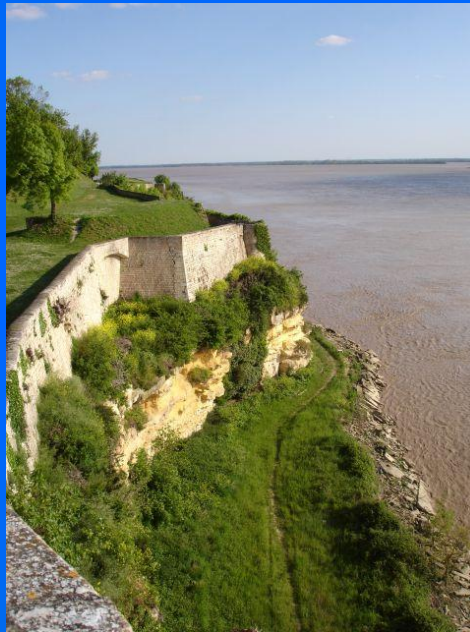


# The carbon flow in the Gironde estuary and the climate change.



The Citadel in Blaye

# Introduction :

- We are working on the carboschool project doing some experiments, listening to researchers like Mr Etcheber and Mr Cotten to know more about our estuary.
- First of all, we studied the carbon flow in the Gironde estuary and the climate change, indeed we made four hypothesis.

1st hypothesis : It could increase the sun's rays .  
We could increase the quantity  
of the solar energy produced.

2nd hypothesis : It could increase the quantity of  
CO<sub>2</sub> on the earth to see if the  
temperature changed.

3rd hypothesis : It could change the earth's  
surface.

4th hypothesis : It could change the earth and its  
position.

We chose the second and the third hypothesis in  
order to do experiments .

# Experiment for the second hypothesis

We used 2 crystallizers, under which we had 2 thermal probes.

To demonstrate that the carbon influences the temperature, we placed under the first crystallizer some chalk which reacts with the hydrochloric acid. There is a release of CO<sub>2</sub>. The experiment was done under a light which represents the sun. The 2nd crystallizer serves us as control.



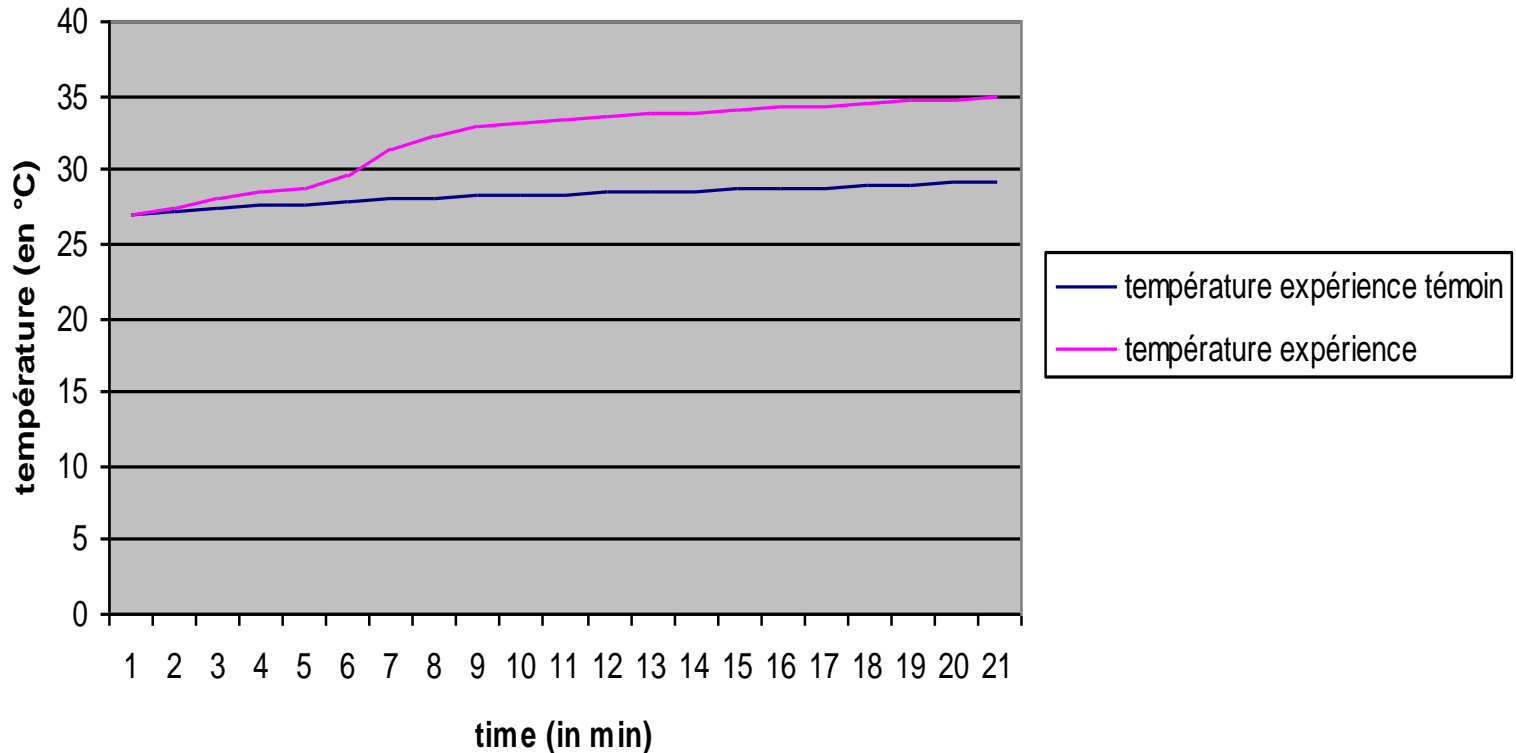
We measure each minute for 20 minutes.  
Here are our results :

<u>minutes</u>	0	1	2	3	4	5	6	7	8	9	10
<u>température of the control experiment</u>	27	27,2	27,4	27,6	27,7	27,8	28	28,1	28,2	28,2	28,3
<u>température of the experiment</u>	27	27,5	28	28,5	28,8	29,7	31,4	32,3	32,9	33,2	33,4

11	12	13	14	15	16	17	18	19	20
28,4	28,5	28,6	28,7	28,7	28,8	28,9	29	29,1	29,1
33,6	33,8	33,9	34	34,2	34,3	34,4	34,6	34,7	34,9

Here is the graph we made of this table :

how the temperature changed between the two experiments



**To conclude : The temperature of the experiments increases faster than the control experiment . We can say that the CO2 rate influences the temperature**

The summary of Mr Cotten's  
conference on the twentieth,  
October 2009

Presentation of the Gironde  
estuary:

# Estuary picture

- The Gironde estuary is the largest in Europe. An estuary is the part of the river which is tidal.



# Animals in the estuary

- Eels, lamproy, salmon and esturgeons are found in the estuary.



← Esturgeons



← Lamproy



← Eels



← Salmon

# The risks in the estuary:

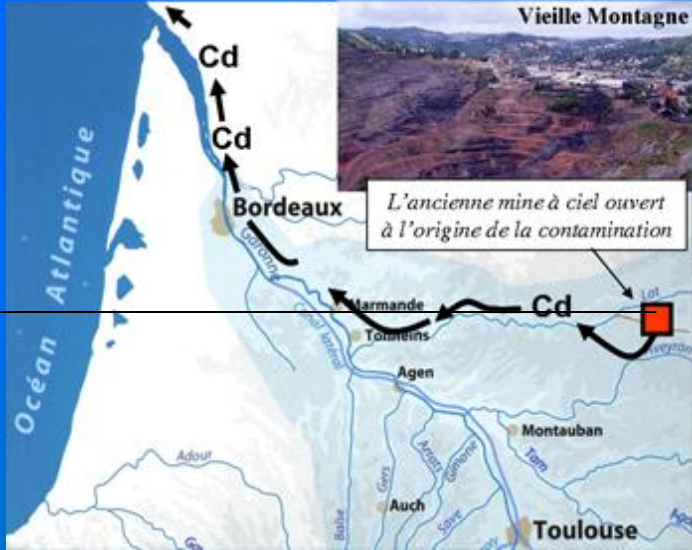
- In Braud- St Louis, there is a nuclear power station. This station could be dangerous for the animals. In fact, it takes water near the estuary's mouth which can kill the little marin animals. There is also natural risks like the erosion, the storms and a more worrying pollution: cadmium (Cd).

# Risks pictures:



Nuclear power station

Origin of the cadmium pollution



# Mr. Etcheber's conference

The turbidity maximum in the  
Gironde estuary.

# Presentation

- Mr Etcheber is an oceanographer who works at « National Center of Scientifical Search » at Bordeaux. He works at EPOC « Environments and Paleo-oceanics environments ». There are approximatly one hundred and fifty researchers.



# Content of the conference

- During this conference he told us about the consequences of the pollution in the water due to the turbidity, which is created by the rain. Indeed, when it rains pieces of soil are detached and they go into the estuary.



# Our summary of the excursion to EPOC

The Red River

Special equipment used

Visit of the buildings

# Visit of the buildings

- Finally, we discovered the equipment used at the university to analyse, with Mr. Etcheber.



# Special equipment used



- Another student, Pierre, explained to us how the « equilibrateur » is used : it's a special machine to balance the partial pressure of air and water to pump it in the river. We can find the CO<sub>2</sub> concentration rate in the water and calculate the rate present in the air with the « valise » (it's another new special equipment which was created by the researcher). Water and air are always in contact which lets us find their individual pressure.

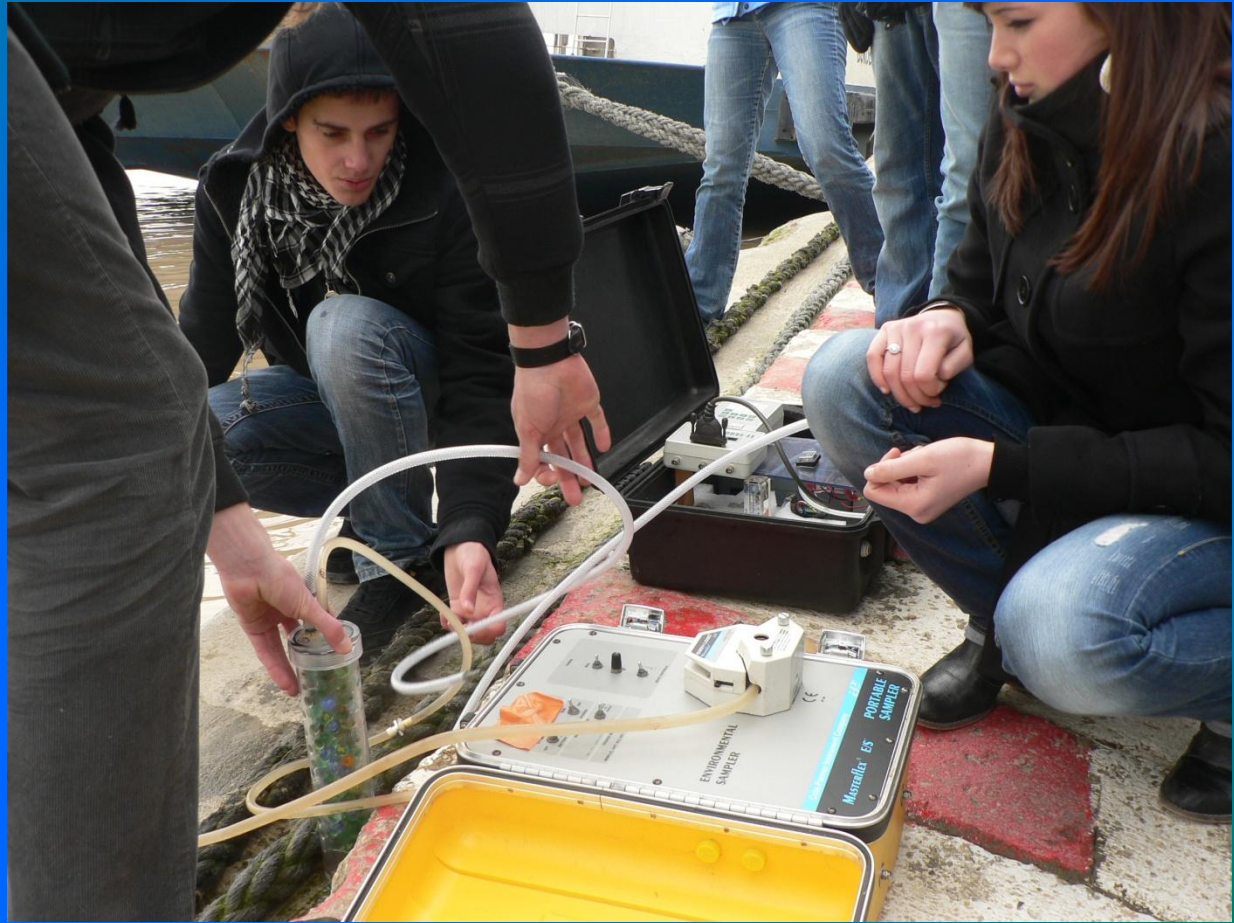
# The Red River

- During the conference, on Saturday december 12th, in Bordeaux University 1, Thi Ha Dang, exposed to us her dissertation about the Red River in Vietnam. This River rythmes the life of the inhabitants, but it is extremely polluted.



# Our water samples and pCO<sub>2</sub> measurements

- Pierre lent us the special equipment for one week to measure the carbon-dioxyde in our estuary. We found differences between high and low tide.



# Mesures de la teneur en CO<sub>2</sub> dans les eaux de l'estuaire de la Gironde

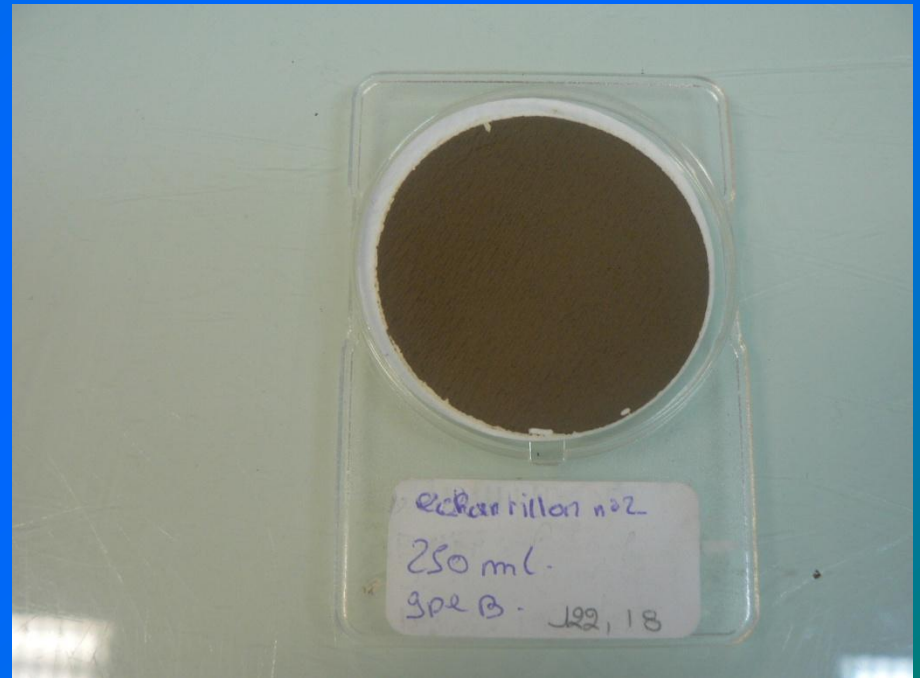
Dates	Marées	pCO <sub>2</sub> (ppm)
11/03/2010	Haute	
15/03/2010	Basse	
16/03/2010	Haute	
18/03/2010	Basse	
19/03/2010	Haute	
19/03/2010	Basse	

- Les valeurs les plus élevées du taux de CO<sub>2</sub> s'observent à marée basse sous l'influence des apports par les rivières.
- Lorsque la marée remonte dans l'estuaire, les valeurs diminuent ; l'océan étant moins chargé en CO<sub>2</sub>,

Every day we took a sample of water, which we filtered in class.

	Heures	Températures de l'eau (°C)	Températures de l'air (°C)	Numéros de filtre	Volumes filtrés (ml)	Marées
Echantillon 1 11/03/2010	15h	6.2	7.8	1	52	montante
Echantillon 2 15/03/2010	13h40	8	13.5	2	50	basse
Echantillon 3 16/03/2010	8h45	8		3	50	haute
Echantillon 4 18/03/2010	15h40			4	48	basse
Echantillon 5 19/03	8h45	7.5	8.8	5	49	haute
Echantillon 6 19/03/2010	16h15	7.2		6	50	basse

The residue was then calcified by M Etcheber in Bordeaux, in order to find the carbon content.



Echantillons	Teneur en MES (mg/l)	Teneur en Carbone organique ( %)
1	667	1.49
2	1099	1.52
3	1114	1.48
4	1079	1.57
5	1527	1.44
6	1306	1.49

# Our study of the Pauillac Station

- In Pauillac, there is a measuring station, which measures turbidity, salinity, the temperature and the oxygen content of the water.
- One group plotted a graph to show the salinity and the oxygen content in the water.
- We found that the two curves were similar and that they followed the tide.