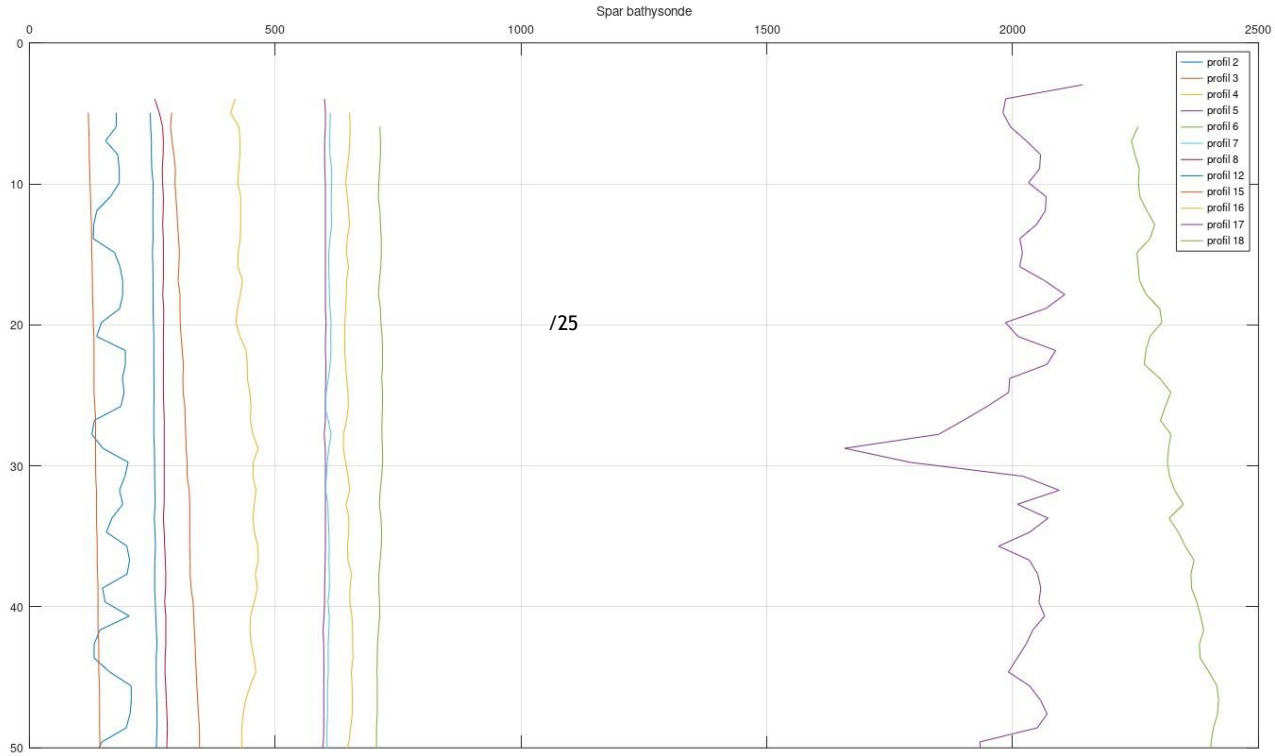
bathysonde : 0,14 ± 0,02 m-1
glider : 0,12 ± 0,02 m-1



- Les profils de log(PAR) de la bathysonde



- Les profils de SPAR de la bathysonde



/25