RESOURCES & PROFESSIONAL DEVELOPMENT

LYDIE LESCARMONTIER, SIENCE OFFICER, *OFFICE FOR CLIMATE EDUCATION*

MAIN OBJECTIVES OF THE OFFICE FOR CLIMATE EDUCATION

TEACHERS

Primary and secondary schools (K5-K8)

Developing and developed countries

PROFESSIONAL DEVELOPMENT

RESOURCES PRODUCTION

ORIGINALITY

Involvement of scientific community (IPCC, Science Academies, labs…)

In phase with IPCC reports

Systemic approach : resources / professional development / network

Free, multilingual and open-source

International cooperation / co-production with field actors (NGOs, teachers…)

Actives pedagogies

Climate action

RESOURCES

DIFFERENT KIND OF RESOURCES

IPCC pedagogical reports

conceptual scenarios

Lesson plans (modules)

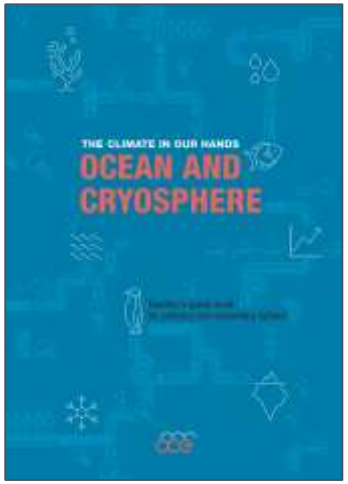
Professional development resources

Videos

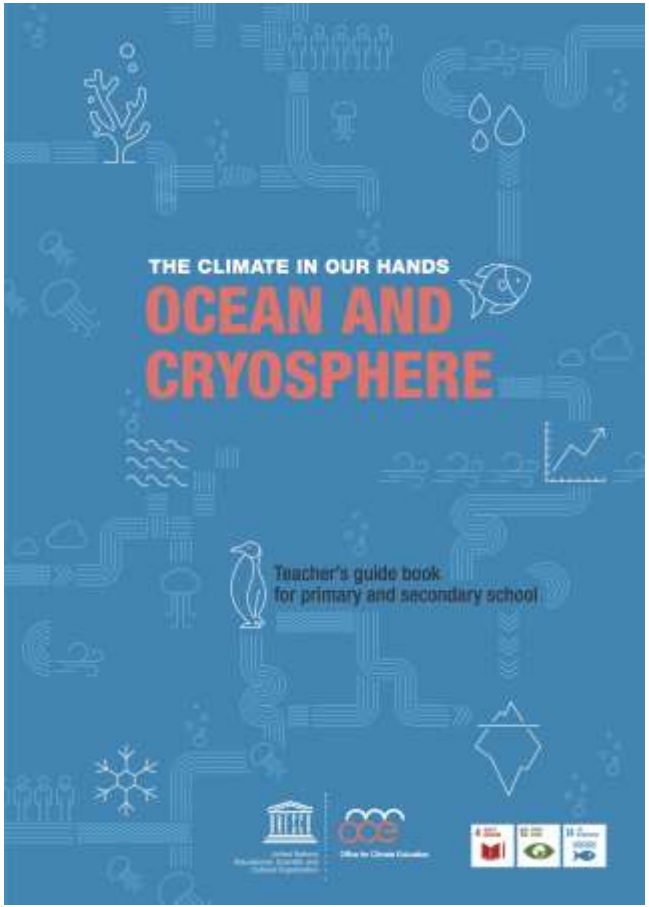
Multimedia animations

Serious games

…



LESSON PLAN – OCEAN & CRYOSPHERE



Primary & secondary school

- Scientific background
- Pedagogical background
- 250 pages
- 2 parts:
  - » We understand
    - 5 turnkey class sequences
  - » We act
    - 3 detailed projects

Pedagogy

- Active pedagogies (inquiry- and project-based)
- Transdisciplinarity
- Action turned

4 languages

- FR, EN, DE, ES

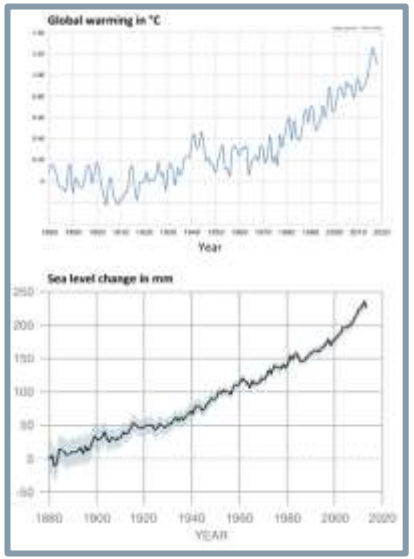
PART I – WE UNDERSTAND

SEQUENCE A – WHAT IS CLIMATE CHANGE?

2 LESSONS

A1. CLIMATE VS. WEATHER

A2. EVIDENCE OF CLIMATE CHANGE



SEQUENCE B – WHAT IS THE ORIGIN OF CLIMATE CHANGE?

3 LESSONS

B1. GREENHOUSE EFFECT: AN ANALOGY

B2. GREENHOUSE EFFECT: ROLEPLAY

B3. HUMANS AND GREENHOUSE GASES

CARBON DIOXIDE – CO_2

- **Emitted by:**
  - burning fossil fuels like coal, oil and gas
  - cement production
  - deforestation
- Partially absorbed by:
  - the ocean
  - land vegetation
  - soils
- Concentration in the Earth's atmosphere increased from ~ 280 ppm (ppm = parts per million) in pre-industrial times to over 400 ppm today.
- Causes:
  - anthropogenic greenhouse effect and global warming (major contributor)
  - acidification of the oceans

SEQUENCE C – WHAT ARE THE CONSEQUENCES OF CLIMATE CHANGE ON OCEAN & CRYOSPHERE?

6 LESSONS

C1. ICE MELTING AND SEA LEVEL RISE

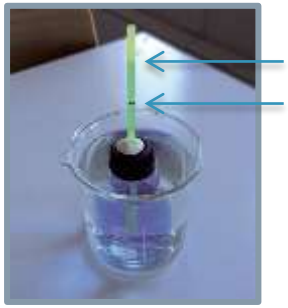
C2. THERMAL EXPANSION

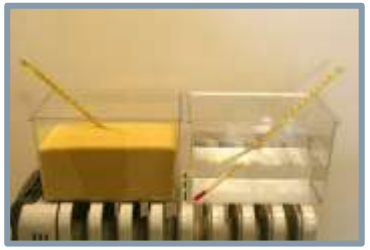
C3. ALBEDO

C4. OCEAN ACIDIFICATION

C5. MARINE CURRENTS

C6. THERMAL INERTIA





SEQUENCE D – WHY ARE THE OCEAN AND CRYOSPHERE IMPORTANT TO US?

3 LESSONS

D1. SERVICES

D2. FOOD WEBS AND ECOSYSTEMS

D3. CULTURAL SERVICES

SEQUENCE E – WHAT CAN WE DO?

3 LESSONS

E1. CARBONE FOOTPRINT

E2. CLIMATE JUSTICE: DEBATE

E3. CLIMATE JUSTICE: ROLEPLAYING GAME

E4. ADAPTATION AND MITIGATION SOLUTIONS WORLDWIDE

Jiao Long from China

My name is Jiao Long and I am 13 years old. I live with my mum in a small apartment at the top of a 48 level building, in the city of Shanxi. My mother says it is the second city in the world with most facilities.

I love seeing all the lights from the buildings, the cars and the advertising screens in the great avenues of the city at night. I also love eating noodles with chicken! I wish I had a brother to play at my videogames with me. We could go together to the technology fair and it would be so much fun.

My mum takes me to school every morning, since I was little. We take the Shanxi metro. I like riding the metro, but sometimes there are too many people and I feel squeezed. There are always lots of people everywhere in my city. Sometimes I wish there were less people, like in my grandpa's village, where I can run everywhere.

My mum says that there are more people every year in our city, because life is getting harder and harder in the countryside and people search a better living.

Mahari from Ethiopia

My name is Mahari. I'm 13 years old and I live with my family in a small village in Northern Ethiopia. My sister's name is Sheeta and my brother's name is Samuel. I enjoy school. My favourite subject is Biology. I want to be a doctor when I grow up.

My family grows vegetables on our land. We grow maize, sorghum, potatoes and tomatoes. We eat these vegetables and then sell some at the market to earn money. We use this money to buy more seeds, books for school and things for our house.

When my father was a young boy, there was enough rain for the vegetables to grow. Now, there is not always enough rain for the crops to grow. My family and our neighbours are ready to sow, but the land is too dry. Together we are building an irrigation system. This is a long pipe that will bring water from a place far away. This will help the crops to grow.

Arianne from the Philippines

My name is Arianne. I live in a house with my mother, father and younger brother. When we were little, we lived in a nice house just in front of the beach. I liked playing with the seashells and watching the baby turtles coming out of their eggs and walking towards the sea. I liked seeing from the window of our house my father arriving in his fishing boat after a long day at sea.

One day, at high tide, the water came further up the beach than usual and our house was flooded. In the following months, this happened more and more regularly. We decided to move, and now we live in a new house a bit further away from the beach. It is built on stilts, so that it can avoid being flooded in the future. We feel much safer here. I really like living near the beach and I hope we will not have to move even further inland in the future.

PART 2 – WE ACT

WE ACT: 3 DETAILED PROJECTS

ADAPTATION PROJECT

INCREASING BEACH RESILIENCE TO CLIMATE CHANGE

Increasing beach resilience to climate change[12] – Adaptation project	
MAIN SUBJECTS	Natural Sciences
GRADE	K4-9
TARGET	Schools in coastal areas

Overview

Sea level rise can cause beach erosion. A "healthy" dune system is essential for sandy beaches to adapt to storms, changing wave conditions or rising sea level. Caring for the dune vegetation and planting new vegetation can help protecting the dunes from further erosion caused by the wind and by beach users. Building fences or other ways of protecting the dunes from being stepped on also helps preventing dune erosion. Beaches with "healthy" dunes recover more easily from post-storm erosion and are more resilient to coastal erosion associated with sea level rise.

Step	Summary
1 – Selecting a beach and identifying potential problems (common to all examples)	Select your study-case beach according to several criteria and gather information for identifying potential threats to your beach that may be related to climate change. In the end, you choose one problem to focus on.
2 – Monitoring the beach	The students monitor their beach and gather data on what is happening to the beach with respect to the precise problem they have defined.
3 – Analysing the data	The students analyse the data to evaluate precisely how the problem they chose to focus on is affecting the beach [?].
4 – Implementing solutions	Once the students have concluded on how climate change is affecting a particular aspect of the beach, they set up a mitigation plan.

MITIGATION PROJECT

SETTING-UP A WALKING BUS

Setting up a walking bus – Mitigation project	
MAIN SUBJECTS	Climate change attenuation: school transportation
GRADE	K4-9
TARGET	Schools in urban areas

Overview

This project only makes sense in urban areas and can therefore be ignored for rural classes. Its objective is to set up a walking bus in order to remove car transportation between students' homes and school. To be successful, it is important that local actors (families, municipality, school) are involved.

The students will conduct a survey in the community, and work on the definition of several itineraries and address different issues related to safety, signage, timetables, etc. They will also work on communication with the local authorities and parents, in order to implement the walking bus.

Step	Summary
1– How do we go to school?	Students conduct an intergenerational survey, among their families, to investigate how daily transportations have evolved over the past 50 years.
2 – Which itinerary is the best for our walking bus?	The class identifies, on a large map of the neighbourhood, the place where each student lives in order to identify a first itinerary for the walking bus.
3 – Which rules to follow?	A person from the town hall comes to the school to help validate the chosen itinerary and define the operating rules of the walking bus.
4 – Is our itinerary feasible?	Students test the routes they have identified for the walking bus and check whether they are practicable and safe.
5 – Which communication?	The class plans the communication relating to the walking bus: for the parents, for the journey, for the municipality.
6 – Test and Launch	Ready for D-day!
7 - Perpetuation	How to ensure the project's perpetuation on the long term, involving the whole school and, beyond, the whole community?

AWARENESS PROJECT

SCIENCE ON STAGE

Science on stage	
MAIN SUBJECTS	Art, Sciences, Literature
GRADE	Cycle 3
TARGET	Raise awareness among students and their community (school, families, local actors) about climate change

Summary

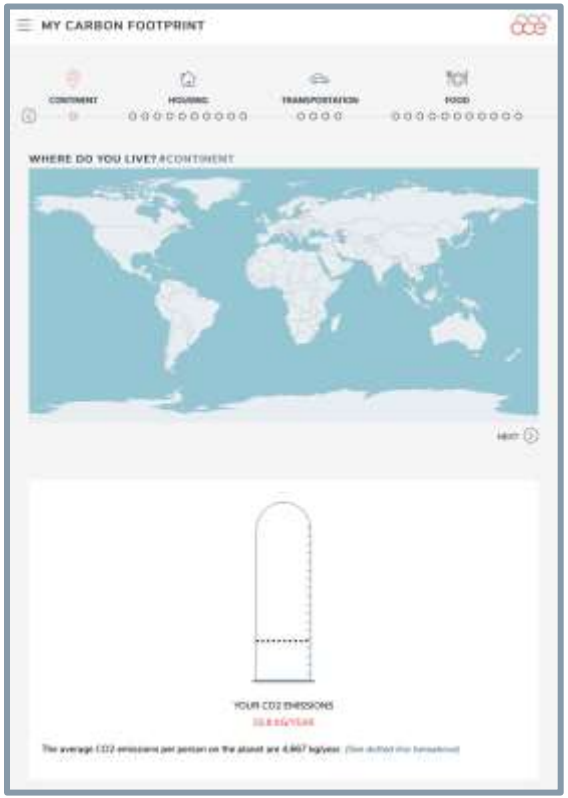
The purpose of this project is to connect science, literature and theatre, with the aim of:

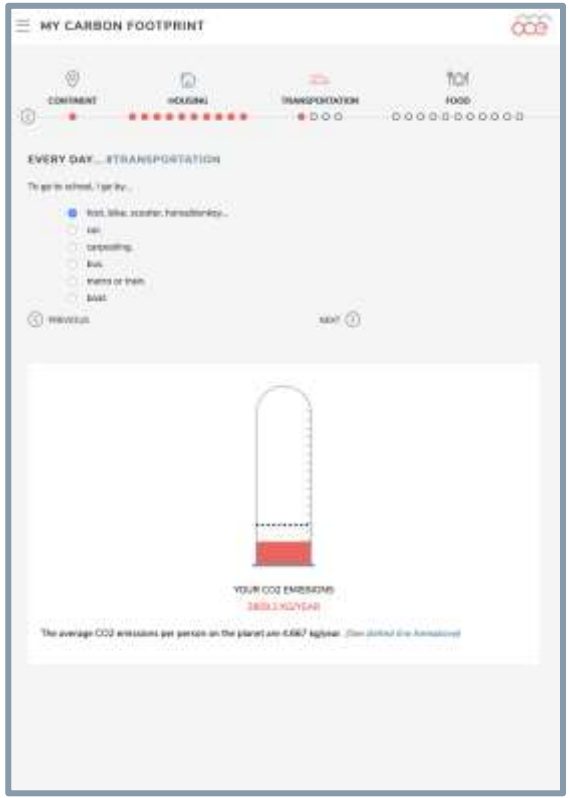
- Assimilate the scientific investigation process by studying the consequences, the origins of climate change, and possible solutions.
- Study the characteristics of theatre text, read and write texts on the climate theme
- Discover the stage while going to the theatre. See one (or more) show (s)
- Learn the practice of theatrical play through exercises that develop contact, look, speaking, variations of voice, body, space ...
- Learn about circus practice through acrobatics
- Put on a play

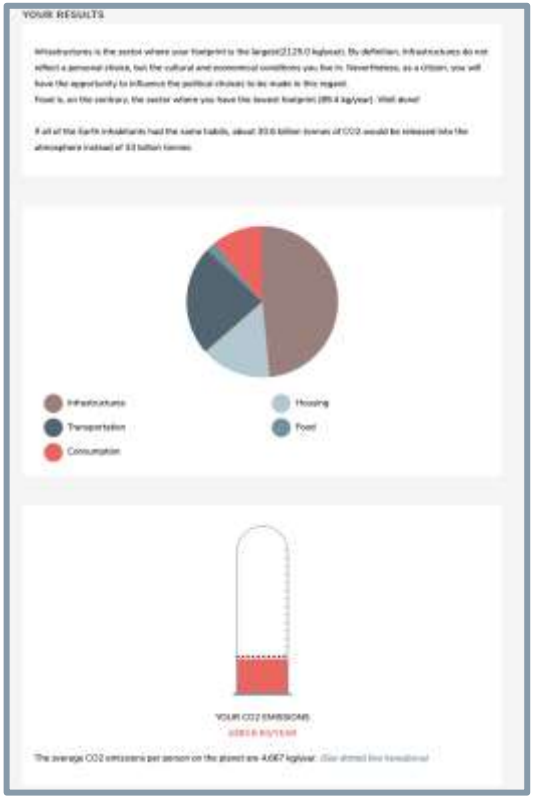
Steps	Summary
1– The "science" part	Understanding of the climate change mechanisms, its consequences and its solutions
2 – "Literature" and "dramatic play"	Discovery of the theatre through dramatic text studies while meeting the objectives of the primary school.
3 – Creation of the show	Work on personal texts, literature, scientists etc... Selection of videos, background sounds etc... that will be used for media during the show.
5 – Modalities (in sessions)	Work on the role play, writing and performances
6 – On stage!	Ready for presenting the show to families, schools and local actors!

MULTIMEDIA ACTIVITIES

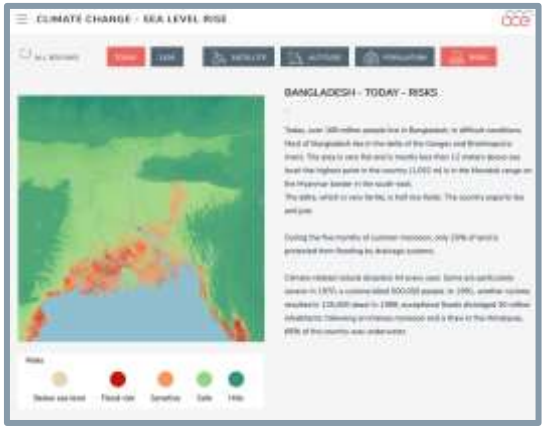
CARBON FOOTPRINT

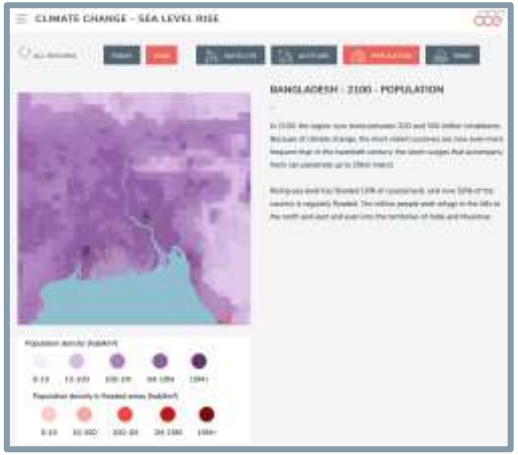


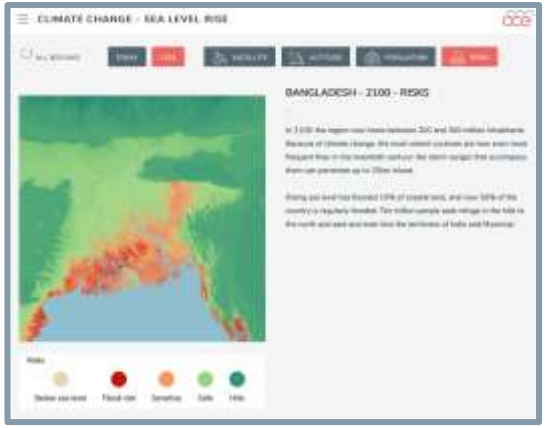




SEA LEVEL RISE

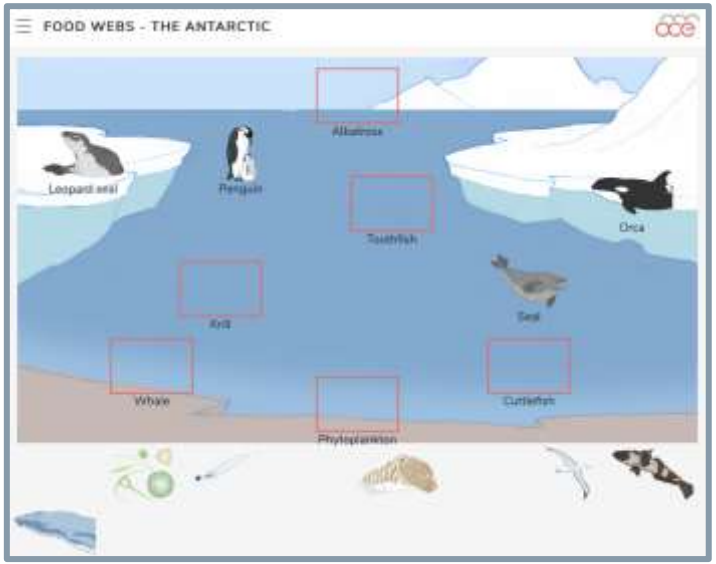


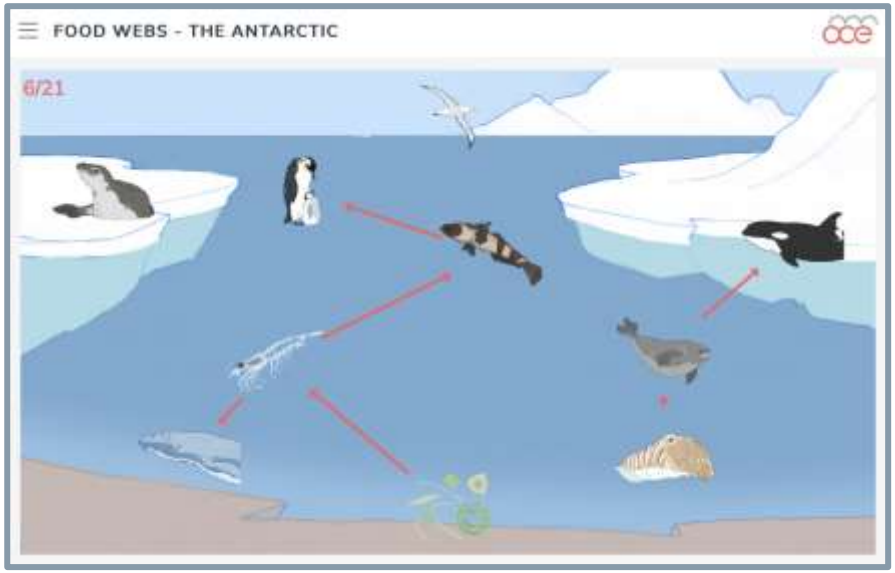


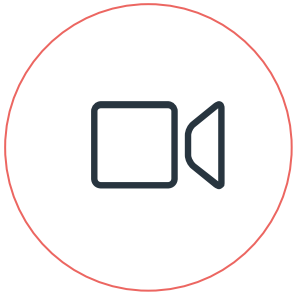


EXAMPLES OF WORLDWIDE SOLUTIONS

FOOD WEBS


FOOD WEBS - THE ANTARCTIC
Albatross
Leopard seal
Penguin
Toothfish
Orca
Krill
Seal
Whale
Cuttlefish
Phytoplankton

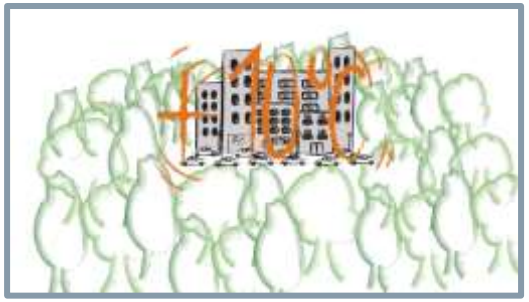

FOOD WEBS - THE ANTARCTIC
6/21



VIDEOS

VIDEOS


Urban heat islands
Aude Lemonsu




Glaciers
Etienne Berthier


CO2


Ocean Acidification
Catherine Jeandel

VIDEOS

Tropical cyclones

Fabrice Chauvin

CNRS Researcher, CNRM, Météo-France

Meteorologist

Marine energies

Raphaël Gerson

Deputy head of renewable energy department

ADEME

Sea ice melt

Martin Vancoppenolle

CNRS Researcher, LOCEAN

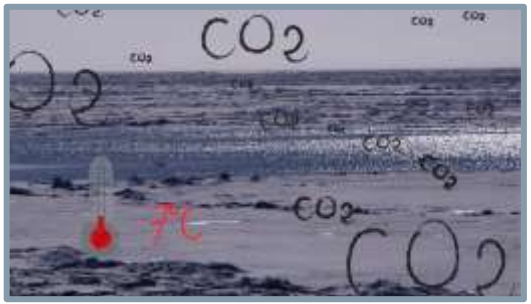
Sea ice expert

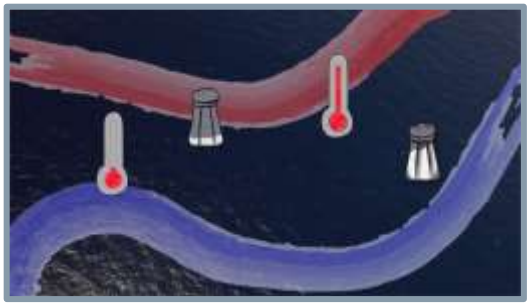
Thermohaline circulation

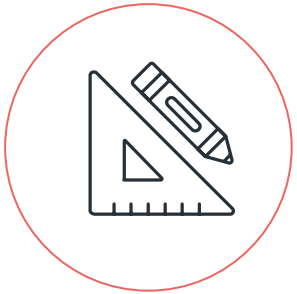
Jean-Baptiste Sallée

CNRS Researcher, LOCEAN

Oceanographer







WHERE CAN YOU FIND THOSE RESOURCES ?

www.oce.global (free resources available in 4 languages)

Teacher professional development

- Online (FR/EN/DE), ES version in 2020

Pedagogical guide

- EN : December 2019
- FR / DE / ES : January 2020

Videos

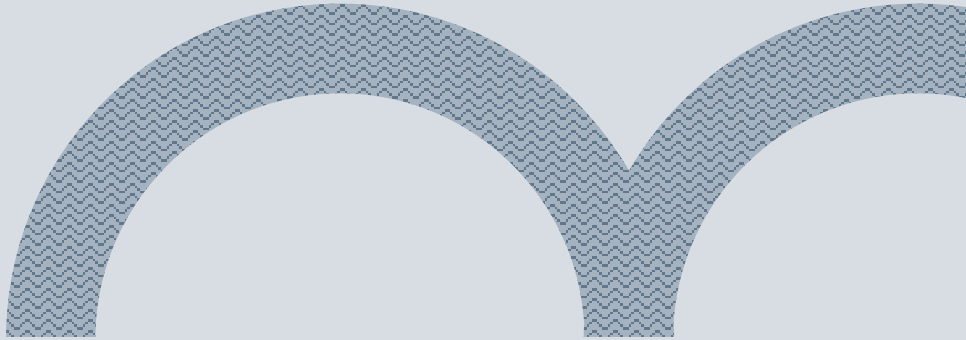
- Online (FR/EN/DE/ES)

Multimedia activities

- FR/EN/DE/ES : December 2019

IPCC SROCC summary for teachers

- EN/FR/DE/ES : December 2019 -> February 2020



TEACHERS' PROFESSIONAL DEVELOPMENT

INVOLVEMENT OF SCIENTISTS

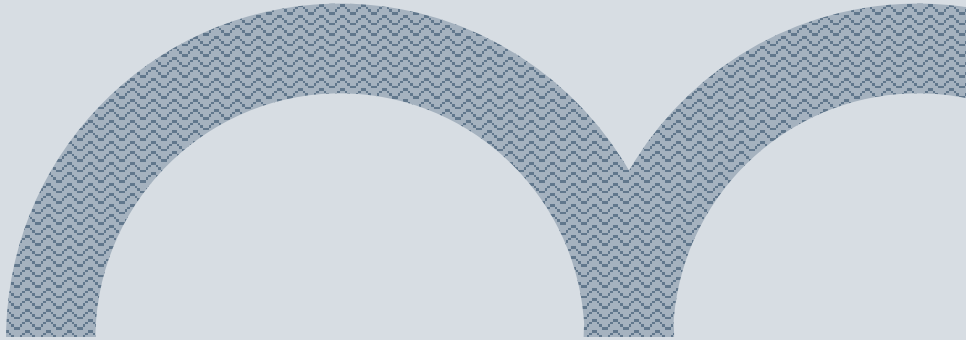
FIELD VISITS

EXPERIENCE SHARING

PRODUCTION OF LOCALLY-RELEVANT PEDAGOGICAL PROJECTS

FIELD ACCOMPANIMENT

- **France: project “science on stage” in Nogent-sur-Oise**
  - Initial training of teachers and teacher trainers
  - 20 classes working on climate change
  - Exhibition created and animated by students
  - Theatre play created and performed by students
- **West Africa (French speaking countries)**
  - Initial training of teachers and teacher trainers
  - Working group (production of locally-relevant pedagogical projects)



NEXT STEPS

NEXT STEPS

- 2020
  - Adaptation to Mexico and Colombia of the resources on ocean and cryosphere
- 2020-2021: LAND USE
  - Same resources (lesson plan, videos, animations, summary for teachers)…
  - Local teachers professional development actions
  - Adaptation to Mexico and Colombia

contact@oce.global
www.oce.global

FONDATION La main à la pâte

METEO FRANCE

IRD Institut de Recherche pour le Développement FRANCE

météo et climat

Institut Pierre Simon Laplace

PIK Potsdam Institute for Climate Impact Research

ipcc Working Group I (WGI)

iap Science Research Health the interacademy partnership

SIEMENS | Stiftung

Fondation LUCIOLE

PRINCE ALBERT II OF MONACO FOUNDATION