



FLOTTE
OCÉANOGRAPHIQUE
FRANÇAISE
PAR L'IFREMER

Ifremer Underwater systems update

Olivier Lefort

19 October 2023

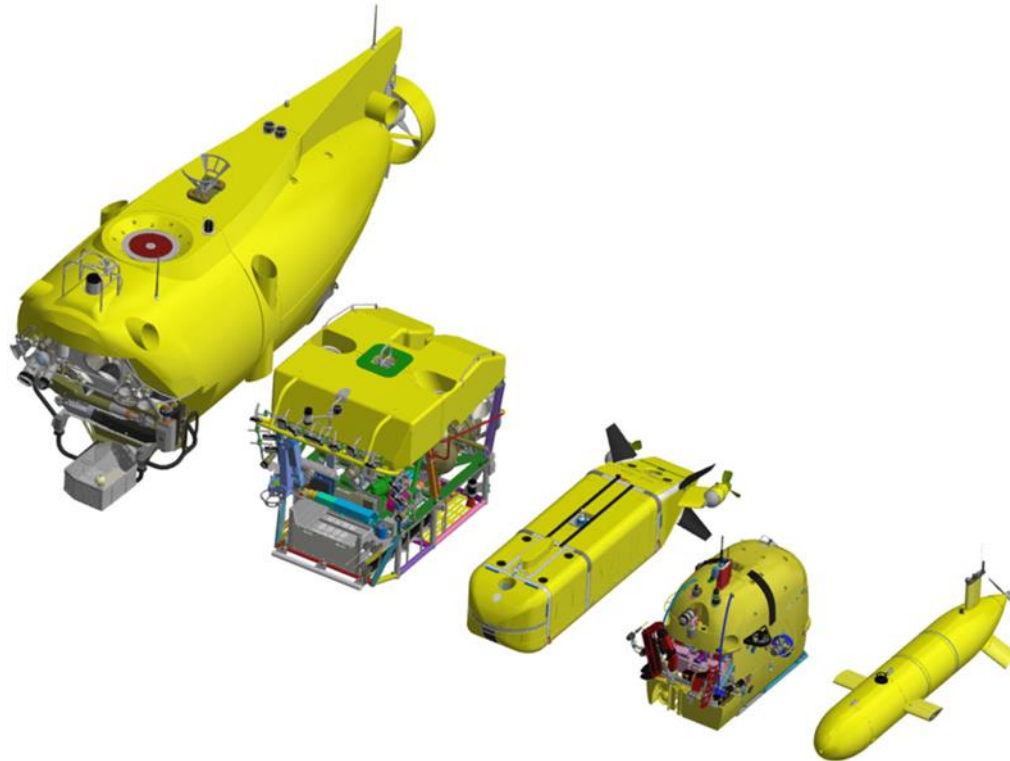
www.flotteoceanographique.fr

La Flotte océanographique française,
une très grande infrastructure de recherche opérée par l'Ifremer



Ifremer underwater systems updates

1. Ulyx AUV 6000
2. Modernization of Victor 6000
3. Nautilie at a crossroads after more than 2000 dives





FLOTTE
OCÉANOGRAPHIQUE
FRANÇAISE par Ifremer



ULYX

An AUV 6000 m unique in the world

Septembre 2023

www.flotteoceanographique.fr

La Flotte océanographique française,
une très grande infrastructure de recherche opérée par Ifremer

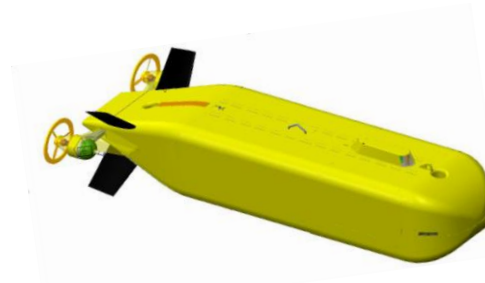


AVR.
2021
Images : Pôles d'images

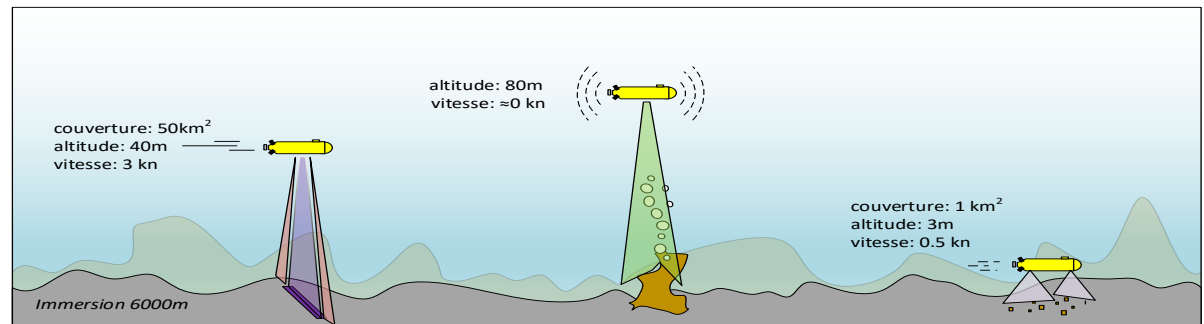


Exploration and inspection of the sea floor down to 6000m

Mapping : *Large sonar coverage up to 70km²*
Optical imagery: *Visual ground truthing*
Intelligence: *Detect and identify targets of interest*



Mineral resources: *Detection / evaluation of resources*
Biodiversity : *Observe local ecosystems*
Geophysics : *Search for hydrothermal vents, observe tectonic phenomena*



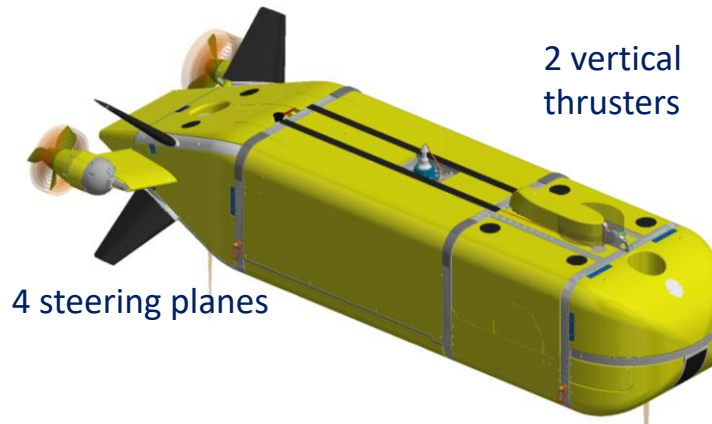
AUV Uly^x - essential specs

Dimensions : 4,5 x 1,0 x 0,8 m
Mass : 2,7T
Energy : 28 KWh (LI)
Endurance : 36h / 150km
Payload : 200kg (air)
Max depth: 6000m

Navigation modes

- long distance cruising (3,5-4 kts)
- low speed close to seabed (0,5 kts)
- hovering capability (0nds)

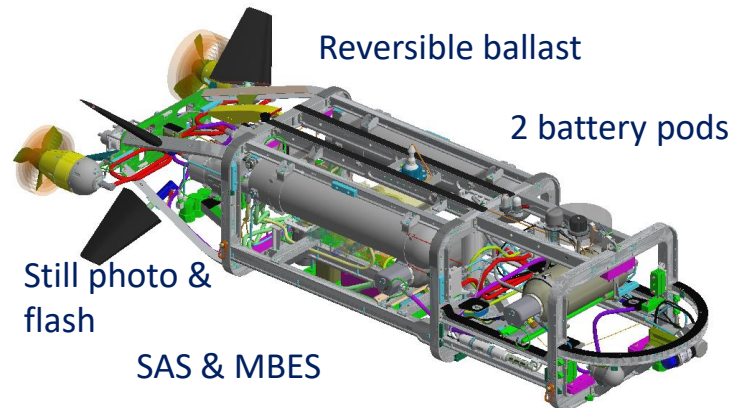
Oriented twin thrusters



2 vertical thrusters

4 steering planes

Reversible ballast



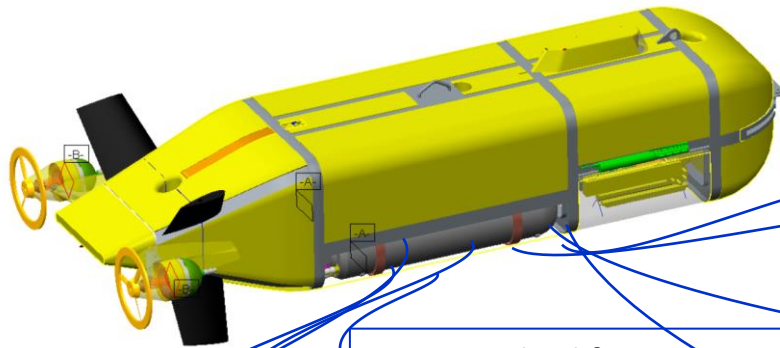
2 battery pods

Still photo & flash

SAS & MBES

Modular bay,
scientific sensors

AUV Uly^x – multi-sensor payload



Multi-sensor hub (6 channels)

- Magnetometer, Nephelometer, Eh/Redox, O₂, CH₄, Ph
- Synchronisation and triggering, time-stamping
- Georeferencing

SAS : iXBLUE Sams 150

- 5x5cm resolution, 500m swath
- Bathymetry by interferometry

SDS : iXBLUE Echoes150

- 1 – 6KHz
- Resolution 20cm, penetration up to 70m

perspectives : Raman spectrometer, water sampler, etc.

CTD – Seabird fastcat SBE49

ADCP: RDI Pioneer (DVL+ADCP)

MBES: Kongsberg EM2040

- Bathymetry
- Backscattering
- Watercolumn profiling

Optical Imaging

- 16MPixel still photo & 2x flash
- Laser line projector for microbathymetry

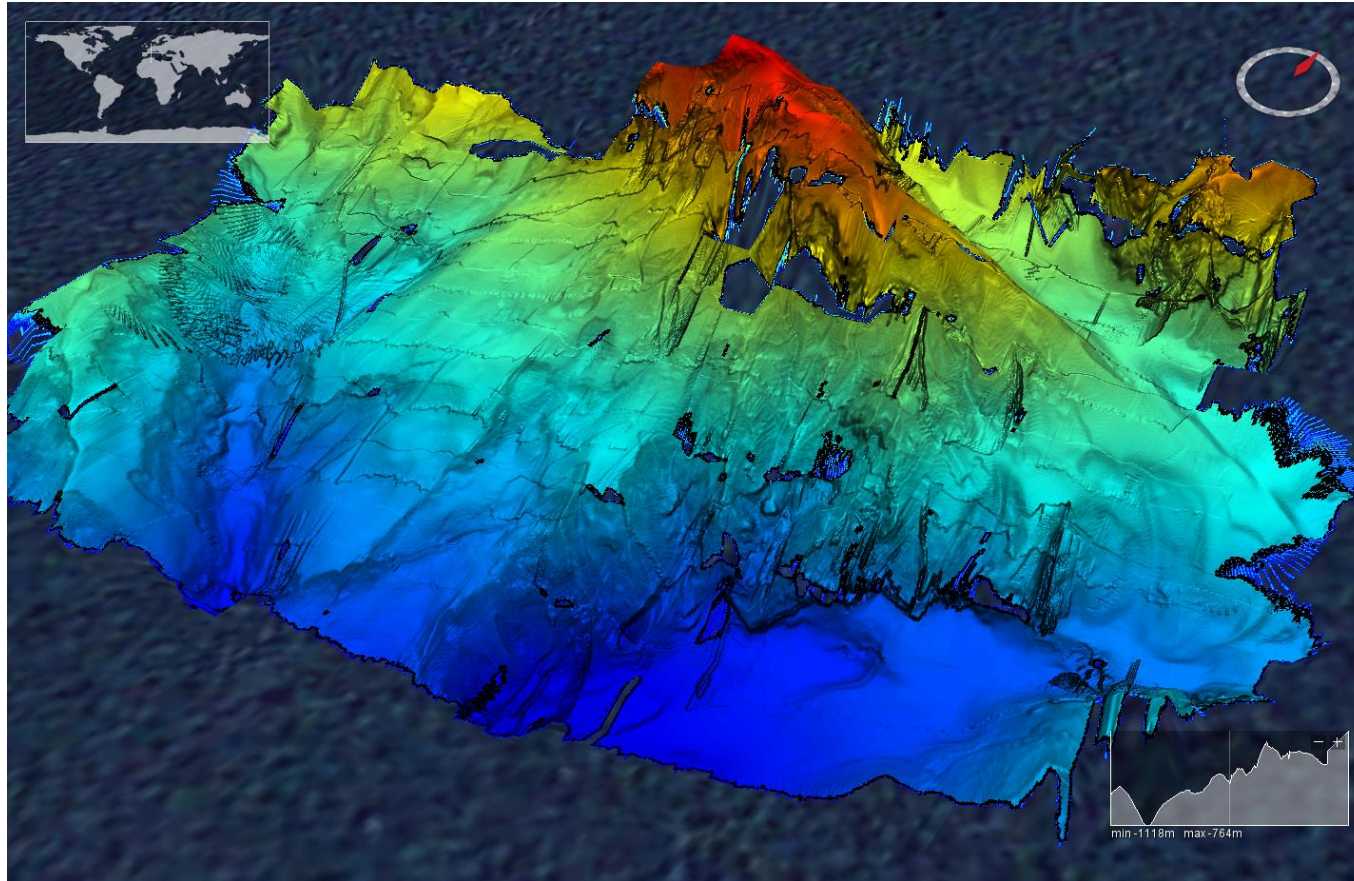


**Permanent
equipment**

**Modular
equipment**



Multibeam mapping of the Mediterranean relief

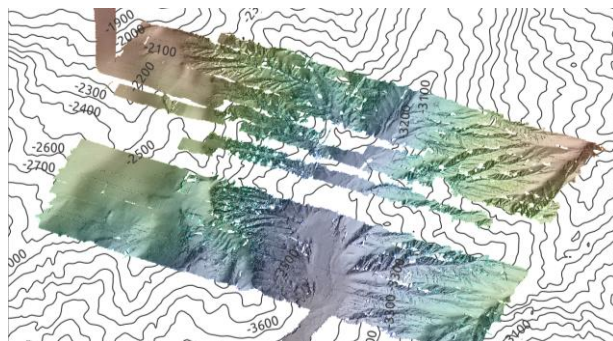


Raw data output directly from the AUV. Robust terrain navigation on steep slopes: the AUV uses inclinations of up to 65° to track and map slopes.

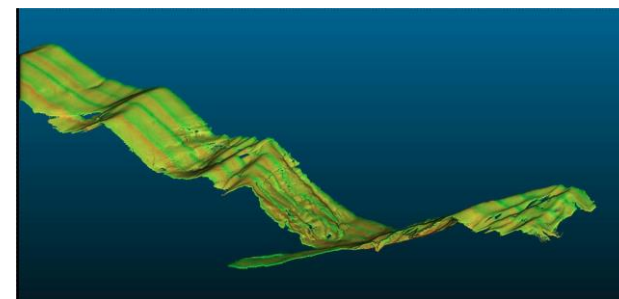
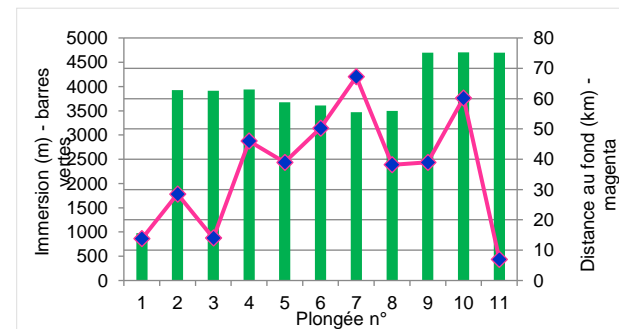
The development of a 6000 m AUV: a long desert crossing

May 2023 :

- 11 dives made at depths between 1000m and 4700m
- Average dive duration 11.3 hrs, maximum duration 16 hours
- 400 km covered on the bottom in total



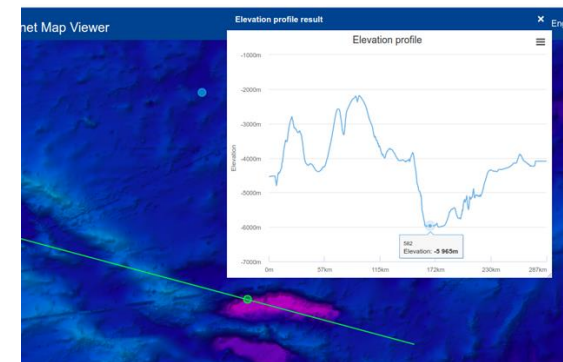
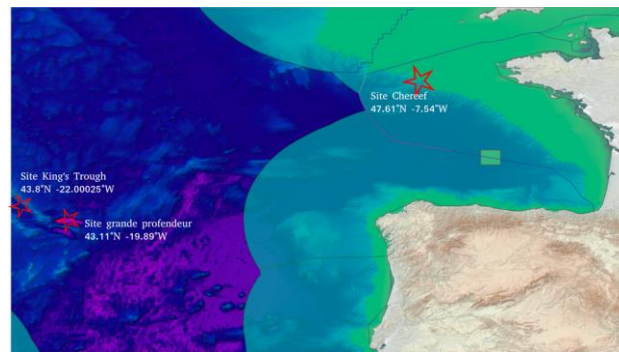
Bathymétrie canyon Lampaul (manque données dû à défaut matériel EM2040)



Bathymétrie brute à l'issue d'une plongée de 40km au fond

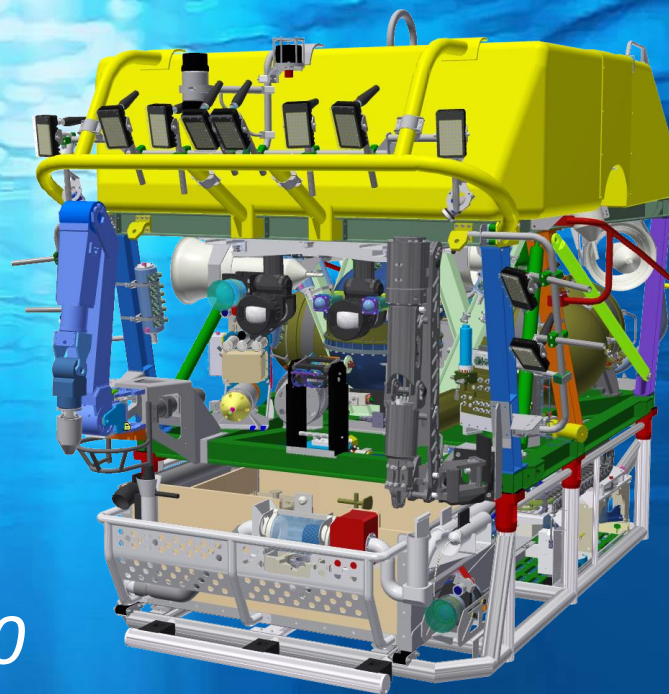
October 2023:

10 dives at deep sites (>5500m)





FLOTTE
OCÉANOGRAPHIQUE
FRANÇAISE par Ifremer



Modernization of *Victor 6000*

Septembre 2023

www.flotteoceanographique.fr

La Flotte océanographique française,
une très grande infrastructure de recherche opérée par Ifremer

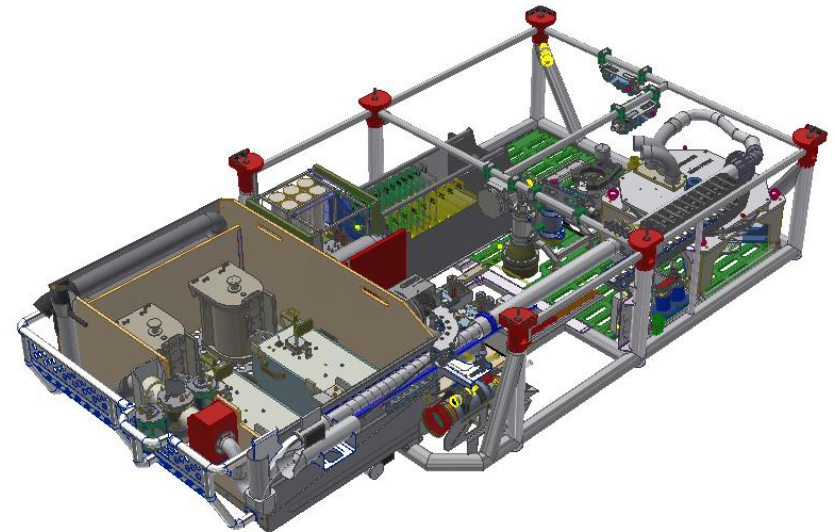
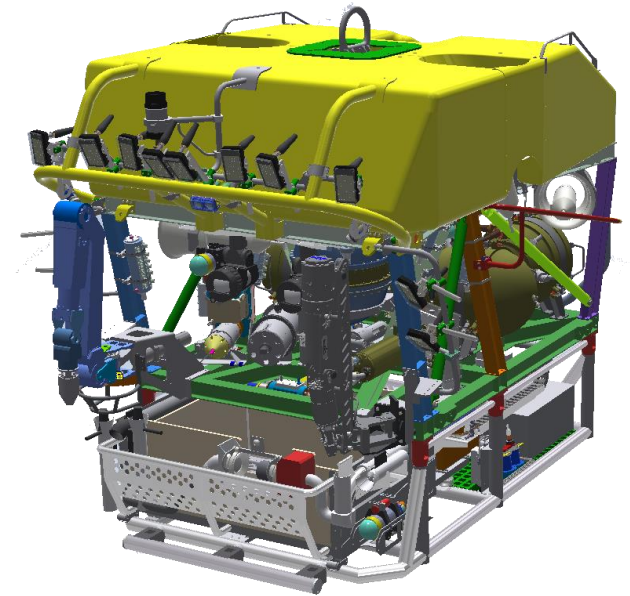


Modernization of Victor 6000: a state-of-the-art Victor 2.0 scientific ROV in 2025

Dealing with obsolescence. Managing technical obsolescence (1997 for some equipment!) and industrial obsolescence (discontinued products, etc.), correcting technical problems identified over the years.

Major developments :

1. Increased carrying capacity (20% overall, approx. 40% science): float and mechanical optimisations
2. Increased electrical power (15% overall, approx. 30% science): bottom and surface power systems
3. Redesign of unified scientific module and equipment, reducing reconfiguration time at sea



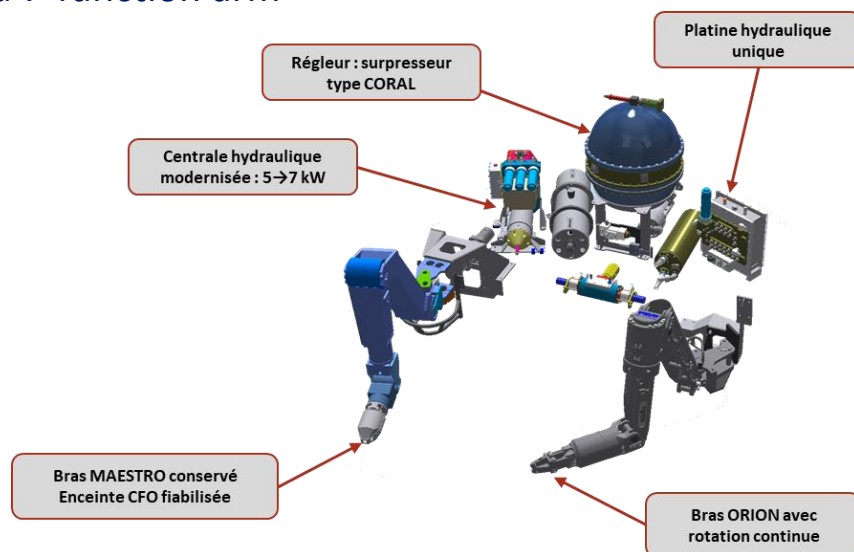
Modernization of Victor 6000

Major developments :

Perception of the environment: individual pilot and scientific cameras, real-time reconstruction, etc.

Rapid access to data, telepresence, new robotic functions in a new IT system

Redesigned handling, integration of a second 7-function arm



Optimisation des tâches de télémanipulation



Aide à la télémanipulation par superposition d'informations

