

## FINAL REPORT PROGRAM LEFE

Two pages to be written in English

Program LEFE/ <b>GMMC</b>	SENOX-ARGO	Years <b>2020 - 2022</b>
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### **Context** (2-3 lignes)

The Northeast Tropical Atlantic (NETA) shadow zone is associated with a dissolved oxygen distribution characterized vertically by a double oxygen minimum, one deep (centered at ~ 400 m) and the other closer to the surface (~ 50-100 m). The latter is located on a depth range such as it is found on the West African coastal shelves, due to the coastal upwelling phenomenon. It thus contributes to provide a significant constraint for the habitat of coastal marine organisms along Mauritania, Senegal, The Gambia and probably also Guinea Bissau

### **Objectives / scientific questions** (2-3 lignes)

Our objective is to acquire observations to better constrain the O<sub>2</sub> budget in the shadow zone of the NETA. Specifically, the whole set-up/strategy should allow to document: the evolution of O<sub>2</sub> properties along the transit path of uSACWs feeding the West African coastal upwelling, i.e. also the structure of the shallow oxygen minimum present in the shadow zone of the Northeast Tropical Atlantic; the structure of the deep chlorophyl maximum present in this same zone. The project also contributes to increasing knowledge of the deep oxygen minimum.

### **Main results** (y compris les relevés de conclusions des réunions de coordination si c'est l'objet du financement LEFE)

Arg067 and Argo091 were deployed on 5/03/2021 from the Thalassa (see deployment sheets in appendices). ArgO2 and ArgBGC have not yet been deployed in their near-shore area following the postponement of the SCOPES campaign to December 2022. They will be deployed at that time.

Data acquired by Arg067 and Argo091 have been monitored at regular intervals since their deployment. They have not been scientifically exploited for the moment. Nevertheless, the elements below seem to justify the validity of the proposed project strategy.

- The mean drift of Arg067 for a little more than a year is directed towards the North-North East (see Fig. 1). It is now located (last profile on 11/04/2022 at 11.477N, 19.181W) about halfway to a potential upwelling over the Senegalese plateau. The velocity fluctuations (estimated between two profiles) could be useful to quantify the importance of mesoscale turbulence. However, it will first be necessary to identify and separate the seasonally varying component of the circulation, which will require additional deployments (see perspectives)
- Ar091 follows a significantly different trajectory (very slight southward drift). Nevertheless, its position remains interesting in that it allows us to document the variability of BGC properties in a sector of the NETA where waters of equatorial origin are brought by the North Equatorial Undercurrent in a more or less intermittent manner.
- The 2 floats allow us to document with unprecedented details the fluctuations of the shallow oxygen minimum in the area (Figure 2). For Arg067, there is a decreasing trend over time but this is largely obscured by fluctuations from one profile to another. Preliminary analyses reveal no significant correlation between the geographical position of the float and the value of this oxygen minimum in the water column.

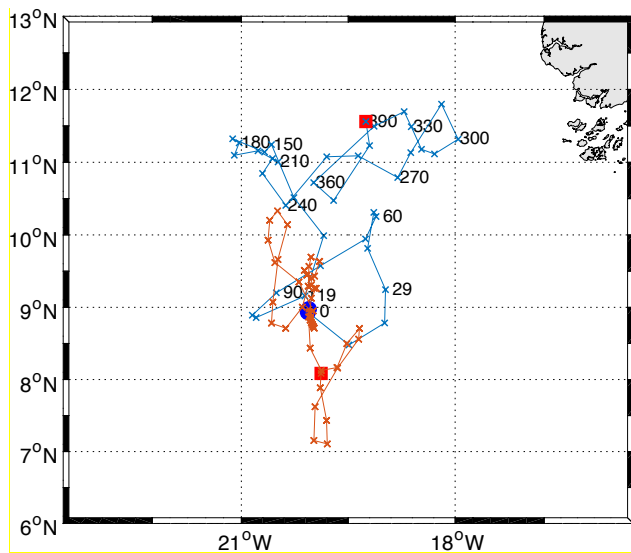


Fig. 1: trajectories and locations of the profiles (crosses) of Arg067 (in blue) and Arg091 (in red) since their deployment on March 5, 2021 (blue circle) until their last profile before April 2, 2022 (red square). The number of days since deployment is indicated every 30 days near the corresponding profile.

The trajectory followed by the two Argos differs appreciably in spite of their release in a very close area.

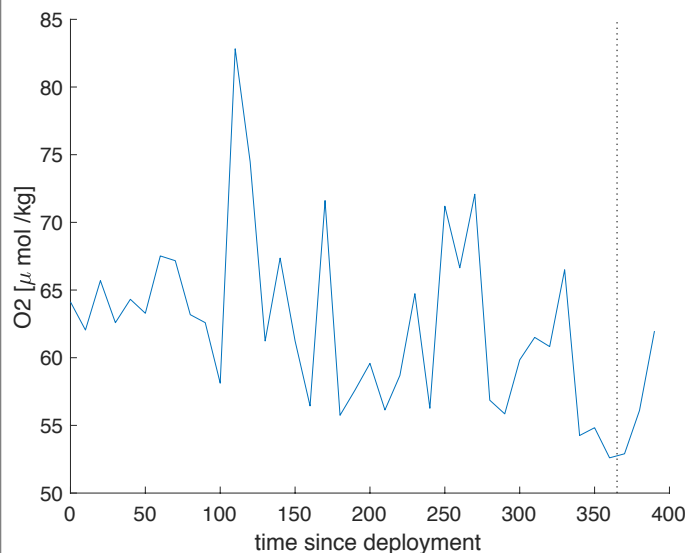


Fig. 2: Time series of the minimum dissolved oxygen value between 0 and 100 m depth from float deployment (t=0) to April 2 (time in days). Profile-to-profile variability dominates the signal but a decreasing trend in dissolved oxygen concentration is also evident.

### Future of the project :

Complementary analyses will be progressively carried out as the dataset grows. Contacts will be resumed with colleagues specialized in ARGO BGC data processing in order to define precisely the analysis and valorization strategy of the acquired in situ data. An effort to evaluate NEMO-PISCES and CROCO-PISCES simulations will also be undertaken using the acquired data set.

A complementary request for ARGOS (O<sub>2</sub> and BGC) will be made to the 2022 LEFE call to allow a new deployment from the offshore area during the spring 2023 PIRATA campaign. Arg067 and Arg091 will then have 2 years of existence. This would allow to reseed the southern part of the NETA shadow zone and to continue the documentation of its physical conditions (circulation, T/S) and BGC. Of particular interest would be to identify the existence of a seasonal cycle for the different variables of interest including O<sub>2</sub>.

*Nombre de publications, de communications et de thèses*

pas encore de publication ou de communication faisant usage des données acquises à ce stade