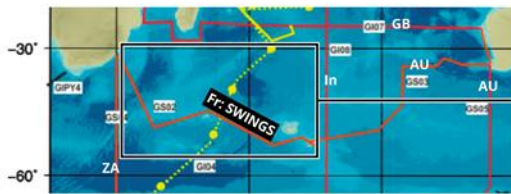


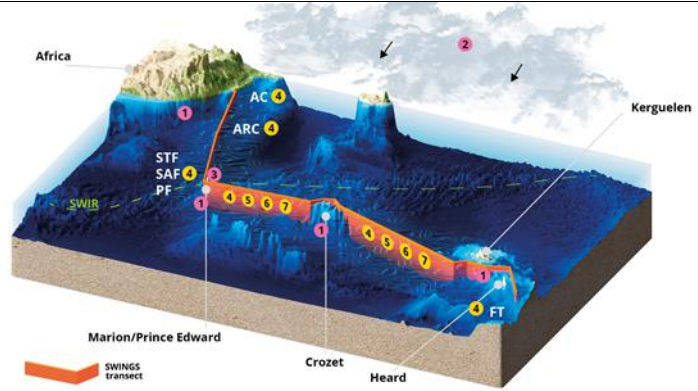
## FINAL REPORT PROGRAM LEFE

Program LEFE/ CYBER	Project Title SWINGS	Years 2018 – 2019
<p>PIs Jeandel Catherine (<a href="mailto:Catherine.jeandel@legos.obs-mip.fr">Catherine.jeandel@legos.obs-mip.fr</a>); H�el�ene Planquette (helene.planquette@univ-brest.fr)</p> <p>Participating Laboratories : LEGOS, LEMAR, LOCEAN, LOMIC, MIO, GET, OOR, CEREGE, CERFACES, LSCE et 6 laboratoires �trangers (US, G, ZA, GB)</p>	<p style="text-align: center;">Contribution to <i>GEOTRACES</i></p> <p>Other funding sources : <b>Attributed in 2019: 597 573.72 � from ANR and 40712 � from FMAC (TGIR FOF)</b></p>	
<p><b>Context</b> (2-3 lignes) The SWINGS cruise proposal submitted in 2017 by the PIs of SWINGS (C. Jeandel and H. Planquette) was evaluated at the highest priority and granted of 2 months of cruise on the Marion-Dufresne by the CNFH. However, the first ANR application failed. CJ and HP therefore asked for some support from LEFE/CYBER to allow gathering the participants and refining SWINGS objectives, rationale and strategy. This was the main justification of the 4800 euros attributed by LEFE.</p>		
<p><b>Objectives / scientific questions</b> (2-3 lignes) SWINGS is a multidisciplinary 4-year project fully dedicated to elucidate trace element sources, transformations and sinks along a section crossing key areas of the Southern Ocean (SO). Refining the objectives of our ANR proposal was key to be successful at our second application. In this light, we organized a meeting in Toulouse in June 2018.</p>		
<p><b>Main results</b> (y compris les relev�s de conclusions des r�unions de coordination si c'est l'objet du financement LEFE)</p> <p>SWINGS was funded 4800 � by LEFE in 2018. We initially planned 2 travels in South Africa + a meeting of the SWINGS participants to prepare the ANR submission. The travels were cancelled but the meeting happened (1500 �) in June 2018 in Toulouse and led to the ANR success. We will spend the remaining 3300 euros to support the costs associated with the pre-cruise meeting that will be held in Brest (12 and 13 March)</p> <p>The main meeting (25 participants + foreign colleagues by videoconference) occurred in Toulouse, M�eteo-France on 25-26 of June 2018. The agenda is provided in annex, as well as the decisions made following the fruitful discussions. The main conclusion was to gather the (two many) questions listed in the first ANR application in three big categories and to stick to the GEOTRACES objectives: 1/ Identification of the major sources of TEIs along the SWINGS section 2/ Quantification of TEI transport by the dynamics in the complex Southern Ocean frontal areas 3/ Investigate the drivers of the internal trace element cycles: biological uptake, remineralization, particle fate and export</p> <p>The PIs followed these recommendations for the organization of the new ANR application, which was successful since SWINGS is funded for 4 years at a level of <b>597 573,72 �</b>.</p> <p><b>SWINGS aims at 1) establishing the relative importance of sedimentary, atmospheric and hydrothermal sources of trace elements and isotopes (TEIs) in the Indian sector of the SO, 2) investigating the drivers of the internal trace element cycles: biogenic uptake, remineralization, particle fate, and export, and 3) quantifying TEI transport by the Antarctic Circumpolar Current and the complex frontal areas at the confluence between Indian and Atlantic Oceans.</b></p> <p><b>The map of SWINGS is recalled in Figure 1 as well as the main measurements planned along the section.</b></p>		
<p><b>Figure 1:</b> Left: The GEOTRACES implementation map illustrates the extremely poor coverage of the SO yet, underlining the Fr-SWINGS (GS02 section) commitment. Right: view of the SWINGS section with indicative front positions and current directions (AC&amp;ARC: Agulhas Current &amp; Agulhas Return Currents, STF&amp;SAF: Sub Tropical &amp; Sub Antarctic Fronts, PF: Polar Front, FT: Fawn Trough. External source tracking and processes with corresponding tracers to be analysed during SWINGS: 1, Land-ocean; 2, atmospheric; 3, hydrothermal; 4, circulation transports; 5, microbial activity; 6, biological uptake; 7, particle-solution exchanges.</p>		



GEOTRACES section implementation & country commitment

- not done
- - - partially done



### SOURCE TRACKING

- ① LAND-OCEAN:  $\delta\text{Fe}$ ,  $\delta\text{Zn}$ ,  $\delta\text{Cd}$ , Ra,  $^{227}\text{Ac}$ ,  $\epsilon\text{Nd}$ , Th, Pa, Pb, REE
- ② ATMOSPHERIC: Hg,  $^{232}\text{Th}/^{230}\text{Th}$ , Pb
- ③ HYDROTHERMAL:  $\delta\text{Fe}$ ,  $\delta\text{Zn}$ ,  $\delta\text{Cd}$ , Ra,  $^{227}\text{Ac}$ ,  $\epsilon\text{Nd}$ , REE, Hg, Pb,  $\delta^7\text{Li}$ , Cr, Sr

⊕ MEASURED IN ALL FRACTIONS, IN DUST, RAIN, WATER COLUMN & SEDIMENTS: Al, Mn, Fe, Ni, Cu, Co, Cd, Ba, REE

### PROCESSES

- ④ CIRCULATION:  $^{13}\text{C}$ ,  $^{15}\text{N}$ ,  $\Delta^{30}\text{Si}$ ,  $\epsilon\text{Nd}$ , REE, Ra,  $^{227}\text{Ac}$ , Th/Pa, Pb
- ⑤ MICROBIAL ACTIVITY:  $^{13}\text{C}$ , Th, Pa,  $\text{Ba}_{\text{org}}$ , Fe&Cu org. speciation
- ⑥ BIOLOGICAL UPTAKE:  $\delta\text{Fe}$ ,  $\delta\text{Zn}$ ,  $\delta\text{Cd}$ ,  $\Delta^{30}\text{Si}$
- ⑦ PARTICLE-SOLUTION EXCHANGES:  $\delta\text{Fe}$ ,  $\delta\text{Zn}$ ,  $\delta\text{Cd}$ , Th/Pa,  $\epsilon\text{Nd}$ , Ra, Pb, REE

**Future of the project :** We hope that nice weather will allow the cruise to be undertaken under the best conditions in Jan-Feb 2021. Specific tasks are detailed in the Gantt diagram of the project is reported in the next page.

Despite the funding already secured from ANR, we will need additional funding for supporting all analytical costs required for a perfect understanding of TEIs biogeochemical cycles. Our application for complementary funds to LEFE failed this year, we will re-apply the coming year in order to ensure the best possible exploitation of samples and publications after the cruise. We also obtained half of what we were expecting at the "soutien campagne en mer (FMAC)" so we will probably apply for a complement too at FMAC again in 2020 for 2021

