

BI-DIRECTIONAL SATELLITE COMMUNICATIONS ON NEW PROFILING FLOATS



Ifremer

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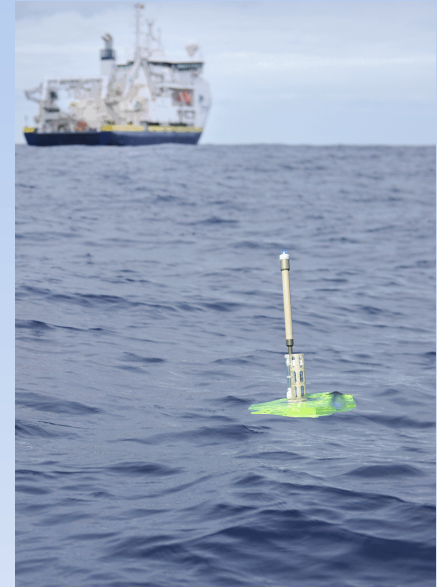
New requirements appeared these last years for profiling float applications:

- For **Argo deployments**, the performances of these instruments could be affected in marginal seas. Thus, it is critical to reduce the transmission time at surface, in order:
 - to lower the risk of thefts, trawling or impacts in these highly trafficked seas,
 - to delay the time of beaching on the shores,
 - to have better estimates of subsurface currents.
- For **coastal applications**, the reduction of time spent at surface:
 - facilitates the realisation of successive profiles at the same location in order to delay beaching,
 - delays the bio-fouling development,
- The modification of mission parameters during operation is now required to monitor specific events.

ARVOR with Iridium satellite transmission

The Arvor float has been fitted with an Iridium modem coupled with a GPS receiver and a high pressure antenna, for Argo marginal seas requirements. The Arvor-C is dedicated to coastal applications and has been equipped with the same communication system.

- Extra information about the behavior of the float is sent,
- A last CTD raw data is acquired before stopping the CTD pump at the end of the rising profile (useful for the knowledge of the surface properties),
- Improved vertical resolution (2 dbars), improved power balance,
- Remote control available during operation (modification of cycling period, parking depth, profile depth...),
- Capability to manage seabed stationing proven at sea.



Arvor-i

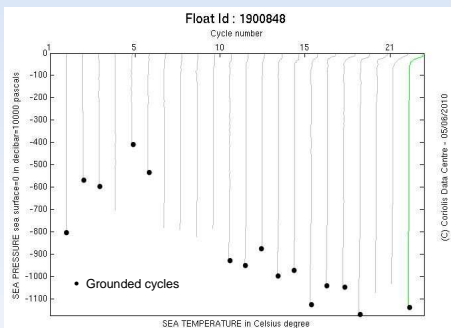
Results at sea:

• 1st Arvor-i:

Deployed in the south of Cyprus (Dec. 2009).
1 cycle / day from 700 m depth.
180 cycles has been done up to early June 2010.

• 2nd Arvor-i:

Launched in Adriatic sea (Feb. 2010).
Several remote commands have been sent to the float in order to modify the cycling period and the profile depth.
3mn only are needed to transmit a high sampled data profile (every 2 dbars).



Iridium features

- 66 Low Earth Orbit satellites
- Global and permanent earth coverage
- 2 ways communication
- Messages delivered to end-user via email

Argos-3 features

- Non-stationary polar orbit satellites
- 4 Argos-2 satellites in operation
- 1 Argos-3 satellite in full operation (5 by the end of 2012)
- Low and high rate data transfer with acknowledgement
- 2 ways communication

ARVOR with Argos-3 satellite transmission

In order to have an alternative way to improve communication performances on floats, assessment and integration of the new Argos-3 system has been done.

Phase 1: understanding and evaluation of the Argos-3 system (2009)

- Test of random protocol (Argos2 mode), interactive mode (Argos3 low data rate mode) and "pseudo-ack" mode (based on satellite pass predictions)
- Assessment on transmission performances and downlink communication, determination of the strategy on profiling floats

Results: transmission of one profile during one satellite pass in less than 15mn, instead of 6 to 8 hours for Argos2.

Phase 2: integration on profiling floats (2009/2010)

- Coding on the embedded target processor & tests in many transmission configurations
- Design of a new double band & pressure resistant antenna

First results in January 2010: transmission of 1 kByte of data, from an Arvor electronics platform, using a unique Argos-3 satellite pass.

2 Arvor floats ready for tests in June / July 2010

- Tests in pressure tank and seawater pool at Ifremer
- Deployment in the Mediterranean sea before the end of 2010.



Integration of the Argos-3 transmitter on Arvor profiling floats