

ARGONAUTICA

OCEAN & CONTINENTAL WATERS EDUCATIONAL PROJECT

2022/11/01
OST ST Meeting

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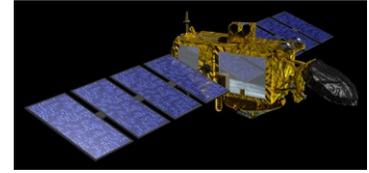
1. ARGONAUTICA

EDUCATIONAL PROJECT

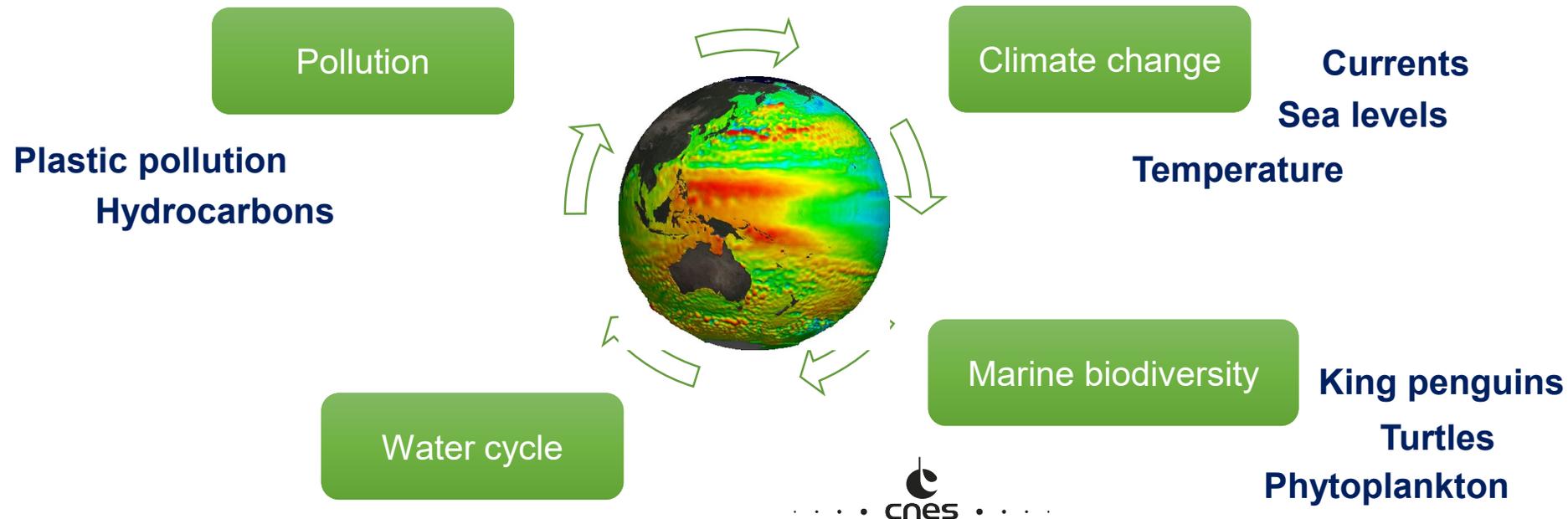
ARGONAUTICA

CNES educational project to study ocean and continental water using satellite data.

- Since 2000
- All levels school students
- To correlate in situ data – mainly collected with ARGOS system - with satellites data - JASON, SENTINEL... -

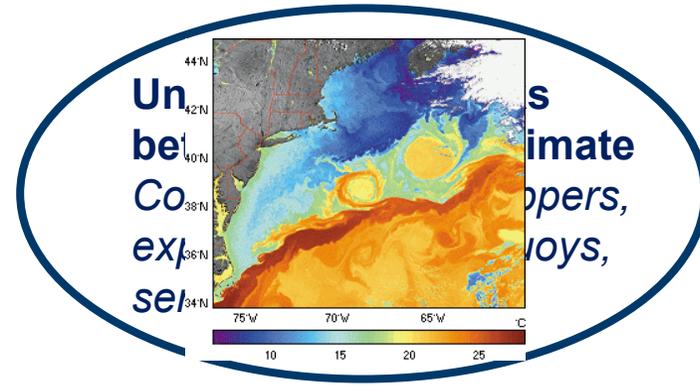


<https://www.jpl.nasa.gov/missions/jason-3>



ARGONAUTICA

CNES educational project to study ocean and continental water using satellite data.



ARGONAUTICA Organisation

Resources for teachers :

- Tracking data (ARGOS)
- Satellites data (JASON, SENTINEL, ...)
- Training
- Discussions & Exchanges with scientists, sea professional, skippers...

Multidisciplinary educational content :

- Geography, mathematics, graphic art, sciences, language (including exchanges with other countries), technology, ...

End of year meeting :

- School students present their class projects and share with other school students and scientists



ARGONAUTICA Argocean/Argonimaux satellites data platform

ÉLÉPHANT DE MER PACOA

Éléphant de mer (Mirounga leonina)
Balise n°13621
Début de suivi : 29/12/2015
Dernière semaine de localisation : 99/99/9999
Lien permanent vers les données de cette balise

Plus d'informations :

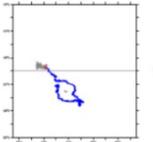
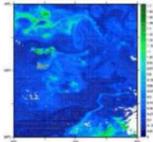
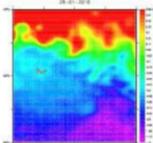
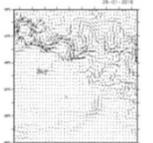
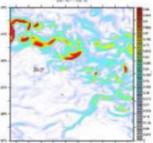
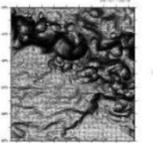
- CEBC-CNRS : éléphant de mer
- dossier pédagogique : suivre des éléphants de mer

Sélectionner une date :

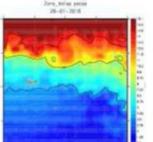
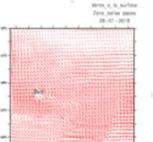
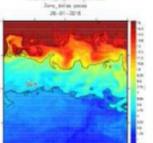
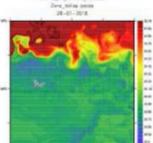
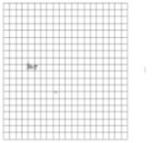
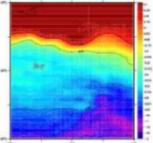
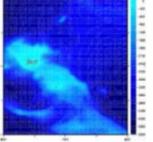
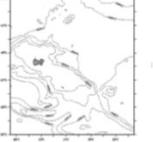
Cartes du 26/01/2016

Positions Cartes

Cliquez sur les images pour les agrandir
 Télécharger toutes les images
 Visualisez les cartes avec Google Earth

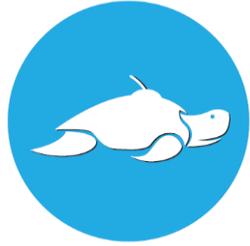
Crédit : C. Guinet

From 14 to 17
« oceanographic » map

- ✓ Tracking map
- ✓ Defined area
- ✓ Polar projection possible

ARGONAUTICA – Argonimaux example : Investigate ! (“Menez l’enquête !”)



Oscar Storm loggerhead sea turtle has been staying at the same latitudes for 6 months, Madagascar south, in the middle of the ocean.



→ Tracking map

→ Topography/ Ocean current

→ *Does it follow a strong current, or does she goes around a storm or vortex ?*

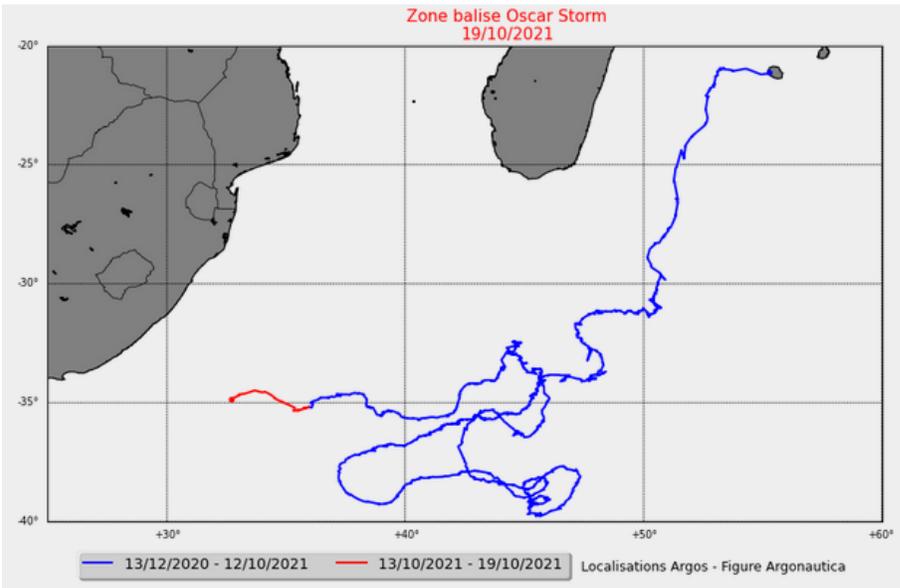
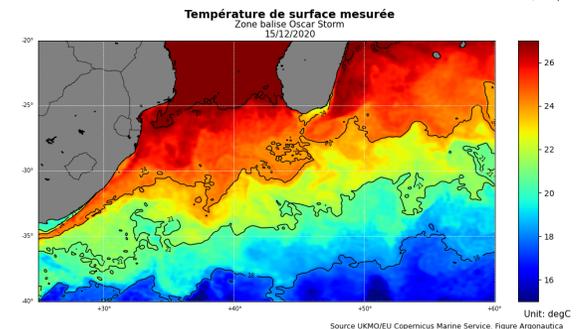
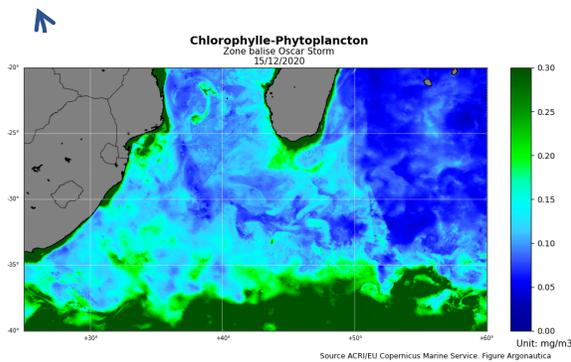
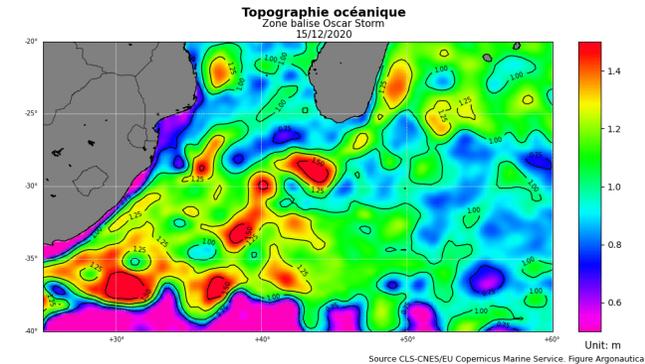
→ Chlorophyll / Phytoplankton

→ *Does foraging influence its behaviour ?*

→ Temperature

→ *Too cold further south ?*

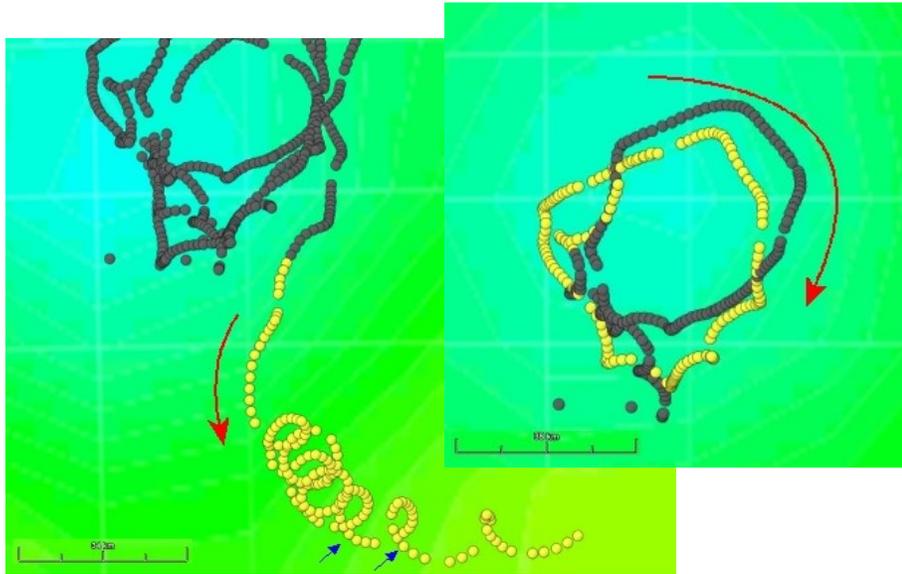
→ Other turtles tracking map ...



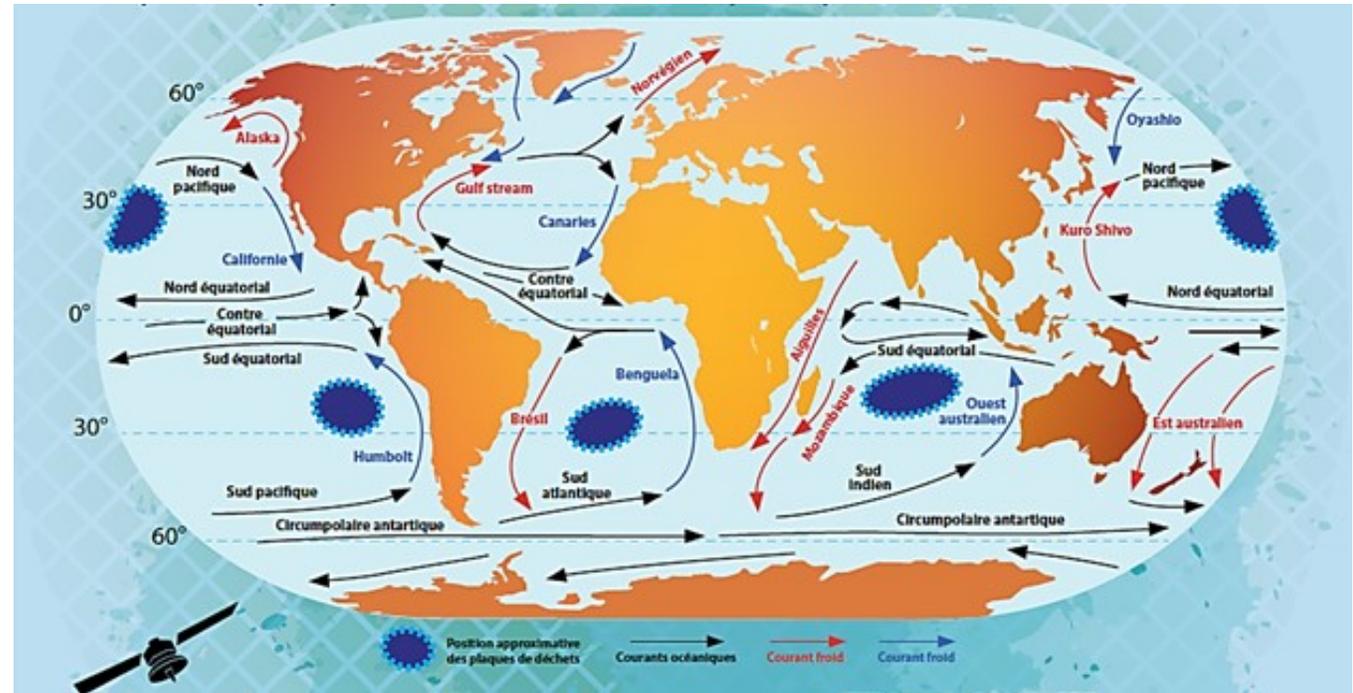
ARGONAUTICA – Argocean example :

- **Coriolis & wind effect on buoys**

→ Follow « *La fille de l'Atlantique* » buoy (southern hemisphere) dropped by skippers during Vendée Globe



→ Satellites global view of ocean gyres





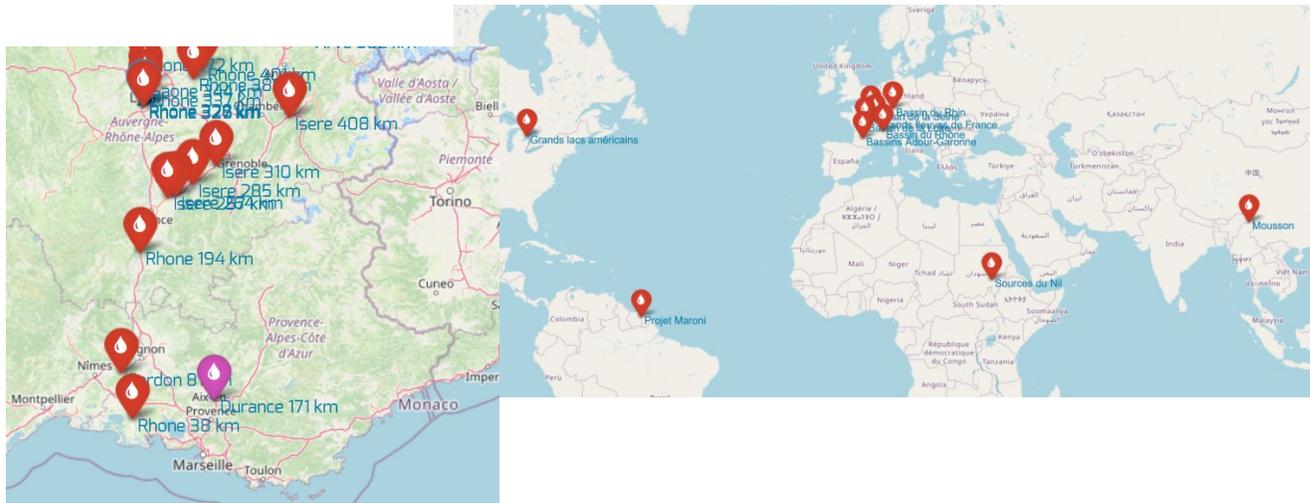
2. ARGOHYDRO SATELLITES DATA

Argohydro satellites data :

- ✓ Satellites data platform is dedicated to teachers and students
- ✓ 5 projects available : American great lakes, Maroni (french Guyana), Nile sources, Monsoon, French rivers
- ✓ Water levels time series (both table and graph)

2022 end-of-year upgrade (in progress with CLS) :

- ➔ To add continental waters observation data – on a map.
- ➔ *Land cover map, Snow...*



Référence : R_RHONE_RHONE_KM0194

Bassin : Rhone

Position (longitude,latitude) : 4.7823°, 44.6609°

Début des mesures : 22/04/2016

Dernière mise à jour : 24/10/2022

Station active, 86 mesures

Source Hydroweb / satellite altimétrique

Satellite: Sentinel-3A

Mesures

Figures

Télécharger le fichier de mesures ci-dessous

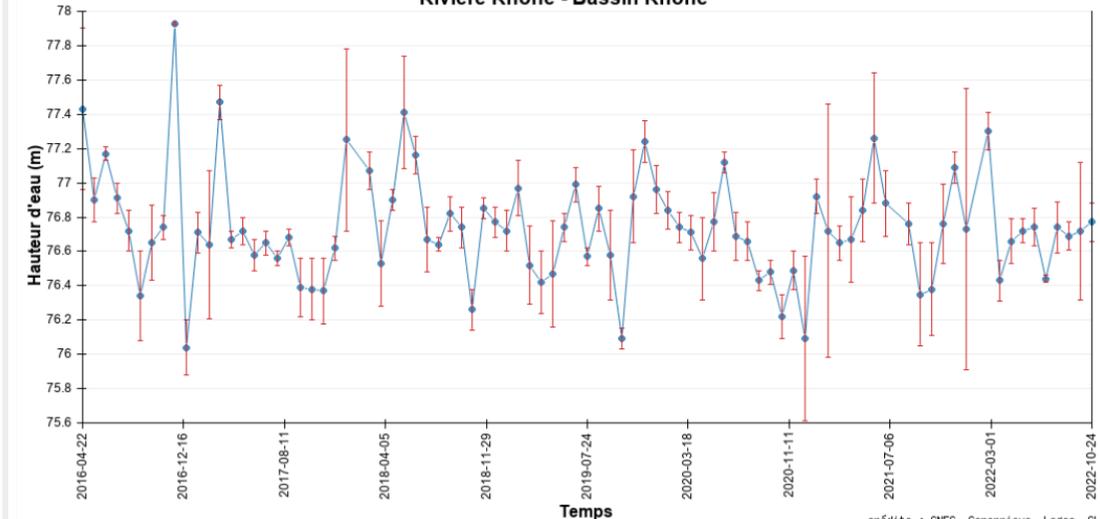
date aaaa-mm-jj	heure hh:mm	haut. m	incert. m
2016-04-22	21:06	77.43	0.47
2016-05-19	21:06	76.90	0.13
2016-06-15	21:06	77.17	0.04
2016-07-12	21:06	76.91	0.09
2016-08-08	21:06	76.72	0.12
2016-09-04	21:06	76.34	0.26
2016-10-01	21:06	76.65	0.22
2016-10-28	21:06	76.74	0.07
2016-11-24	21:06	77.93	0.01
2016-12-21	21:06	76.04	0.16
2017-01-17	21:06	76.71	0.12

Mesures

Figures

Télécharger la figure

Rivière Rhone - Bassin Rhone



crédits : CNES, Copernicus, Legos, CLS

Hauteurs d'eau mesurées par satellite



3. « ARGONAUTICA » SERIOUS GAMES



Argonimaux serious game



1. Pingouin



2. Sea elephant

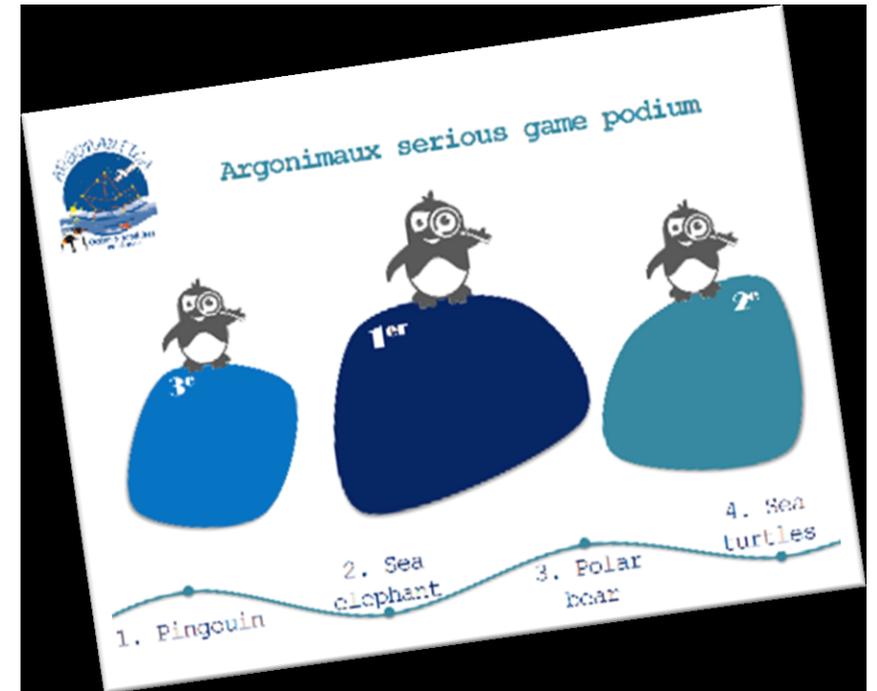
3. Polar bear



4. Sea Turtles



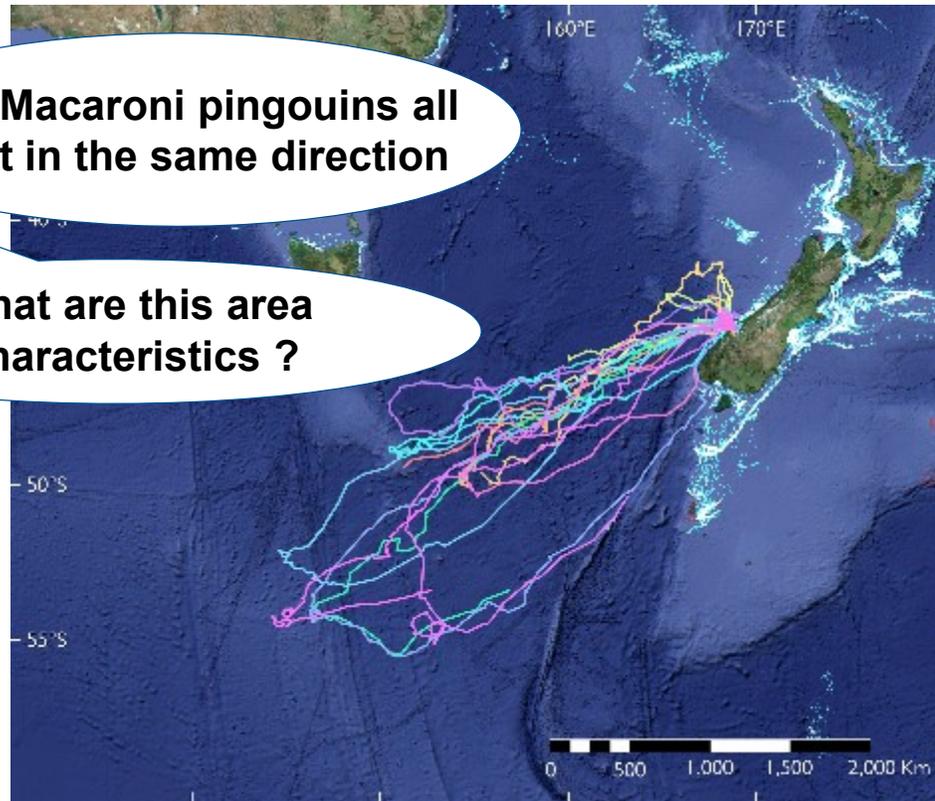
- ✓ 4 games in 1
- ✓ A clue to discover each game
- ✓ All clues allow to find the final question
- ✓ Download not proposed → animation required





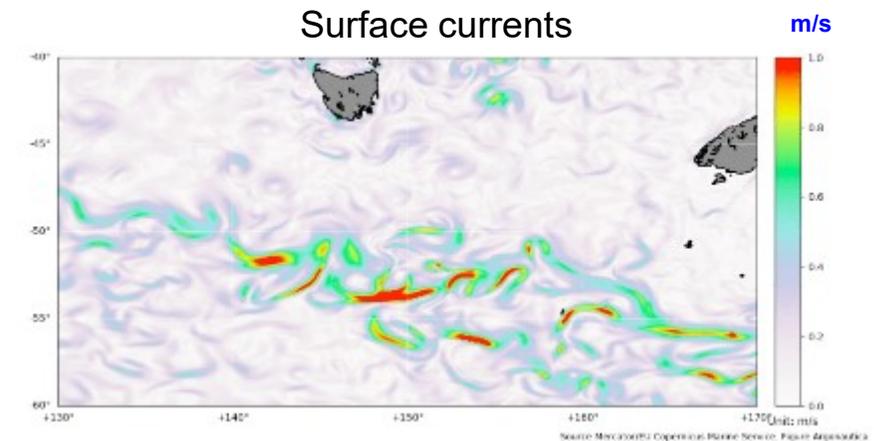
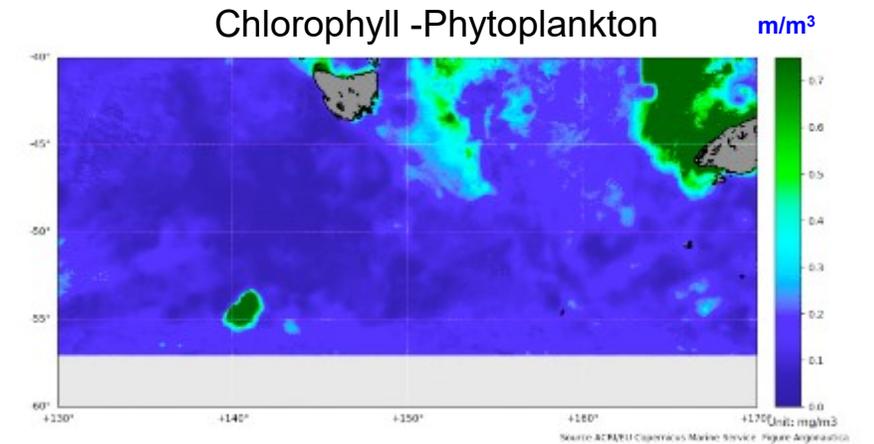
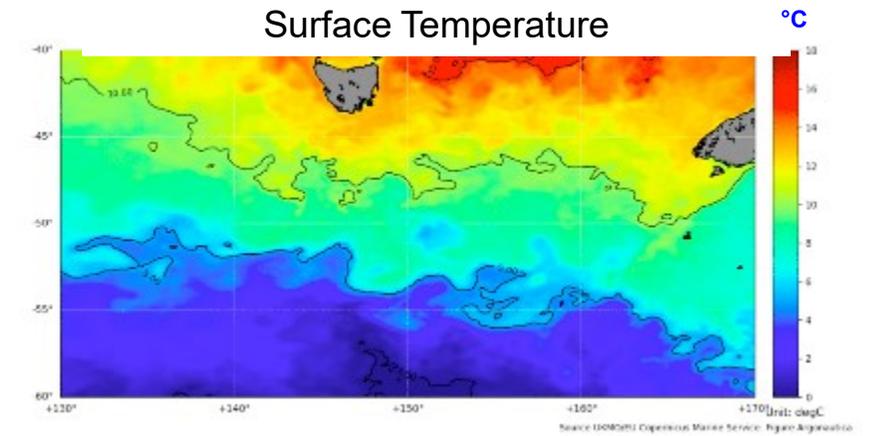
Ho ! Macaroni pinguins all went in the same direction

What are this area characteristics ?



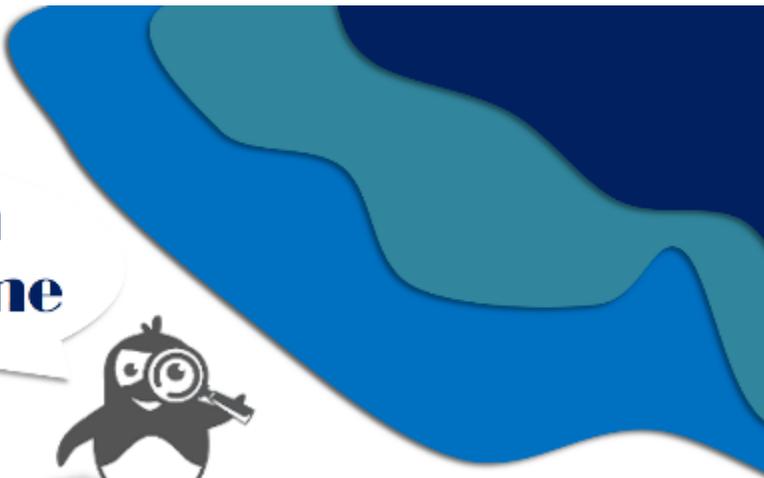
« Macaroni penguin » CLUE :

- A : Warm water / A lot of chlorophyll / fast sea currents
- B : Warm water / A lot of chlorophyll / slow sea currents
- C : Warm water / Lack of chlorophyll / fast sea currents
- D : Warm water / Lack of chlorophyll / slow sea currents
- E : Cold water / A lot of chlorophyll / fast sea currents
- F : Cold water / A lot of chlorophyll / slow sea currents
- G : Cold water / Lack of chlorophyll / fast sea currents**
- H : Cold water / Lack of chlorophyll / slow sea currents

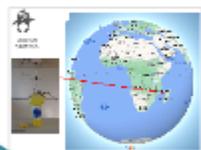




Argocean serious game



1. Tides



2. Drifting buoy « Aquaflex »

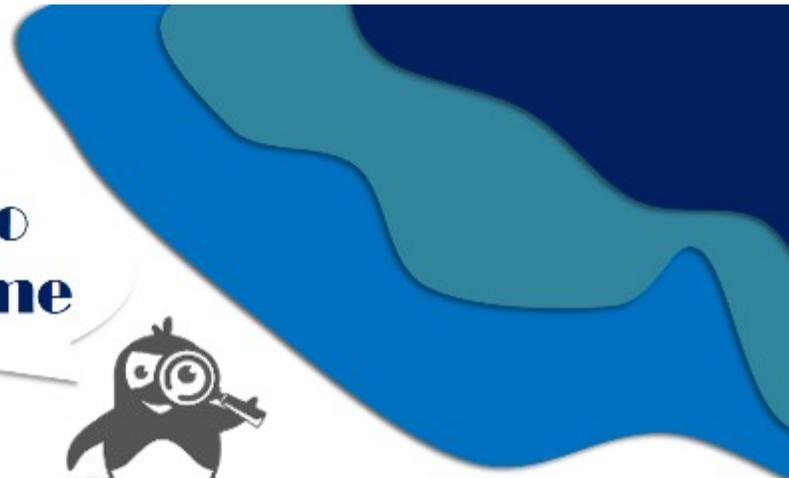
3. Environment



4. Sea currents



Argohydro serious game



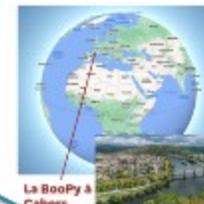
1. Nasser lake



2. Evapotranspiration

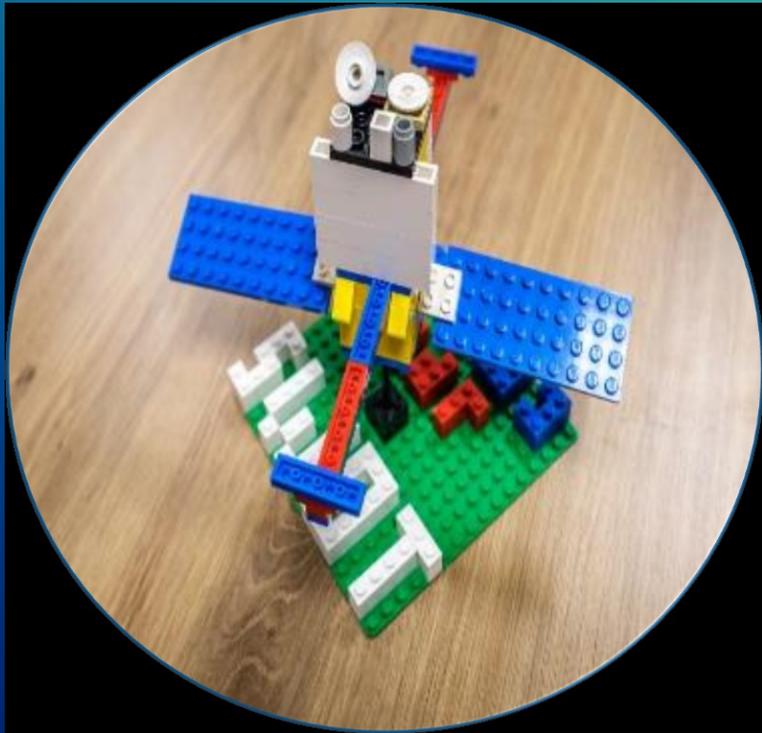


3. BooPy buoy



4. West south of France





4. « SWOT CHALLENGES »

SWOT Challenges

- ✓ From elementary to high school
- ✓ Each month one challenge from September 2022 to January 23
- ✓ Resources proposed to classes
- ✓ Free production posted [on a padlet](#)

80
engaged
classes

Already 48
productions
on padlet
from #1 & #2

Topics

#1 « CNES qui manque ? »

Imagine your own instrument to be added on SWOT payload

#2 « À la hauteur de SWOT »

On dedicated altimetry data platform find water surface elevation of a French river

#3 « Des phénomènes extraEArdinaires »

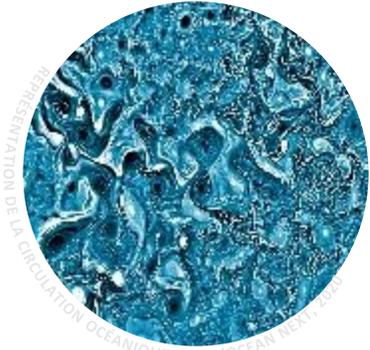
Highlight an hydrological extreme event with satellite images

#4 « SWOT à contre courant »

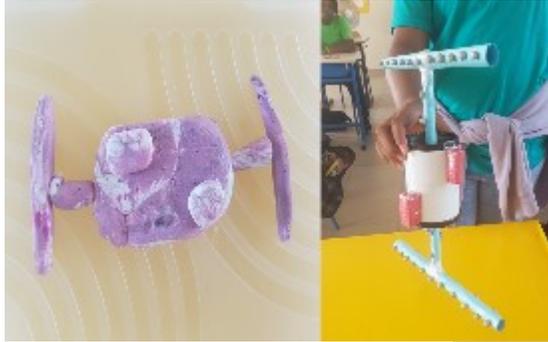
Illustrate and comment an ocean currents with satellites data

#5 « Qui grignote mon littoral ? »

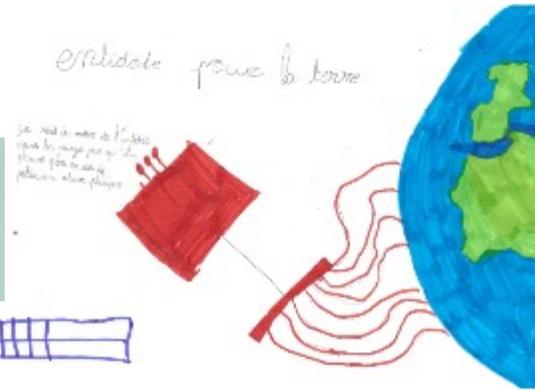
Proposed and comment a coastal erosion scientific problem



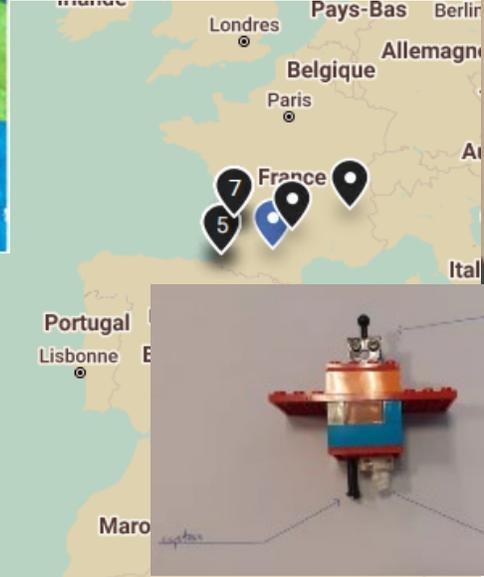
SWOT Challenge #1



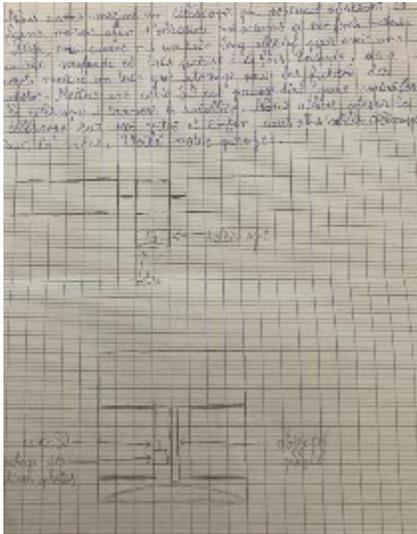
École de Rivière Salée, Martinique



Ecole Jean Verdun de Hasparren, Pyrénées Atlantique



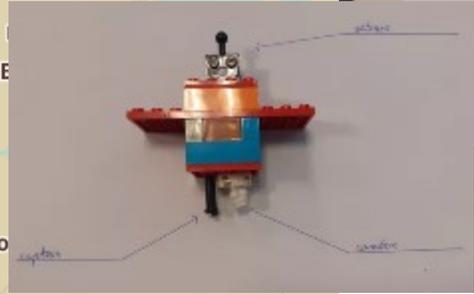
École Notre Dame de Bordeaux, Gironde



Collège Agarande de Kourou, Guyane



Lycée Alexis Monteil de Rodez, Aveyron



CNES qui manque ?
Def 1
 Nous souhaiterions voir embarqué sur le satellite SWOT 3 instruments en plus de KalRa
 1- un instrument qui va mesurer la couleur de la surface de l'eau de mer. En fonction de cette couleur, nous pourrions qu'il sera possible de déterminer la quantité de déchets (déchets humains) qu'elle contient et de quelle nature ils sont. Ce serait pour savoir si les déchets flottent en surface ou juste dessous ou plus en profondeur. Nous pensons que la surface doit réfléchir les ondes différemment en fonction de la quantité de déchets qu'elle va posséder.
 2- Un instrument laser qui détermine la température de l'eau de mer nous semble particulièrement utile afin de voir où se situent les zones qui se réchauffent davantage.
 3- Pour compléter cela nous souhaiterions un instrument qui mesure la quantité de sel. Nous souhaiterions savoir si cette quantité change et si elle modifie la biodiversité marine.

Collège Lucie Aubrac de Grenoble, Isère



Thank you for your attention

If you want to be a part of this project in any way, do not hesitate to contact me.
estelle.raynal@cnes.fr

Web site : <https://enseignants-mediateurs.cnes.fr/fr/projets/argonautica>

