



TECHNOLOGICAL INNOVATIONS

CHALLENGING
PROFILING FLOATS
CAPABILITIES

7th Euro-Argo Science Meeting
Athens

Presented by Xavier ANDRÉ
23 October 2019

Plan

7th EURO-ARGO SCIENCE MEETING

ATHENS

22-23 OCT 2019



Platforms from head to toes



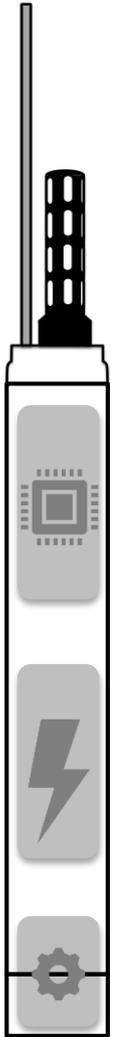
Applications



Conclusion

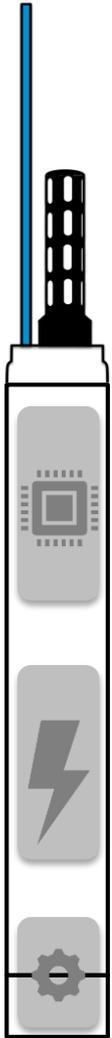


From head to toes



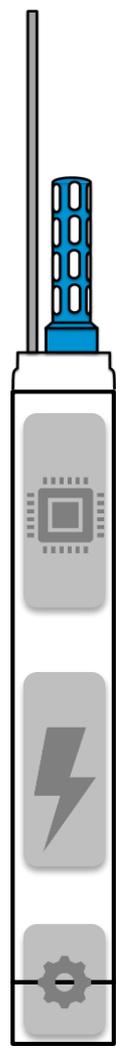
From head to toes

Transmissions

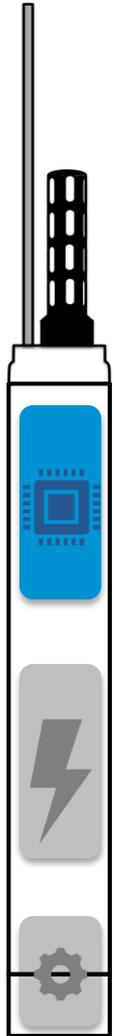


From head to toes

CTD



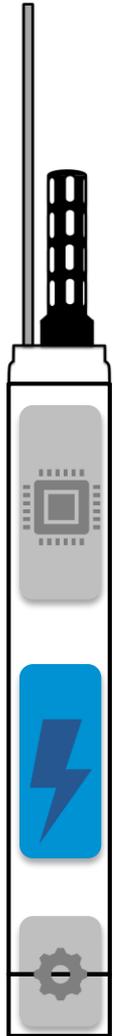
From head to toes



Hardware & software



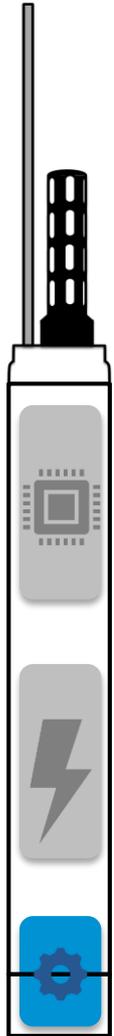
From head to toes



Batteries



From head to toes

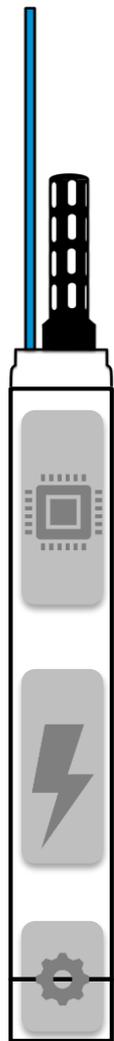


Hydraulic system



Transmissions

Argos vs. Iridium



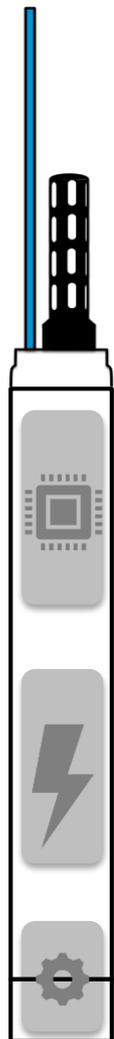
72* % of the fleet



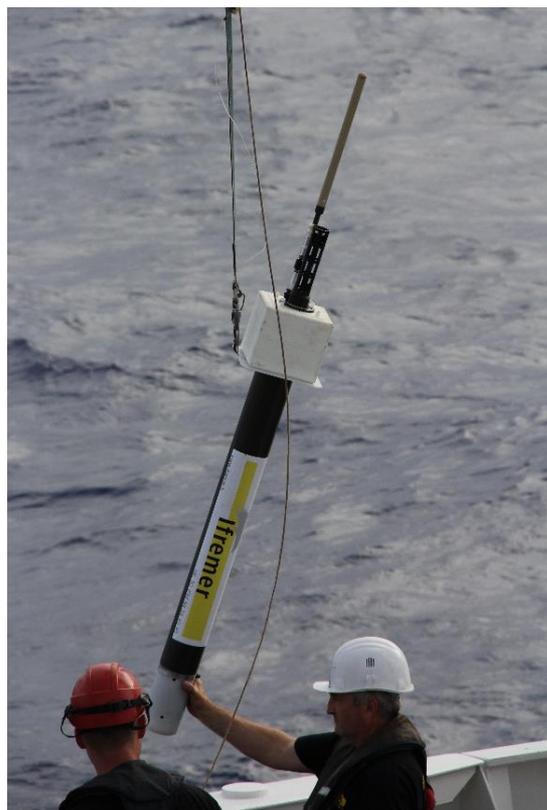
Argos-2



Transmissions



Argos-3/4 & Kineis



Arvor Argos-3
© Ifremer

Iridium Next



© Iridium Next

Internet everywhere

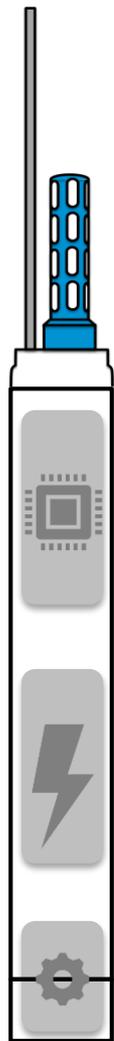


© One web



CTD

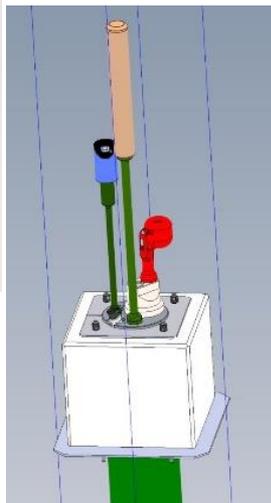
RBR CTD



TWR APEX
© RBR



MRV Alamo
© RBR



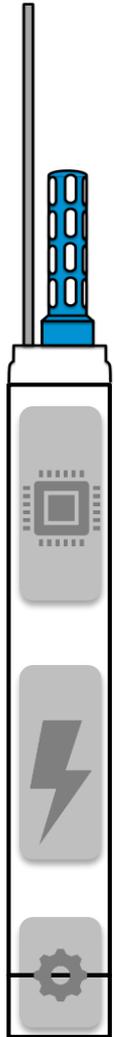
Arvor
© Ifremer

NOSS density sensor



Provor NOSS
© nke instrumentation





Surface measurements

■ Risk: biofouling of sensor

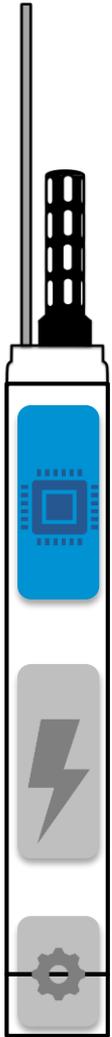
Bottom measurements

■ Systematic grounding

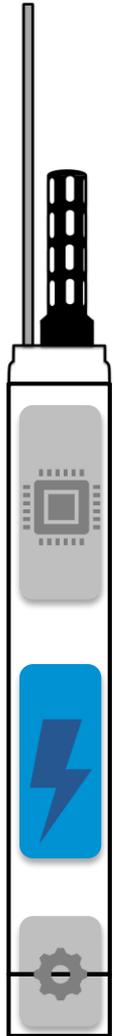


Embedded intelligence

- Artificial intelligence & machine learning
- Hardware capacity!



Batteries

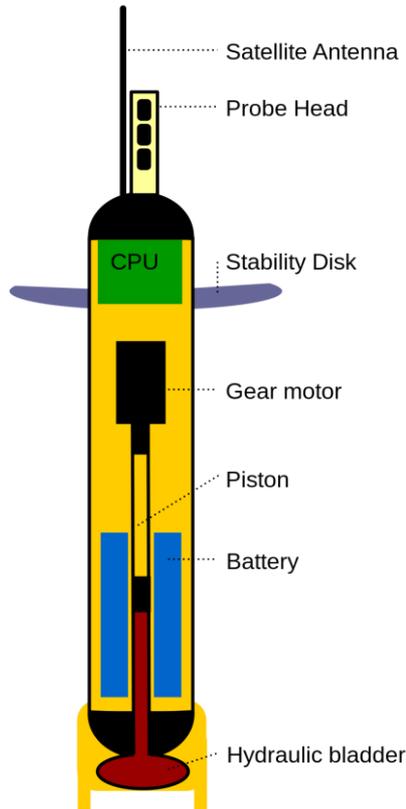
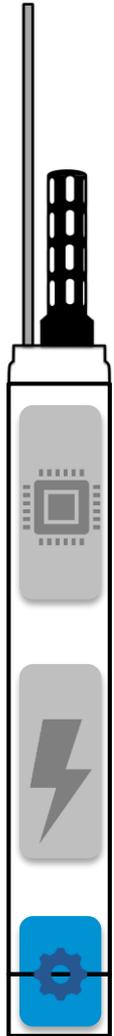


- | Life extension
 - | Tadiran on APEX & SOLO
 - | Energy recovery ?



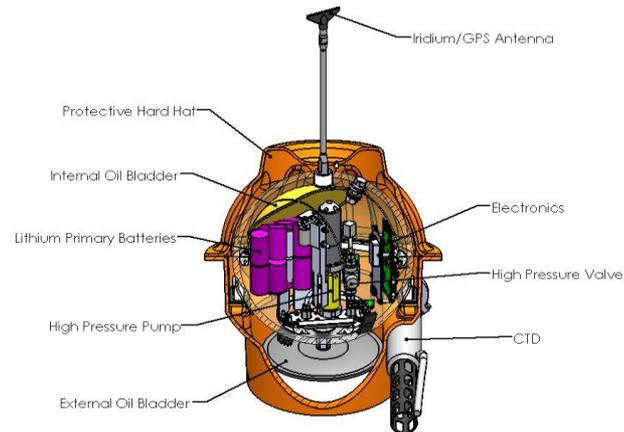
Hydraulic systems

Piston

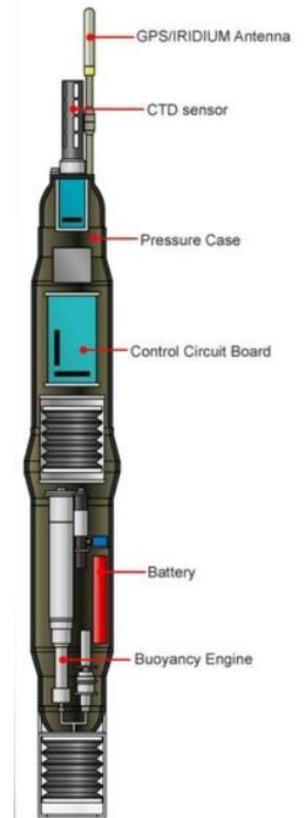


APEX
© TWR

Pump & valve



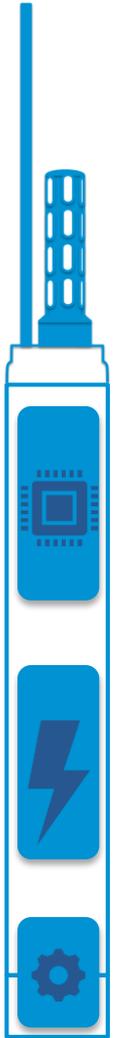
Deep SOLO
© MRV



Deep NINJA
© JAMSTEC



Environmental impact



- | Pollution due to profiling floats
 - | Less polluting materials
 - | Recovery



Plan



 **Platforms from head to toes**

 **Applications**

 **Conclusion**



Deep-Argo

Sphere



Deep APEX



© MRV

Deep SOLO

Cylindar



© Ifremer

Deep Arvor



Deep Ninja
© TSC



Up to 6 external sensors

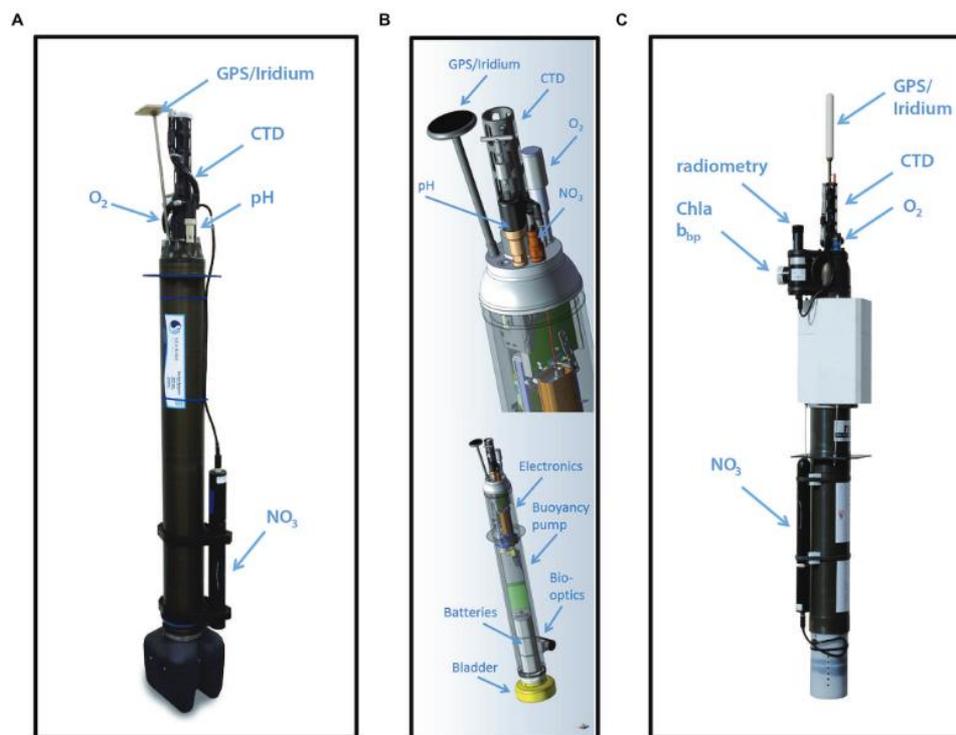


FIGURE 1 | The three main models of BGC-Argo floats presently in use include (A) Navis, (B) APEX, and (C) PROVOR.

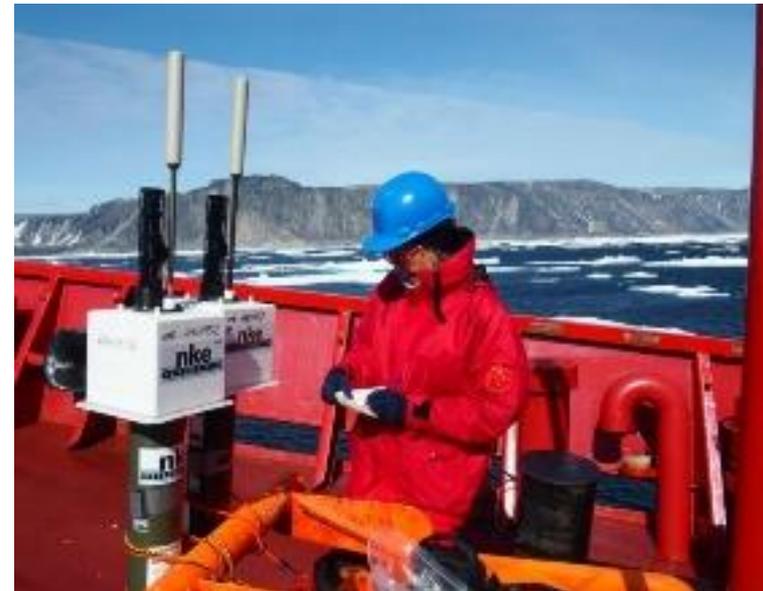


Polar-Argo

Ice detection

- >45,000* profiles
- Bi-di transmissions
- Ice Sensing Algorithm
or Upward Looking Sonar

■ Challenge:
better location under ice



© Takuvik



Specific developments

Comparison platforms

- SBE61 – SBE41 – RBR concerto



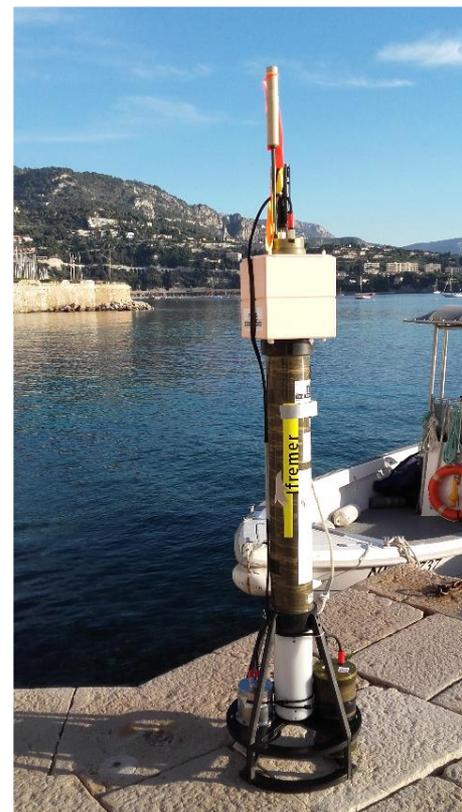
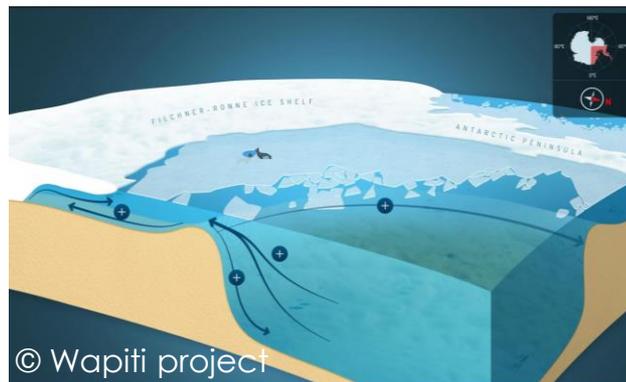
3-heads deep-Arvor

© Ifremer



Specific developments

Deep additional sensors



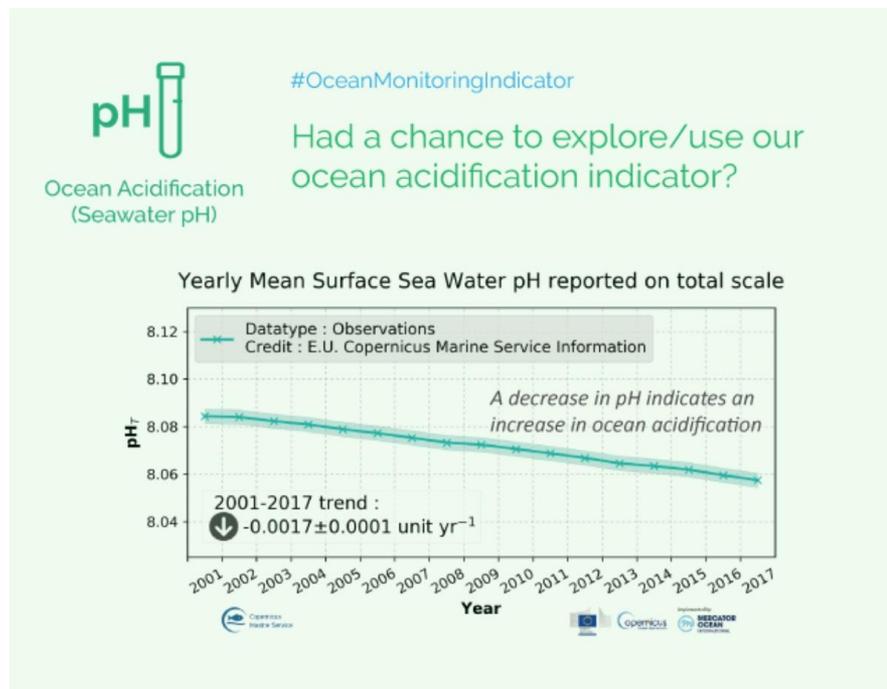
ADCP deep-Arvor
© Ifremer

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°637770.



New challenges

pH



Source: Copernicus Marine Service Ocean Monitoring Indicator (OMI).

pCO₂



© Emilie Diamond



Plan



 **Platforms from head to toes**

 **Applications**

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Technology

should adapt to the **science** needs,
and not the contrary!



Deep-Arvor profiling float

Deep-Arvor: a deep profiling float « 100 % Argo compliant »

- Profile during ascent
- Profile data transmitted within 48 hours
- Ascent & descent speed control
- Meas. available during descent
- Ice Sensing Algorithm (ISA)
- Reinforced grounding management
- High resolution (4,000 CTD samples)
- From seafloor to surface
- Cost effective

Continuous pumping: up to 150 CTD cycles

Spot sampling: up to 200 CTD cycles

DO available + in-air meas.

max 4000 meters depth

26 kg PAYLOAD capacity

WAPIII Deep-Arvor

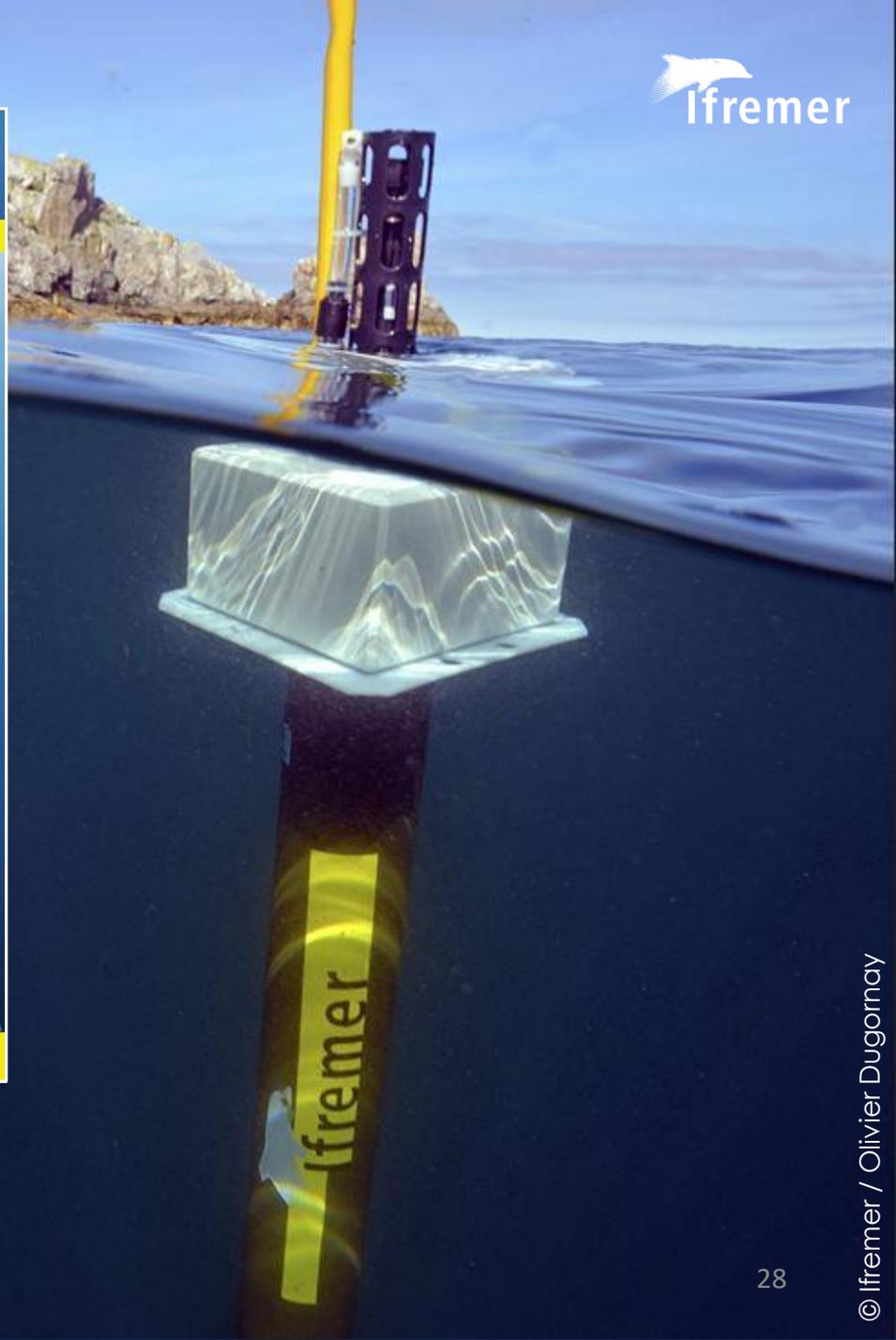
- Deep-Arvor + ADCP
- Measurement of deep water masses currents in the Weddell sea (Antarctic)
- ADCP in bottom tracking mode

3-heads Deep-Arvor

- Deep-Arvor with Seabird 58E41 CTD + Seabird 58E41 CTD + RBR Concerto CTD
- In-situ inter-comparison of CTDs:
 - Pressure dependency?
 - Accuracy?
 - Long-term stability?
- Designed to embed more sensors

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Partners: nke, European Union, erc, ANR



Poster session



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Thank you for your attention!

Questions?



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