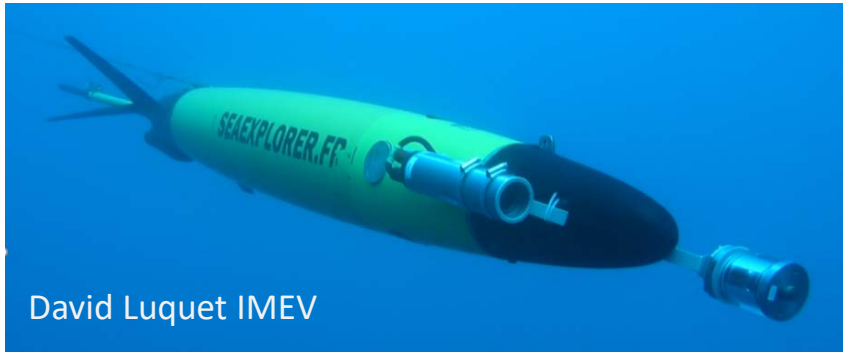
European Glider Data Management Workshop

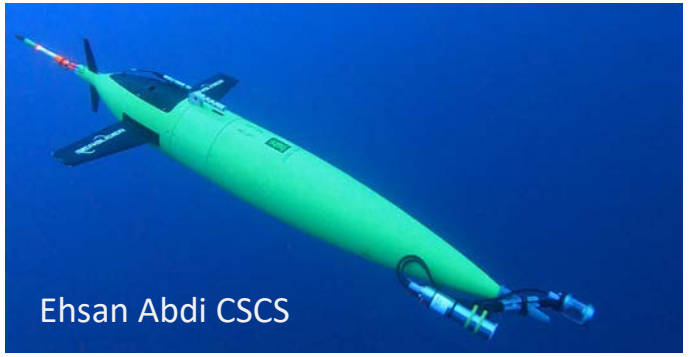
Introduction to the Underwater Vision Profiler (UVP) for gliders

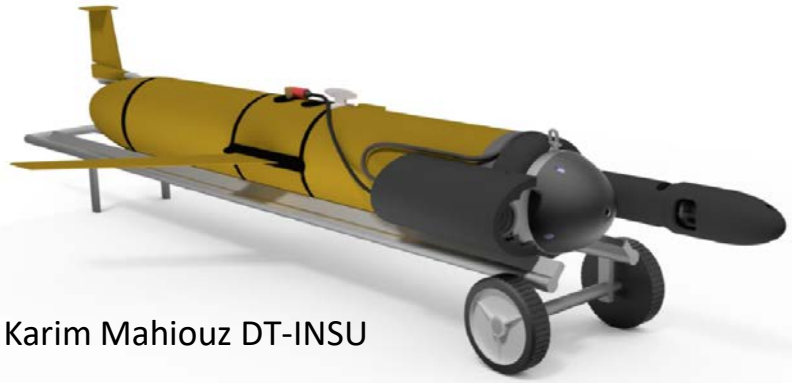
2022/07/07

Marc Picheral - Camille Catalano



David Luquet IMEV


Ehsan Abdi CSCS


Karim Mahiouz DT-INSU

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- A Particle **COUNTER** (> 100µm)
- An **IMAGING DEVICE** for Plankton and Particles (> 650 µm)

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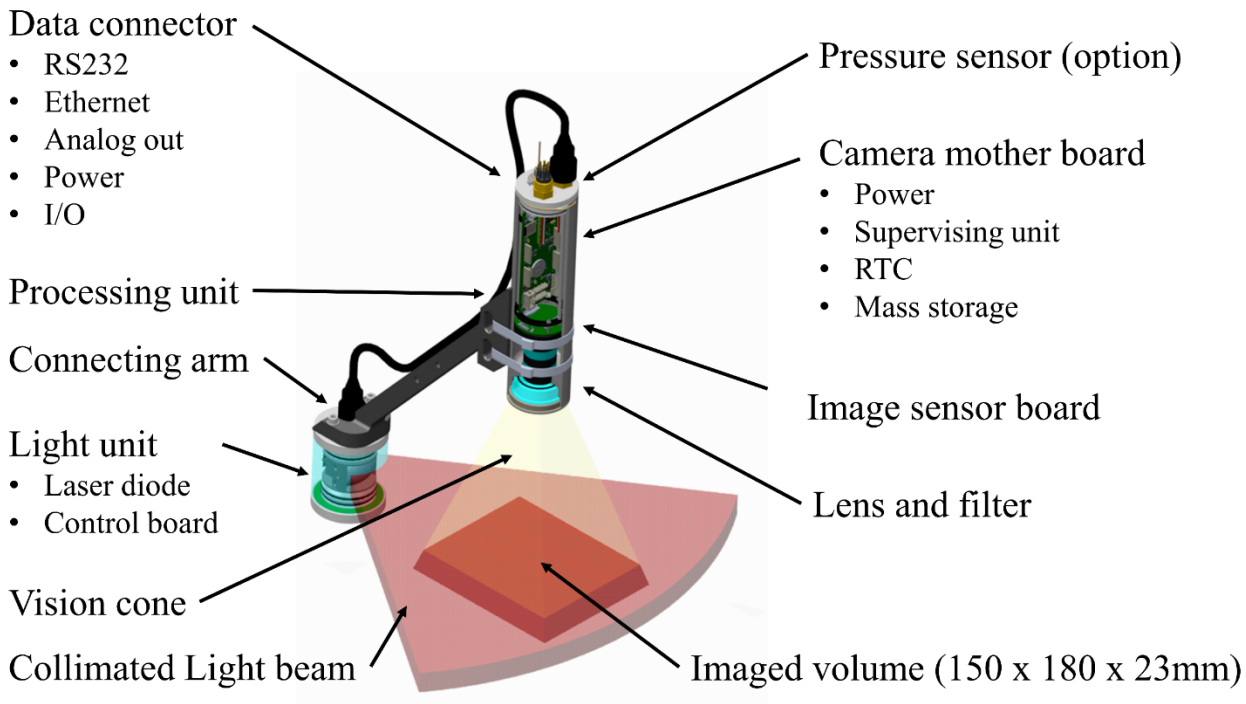
- LOW POWER : 0.02 - 0.8 W
- DEPTH RATED : 6000m
- LIGHT : 1.6 Kg in water
- Very versatile
- **EMBEDDED CLASSIFICATION**



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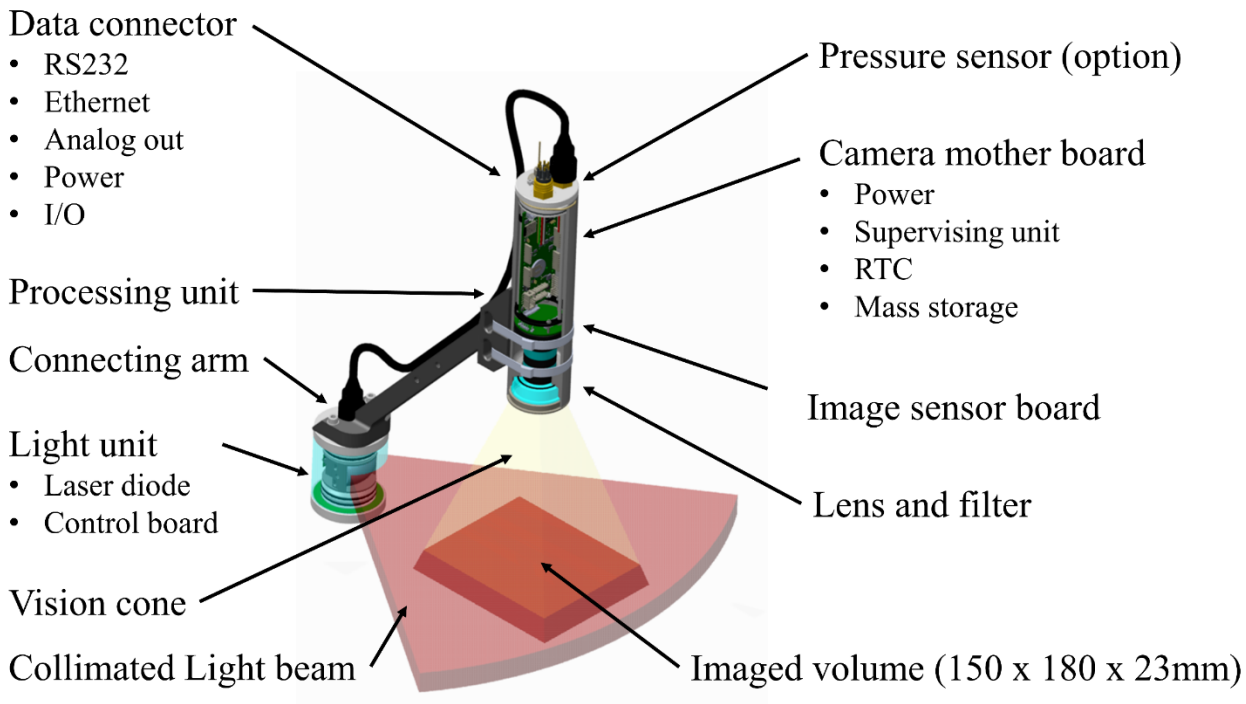
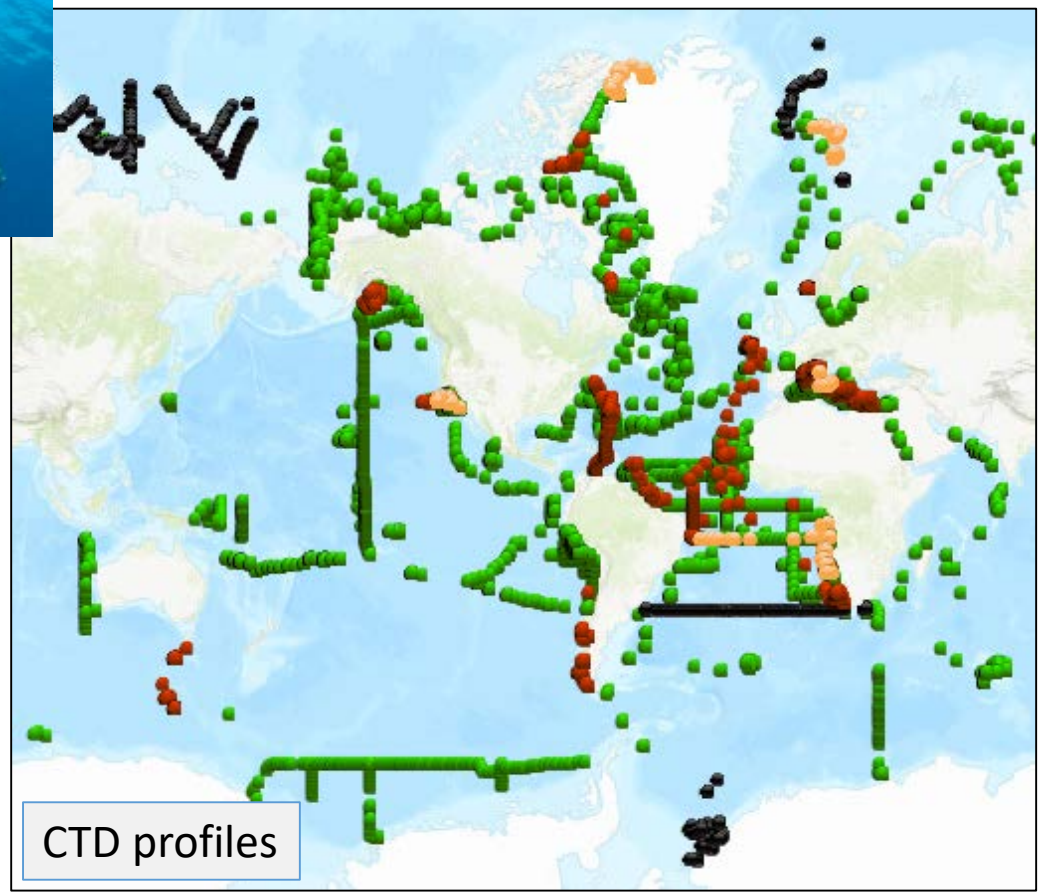


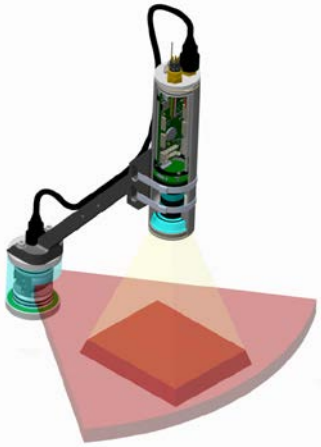
The UVP are utilized for :

- **Plankton Ecology (EOVs)**
- **Carbon pump study**

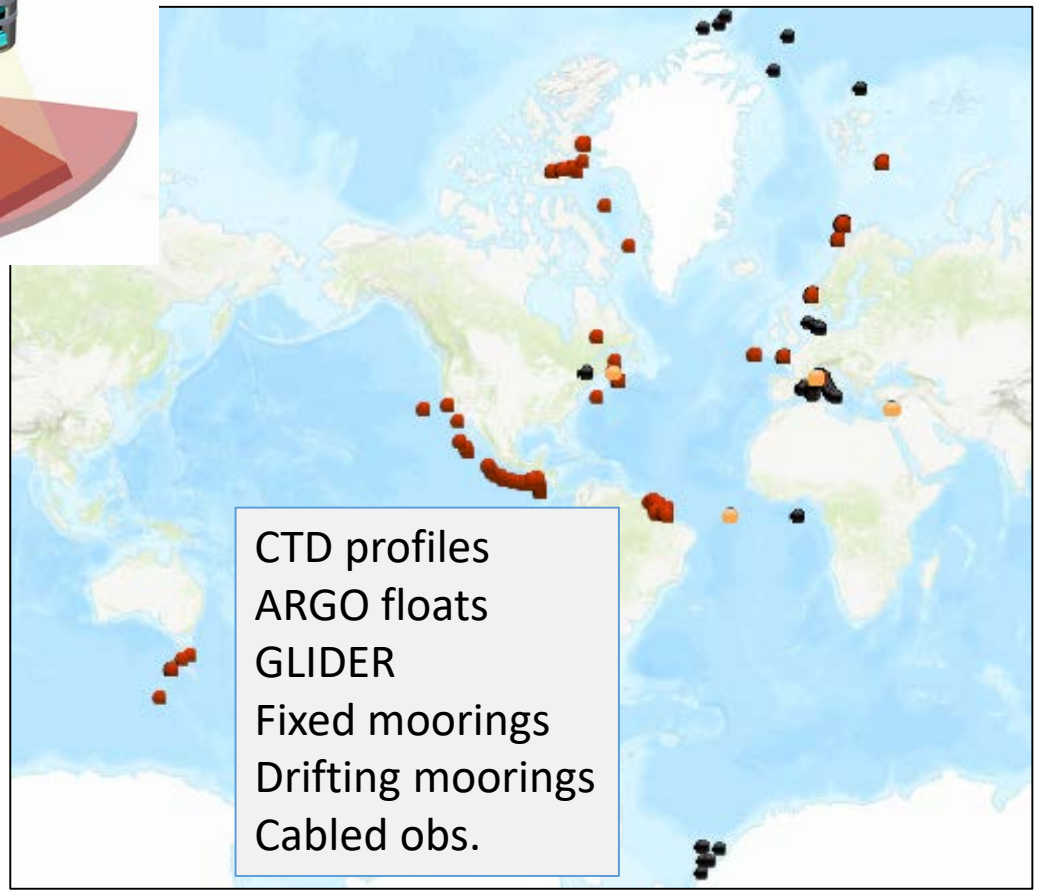
UVP5 (2008)



12810 UVP profiles or time series since 2008



UVP6 (2018)



6365 UVP6 profiles or time series since 2018

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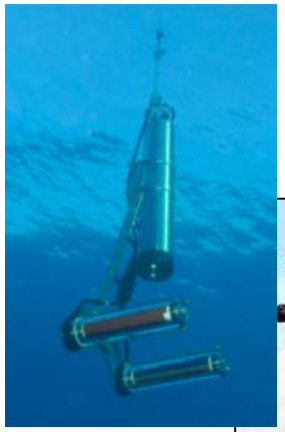

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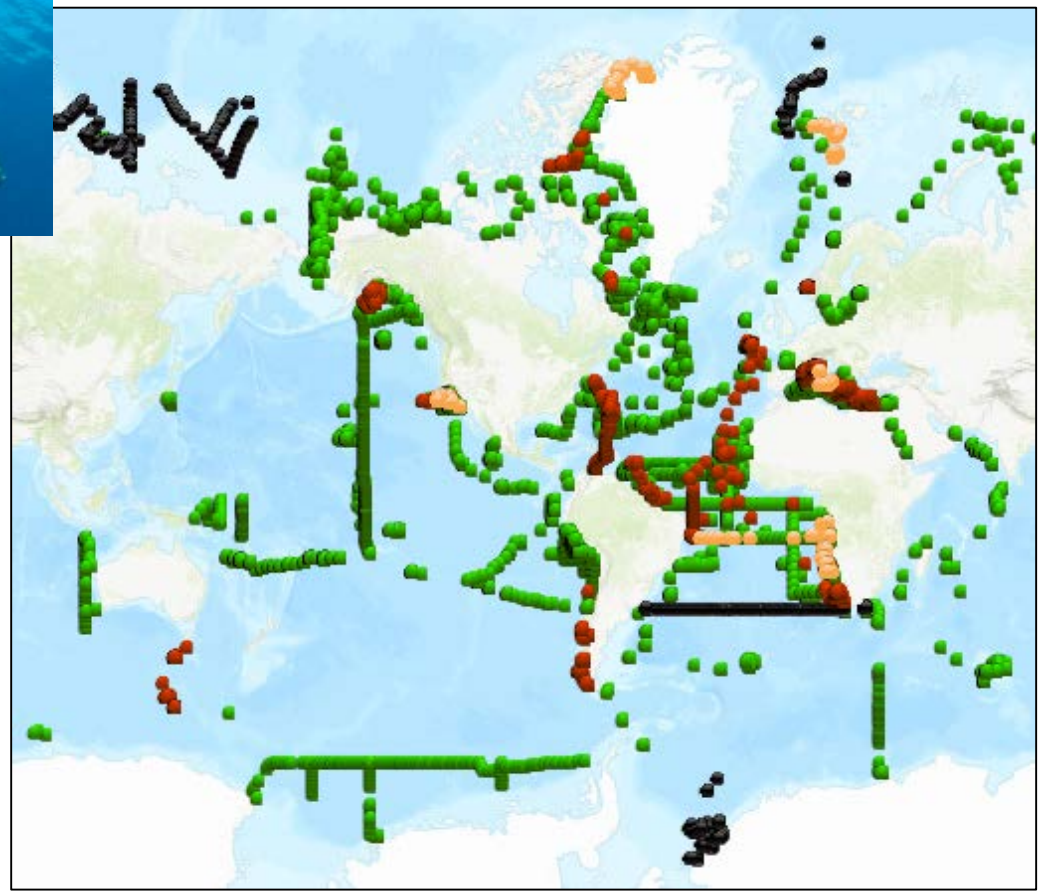

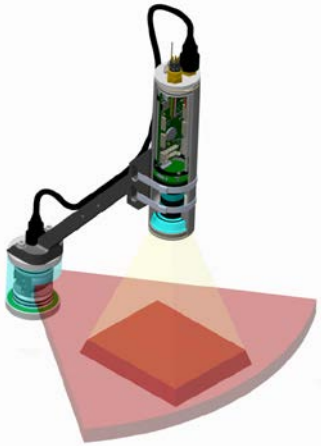

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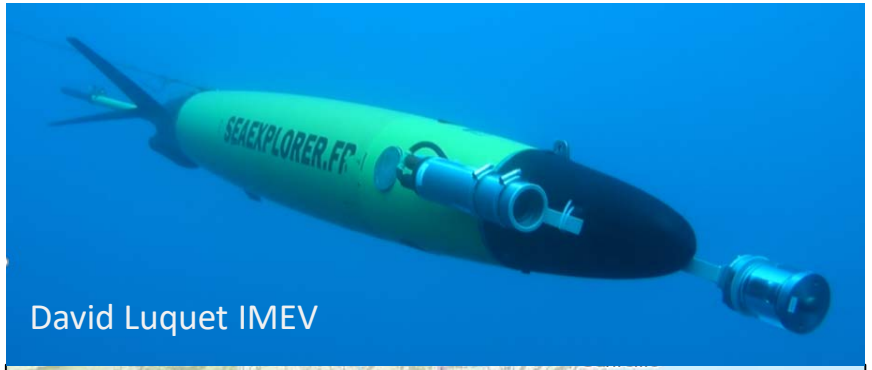
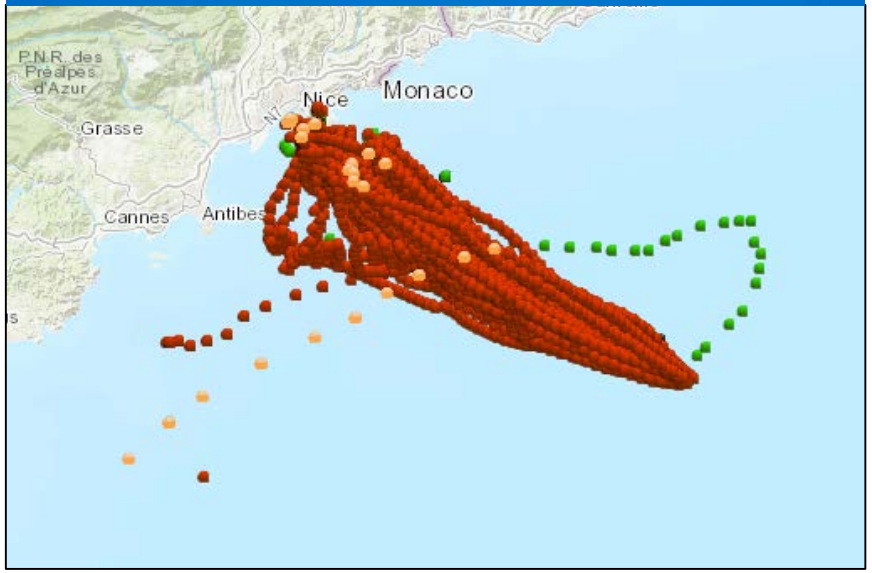
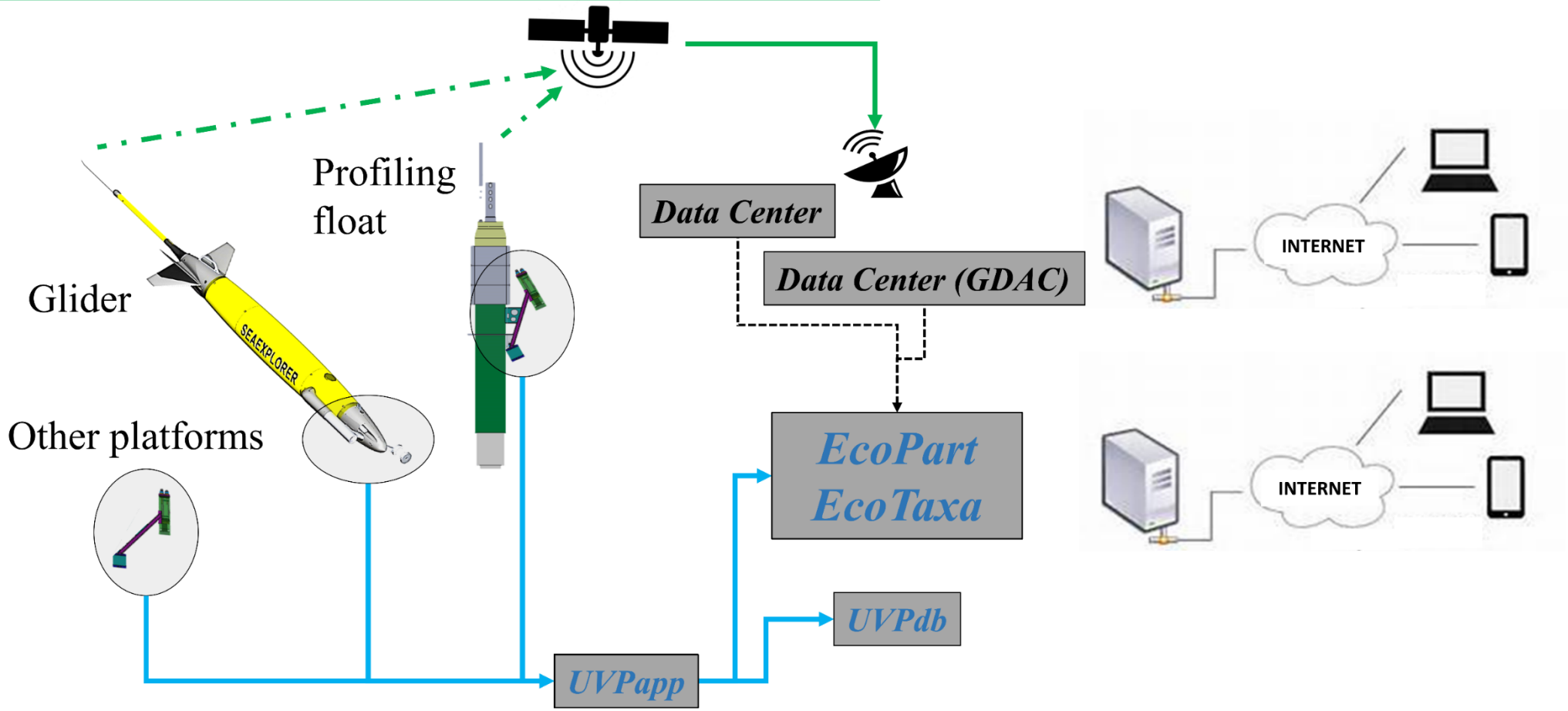




12810 UVP profiles or time series since 2008

6000 UVP6 profiles in 2021 on SeaExplorer

REMOTE *Dataflow* : data and piloting



RECOVER *Dataflow* : raw data, images and piloting

RECOVER : the UVP6 RAW data (internally recorded in SD card 400GB or 1TB) :

- Instrument & Acquisition metadata
- Frame metadata (time, pressure, internal temperature) + Number of objects and grey level per pixel size and per frame
- Background noise
- ROI (images) of the objects > 650µm

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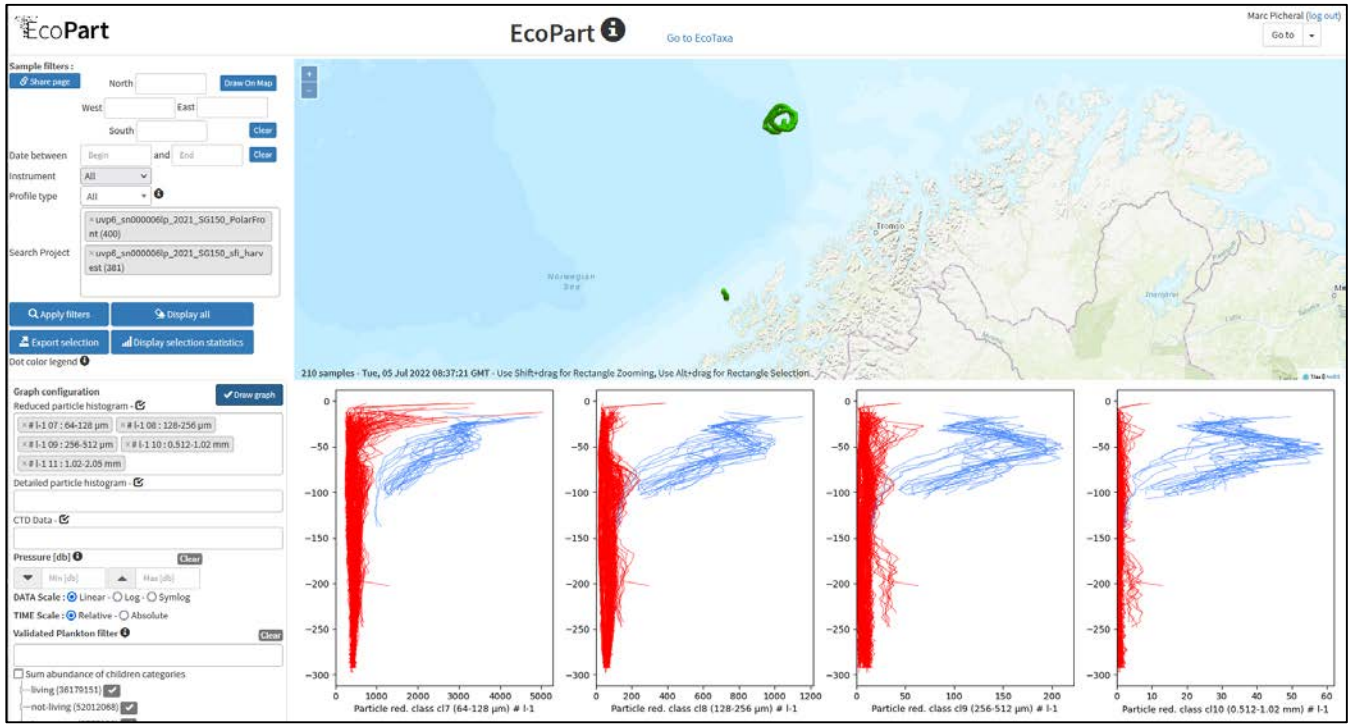

https://ecopart.obs-vlfr.fr/

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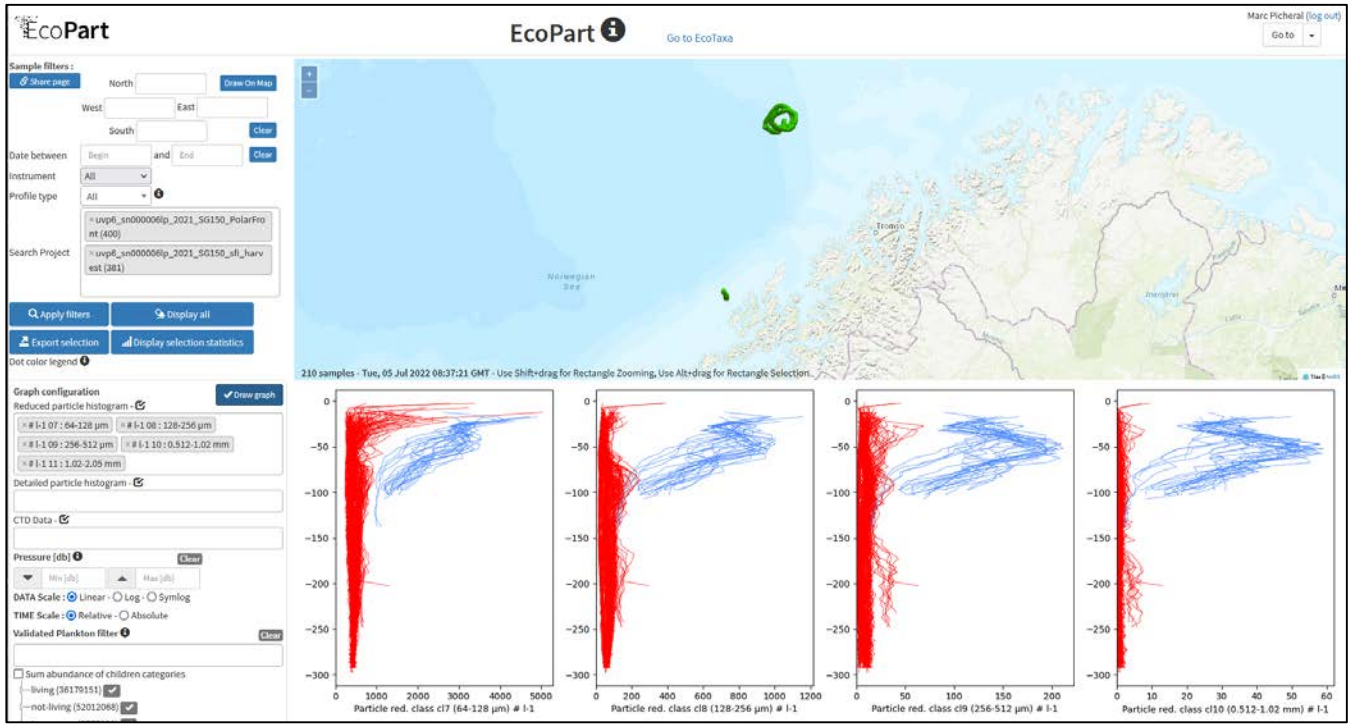
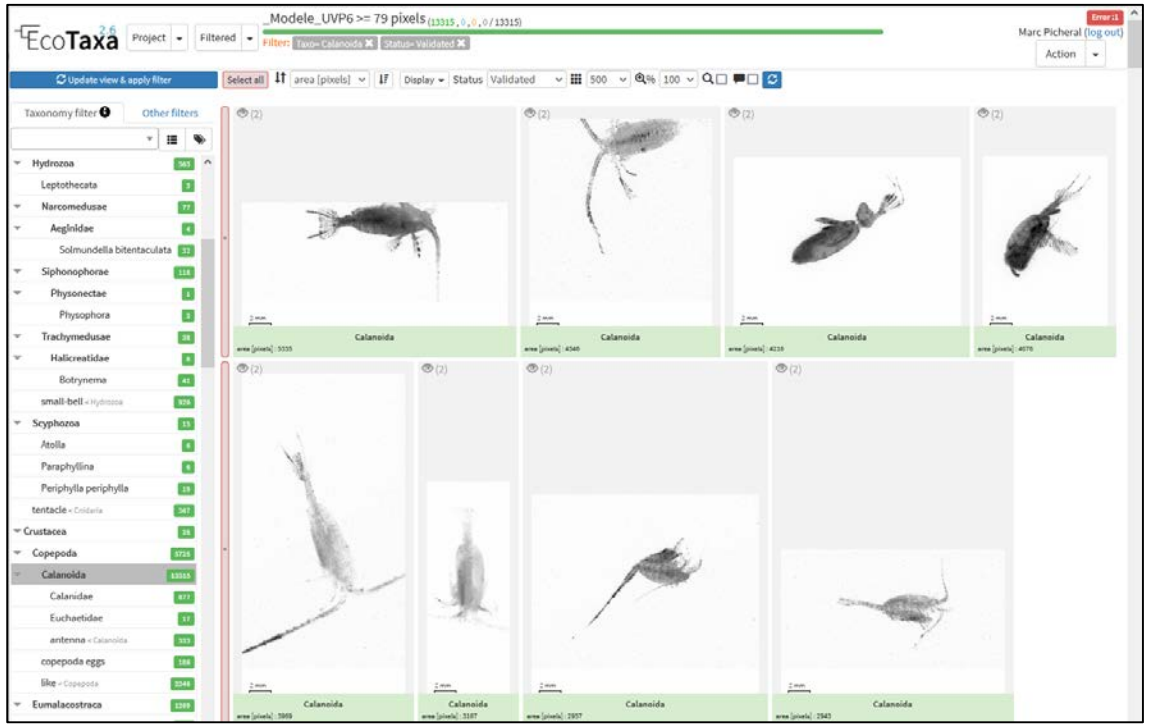
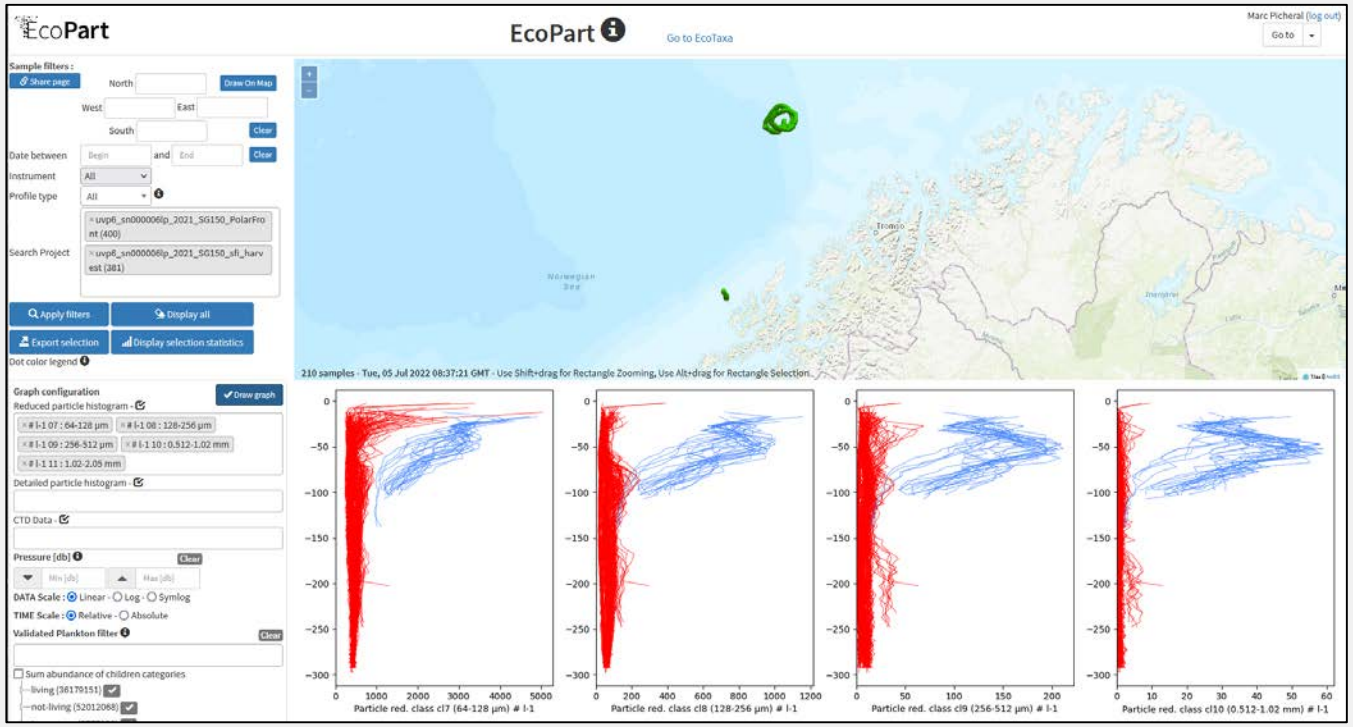




https://ecopart.obs-vlfr.fr/

https://ecotaxa.obs-vlfr.fr

The RAW (RECOVERED) data can be downloaded from the EcoPART application using the EXPORT tools or the API.



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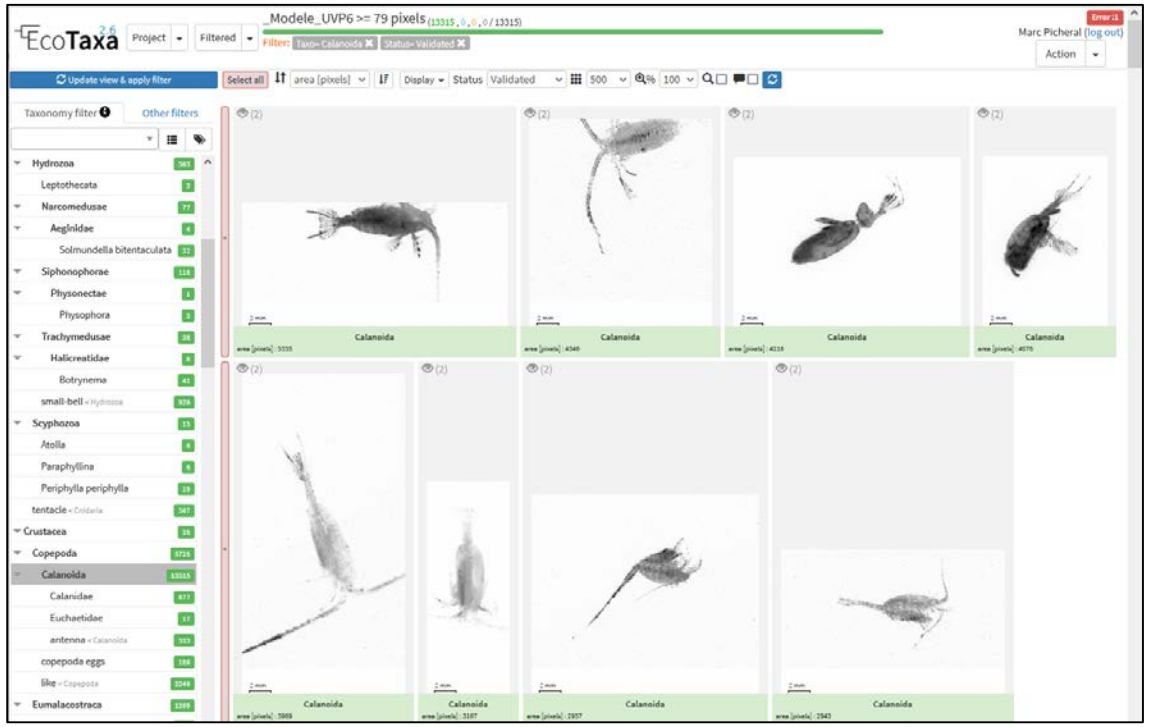

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REMOTE : the UVP6 REAL TIME transmitted metadata & data :

- Instrument & Acquisition metadata
- Frame metadata (time, pressure, internal temperature) + number of objects and grey level per size class (18) and per frame(s)
- Taxonomic classification of the objects > 650µm (optional)
- Background noise

The METADATA frames are sent to the host platform

- On demand
- Every time an acquisition starts

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Hardware CONFIGURATION frame :

HW_CONF,000176LP,1,ACQ_CAL_FULL,0,000178VE2,1,0,250,,0.600,393857,10000,2,193.49.112.100,0,64,6,20,2300.000,1.136,73,0.550,UNDEFINED,20220331 0831,alice.pierret@imev-mer.fr,50.8,64,80.6,102,128,161,203,256,323,406,512,645,813,1020,1290,1630,2050,2580,ver2022.01;

Acquisition CONFIGURATION frame :

ACQ_CONF_0 frame="ACQ_NKE_0,1,2.000,1,0,0,1,0,2,645,1.5,40,10,0,1000,60,marc.picheral@imev-mer.fr, TAXO_NKE_0,0

Taxo CONFIGURATION frame (option):

TAXO_NKE_0,Mglob_20220421,65535,20,93382,56693,85123,27642,45074,11514,13381,56317,11758,342,25942,85008,93973,84963,85076,85011,85024,93 491,85039,85025,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0

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The DATA frames (sent to the host platform : glider)

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The DATA frames (sent to the host platform : glider)

LPM DATA frame :

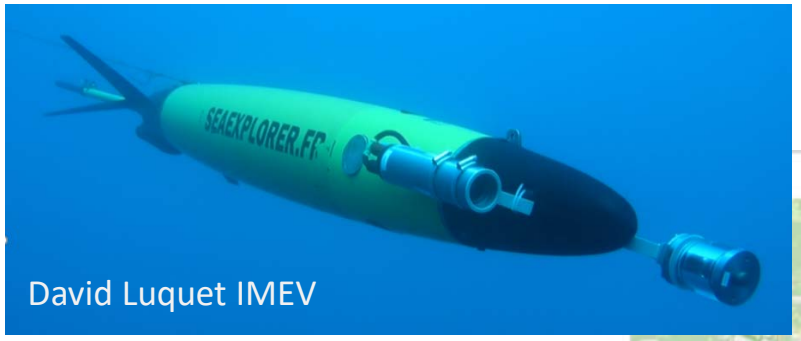
LPM_DATA,1593.59,20220209,065348,1,23.25,103,0,6,1,2,1,2,2,0,1,1,0,0,0,0,1,0,6,20,0,20,19,18,22,22,21,0,28,33,0,0,0,0,45,0,155;

BLACK DATA frame:

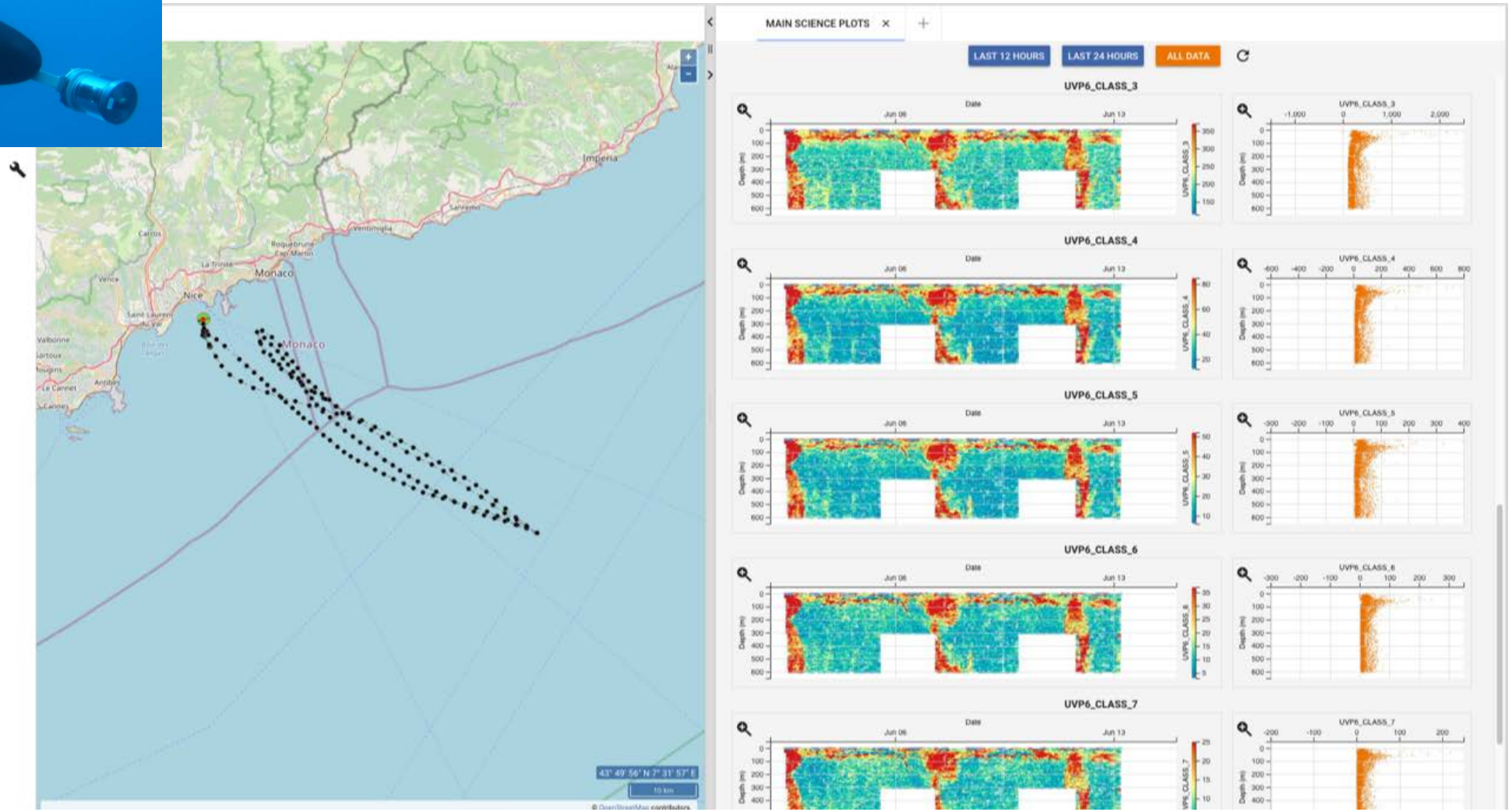
BLACK_DATA,1593.54,20220209,065343,1,23.25,107,0,11,1,1,1,0,0,0,0,0,0,0,0,0,0,0,3;

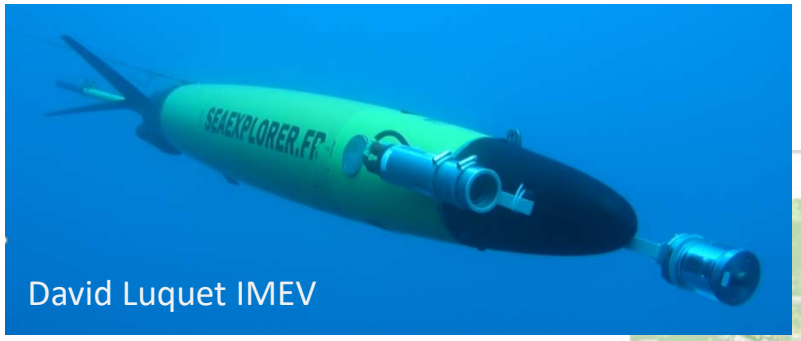
TAXO DATA frame (option):

TAXO_DATA,1,8,866,151,25,2588,160,1,1301,69,39,256,157;



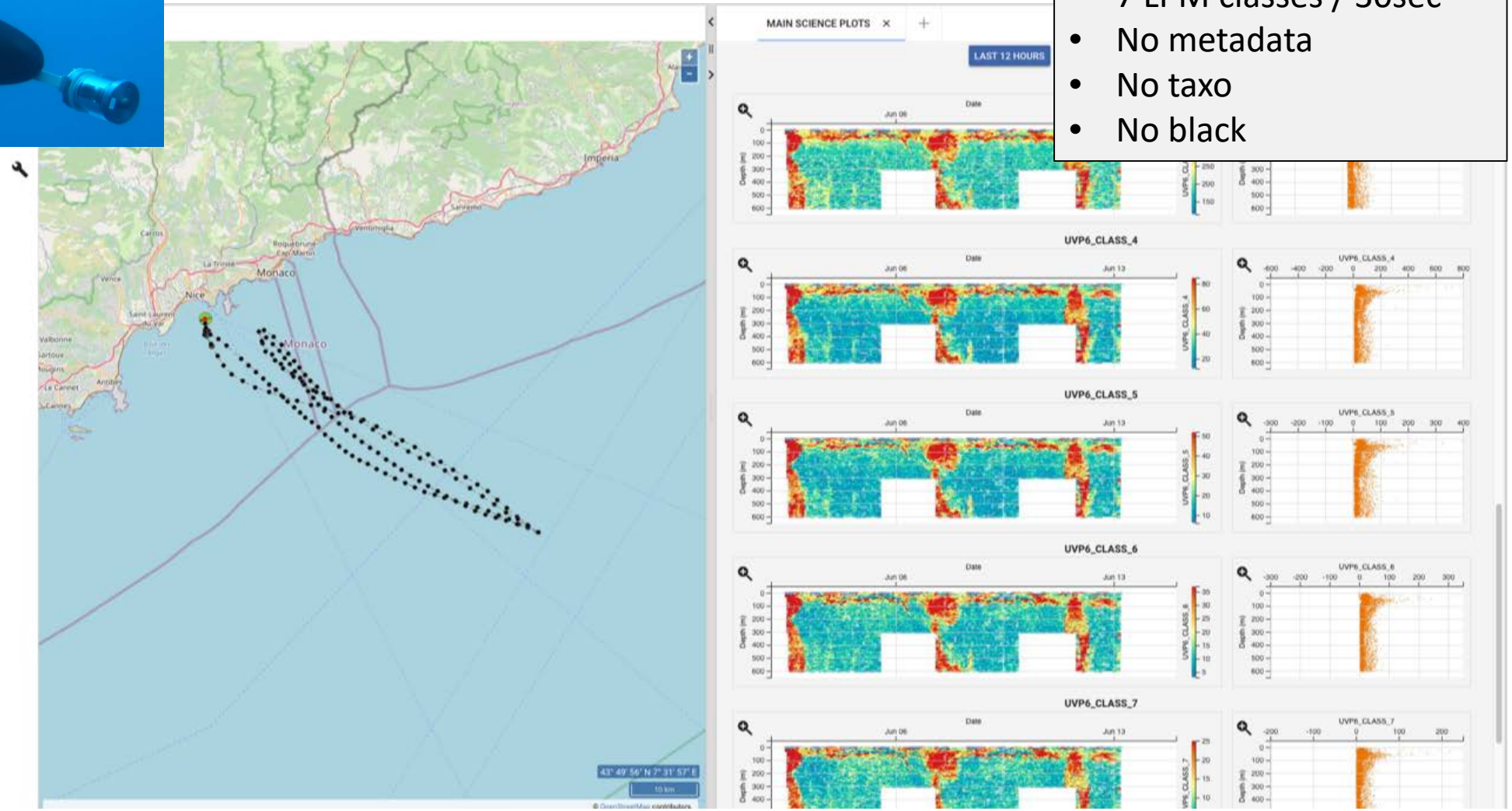
SEAEXPLORER and GLIMPSE web application

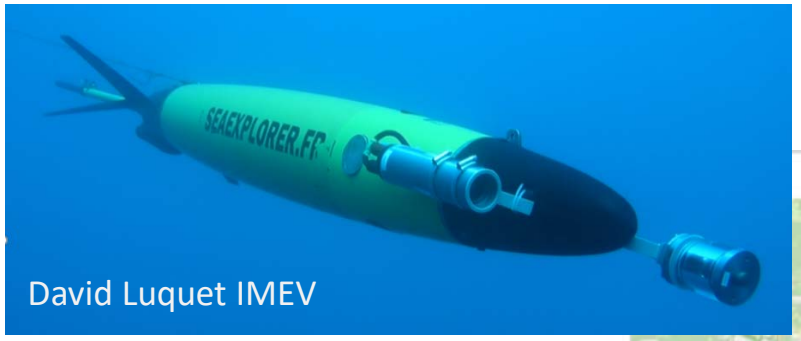




SEAEXPLORER and GLIMPSE web application

ONLY
- 7 LPM classes / 30sec
- No metadata
- No taxo
- No black





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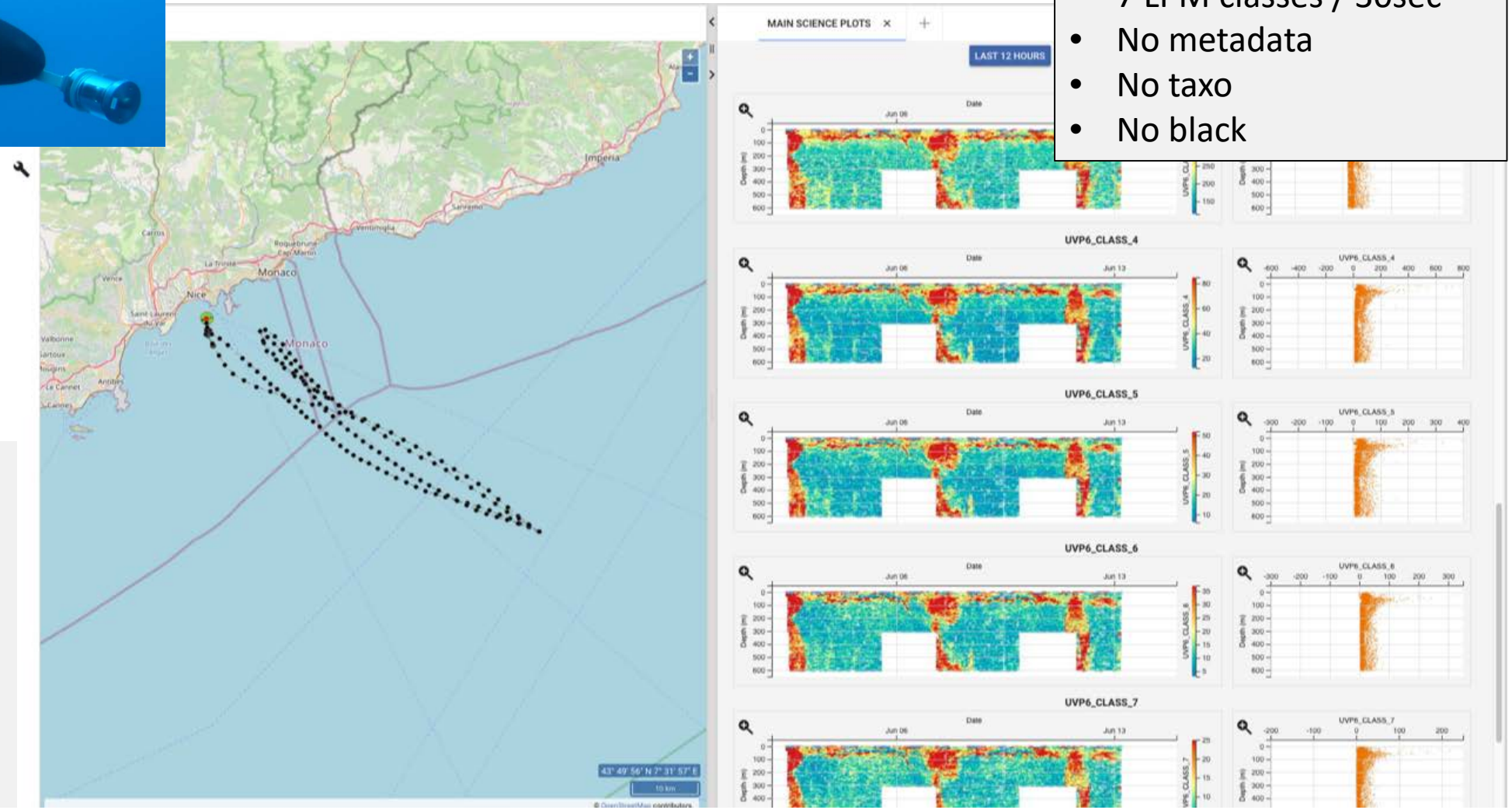
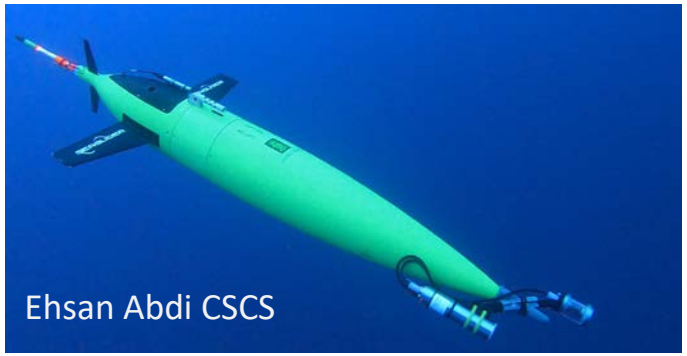


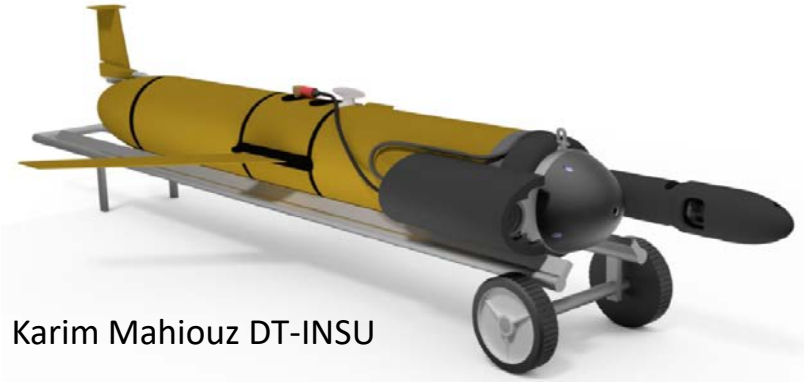
The quantity and diversity of the UVP6 data prevent sending all them to shore unless they are synthetized by DEPTH-TIME bins and compressed.



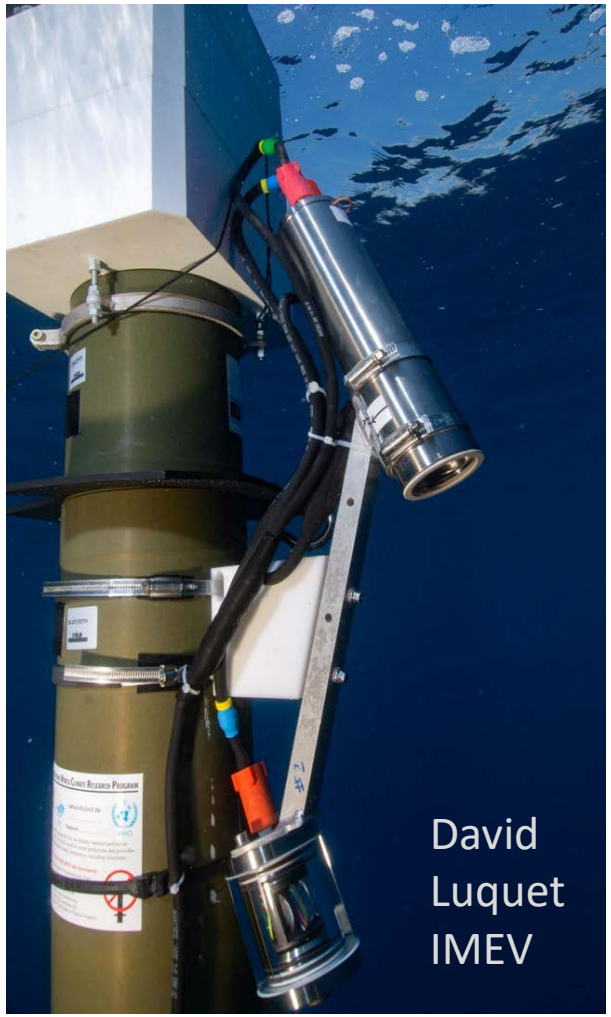
SEAGLIDER :

Drivers from CSCS, utilized during 3 norvegian cruises in 2021 & 2002

- Only data files of selected LPM data frames and grouped size classes
- No visualization
- Working on it with CSCS (to be improved this year)



SLOCUM : task started with DT-INSU, not yet tested ! To be done next fall.



BGC ARGO floats (NKE CTS5)

NO RECOVERY of the RAW data

=> optimisation of the DATA transmission

- NetCDF files in the **BGC ARGO sandbox**
  - All instrument and acquisition metadata
  - All black measurements
  - LPM data synthetized per depth slices
  - TAXO data synthetized per depth slices

- TEXT files for **EcoPART** data automatic importation
  - All instrument and acquisition metadata
  - All black measurements
  - LPM data synthetized per depth slices
  - TAXO data synthetized per depth slices

WHY should we send and provide access to real time UVP6 data from GLIDERS ?

1. **Instrument control**

2. **Mission optimisation**
   - The actual subsampling is usable for LPM data ONLY (small particles).
   - The major interest would be to utilize the TAXONOMIC data using either the standard classification model or a model optimized for the purpose of the mission.

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1. **IMPROVE the GLIDER firmware to synthetise the data per depth bins, include the taxonomic identifications and manage the metadata**

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3. **ASPIRE the DATA from EcoPART (REMOTE data during the mission and RECOVERED data after instrument download)**

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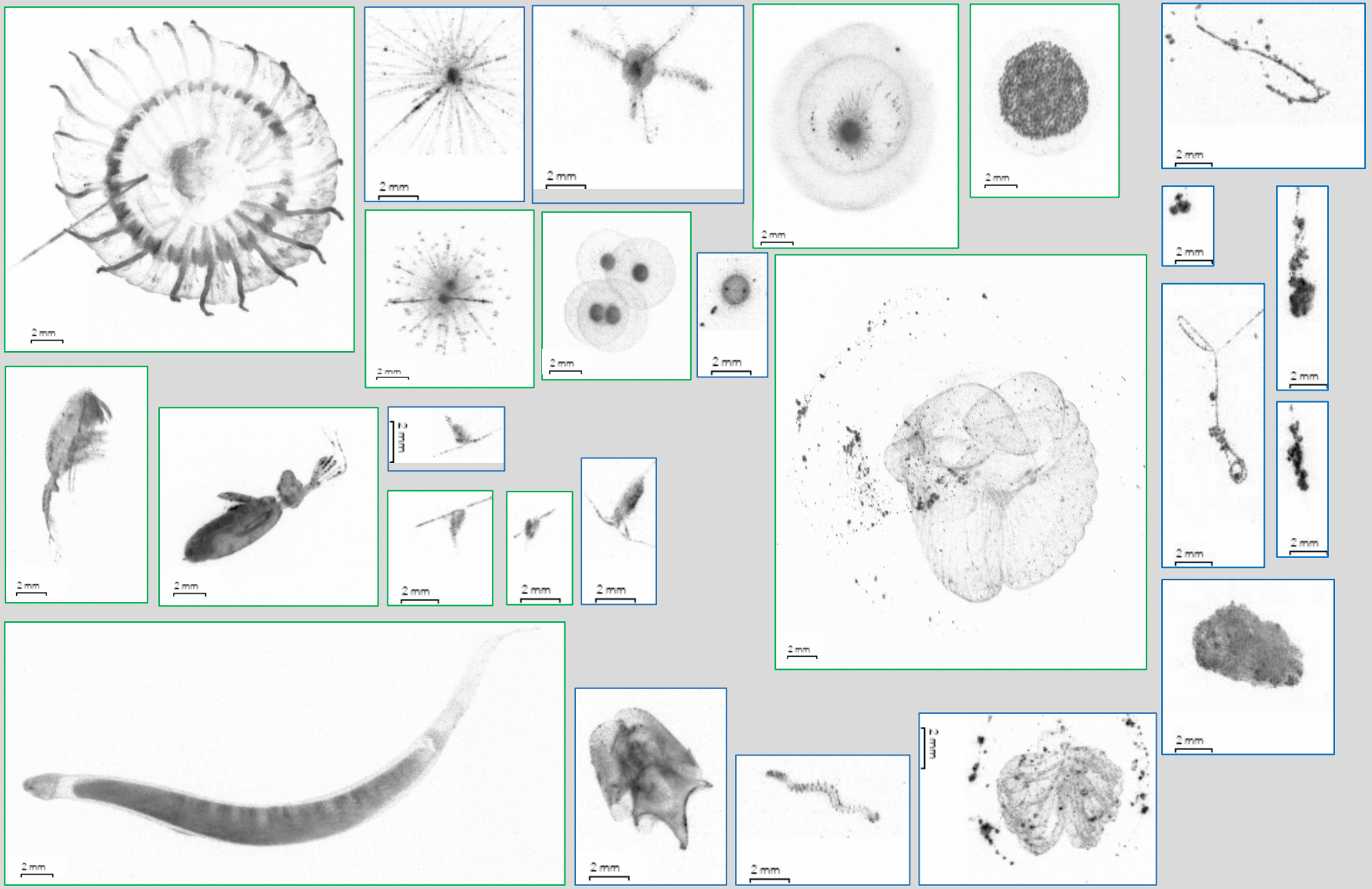
THANKS

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