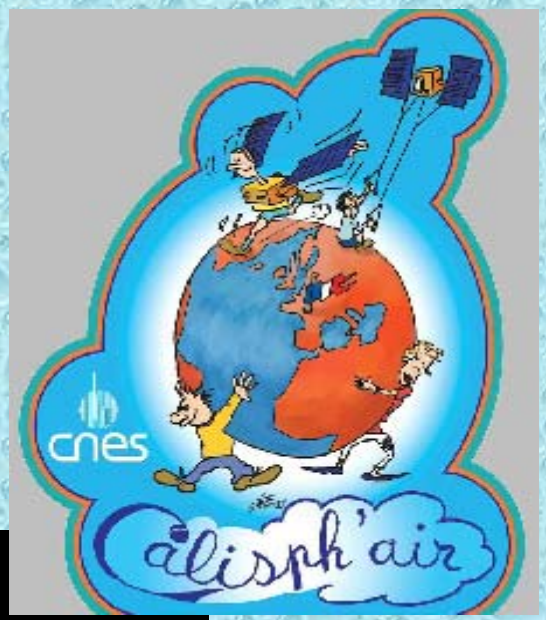
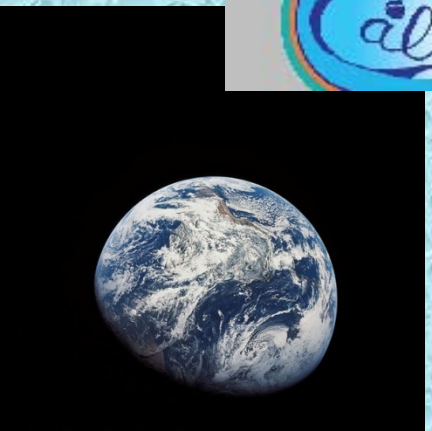
Calipso and Jason-2





Calisph'air project

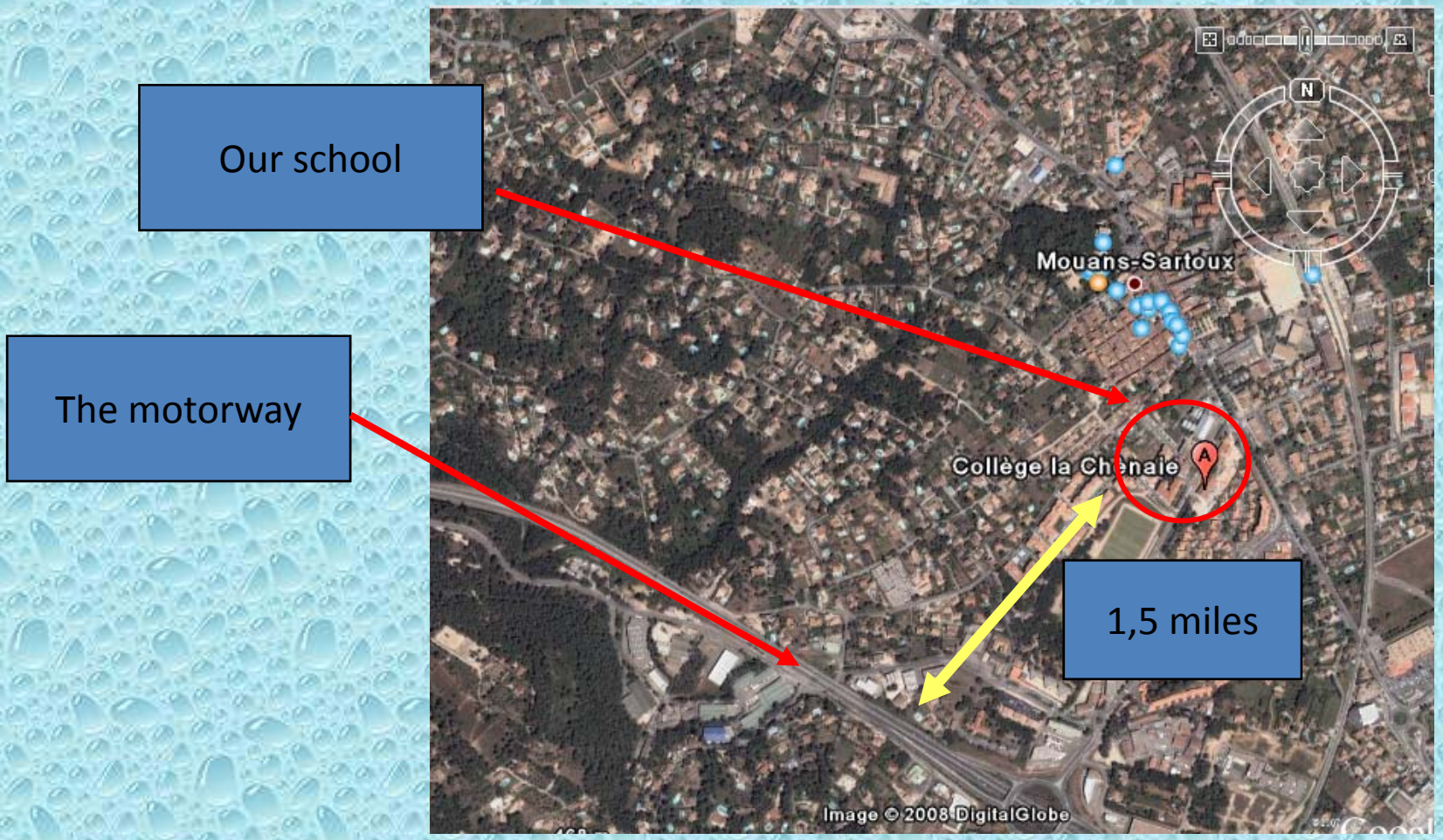
Collège « La Chênaie » Mouans Sartoux 2008-2009

Introduction

- The project has been set up in June 2006. The teachers picked third form pupils who were really interested in science. This class was made up of pupils of very different standards. Some of them were even disruptive.

Our school

- We live in Mouans Sartoux, a very little town near Cannes, a very big city on the sea front.
- Our school is situated near a motorway, so last year, we wondered what the effects of pollution were on our healths.



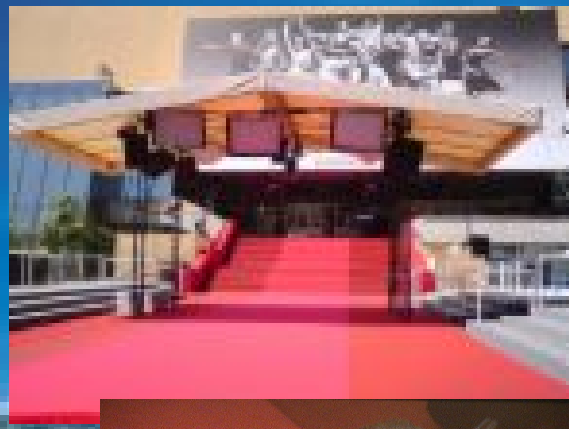
The classes

- The third form has twenty eight childrens. They keep on measuring and observing the consequences of pollution as the former class has done and the impact of tropospheric ozone on our healths. They are participating to the Calisph'air project.

- The fourth form has twenty six students. We keep on measuring and observing the consequences of pollution particularly on the marine environment and on the plankton that is at the beginning of the food chain.

Cannes

Cannes is famous for its film festival. A lot of American stars and Artists come to Cannes in order to show their movies, their art, to win the golden palm and to sign contracts.



But Cannes is in front of North Africa and what's more Sahara. So, a lot of aerosols are carried with the wind.

FESTIVAL DE CANNES

The increase level sea

The sea level has been rising at a rate of around 1.8mm per year for the past century, mainly as a result of human-induced global warming. This rate is increasing; measurements with an altimetric sensor of the CNES-NASA satellite named TOPEX/POSEIDON , from the period 1993-2000, indicated an average rate of 3mm a year. Global warming will continue to increase sea level over, at least, the coming century.

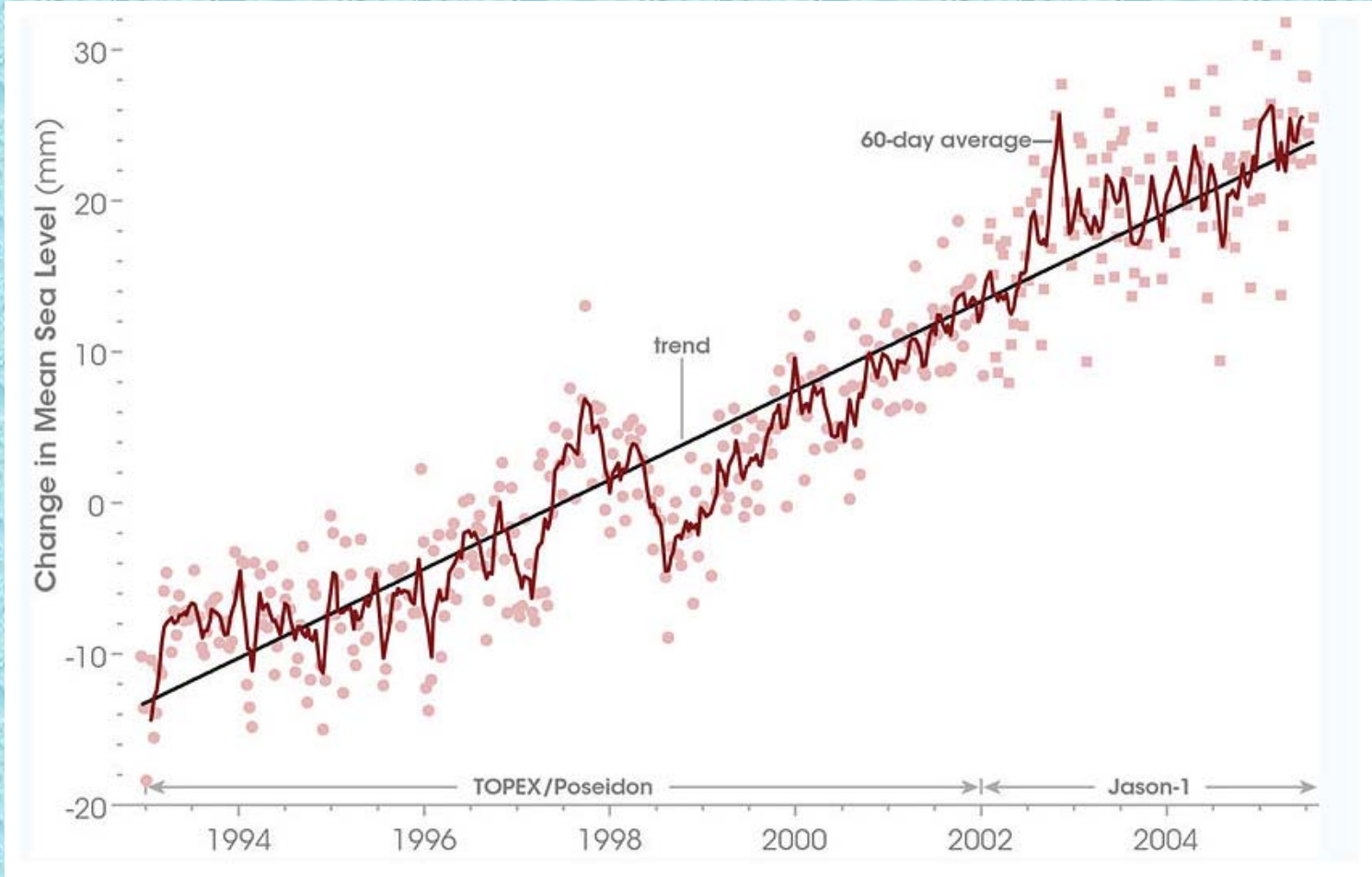
The phenomena of the rising of temperature with a dilatation of water is well known. The rate of dilatation will increase or dicrease according to how quickly ice caps melt will global warming and this is difficult to foresee.

This thermal dilatation of sea water is the main factor of the sea level rising.

And for the next century we can expect a rising of 90 to 880 mm with an average of 480 mm. Only if the melting of ice substantially increases will it become 880 mm.

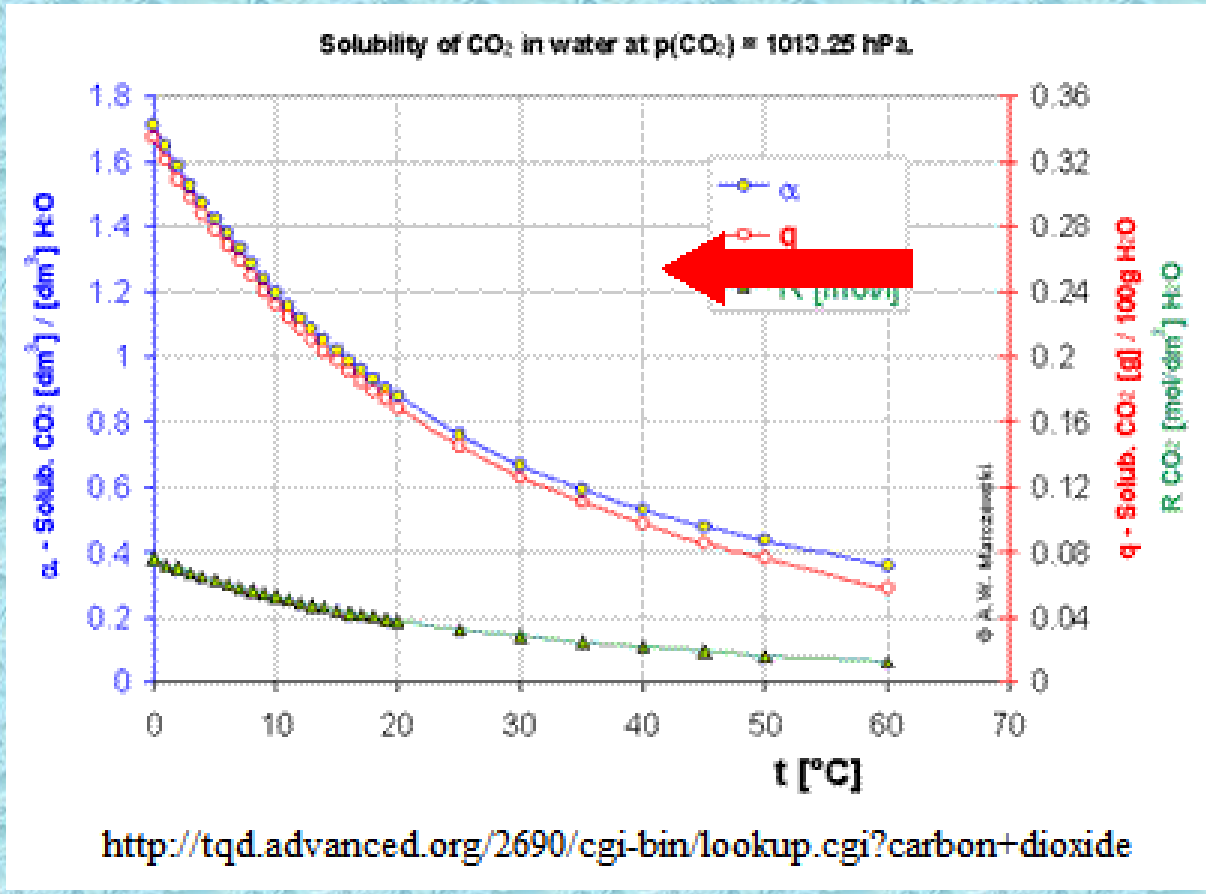
Higher temperatures could have a bad effect on phytoplankton which is at the beginning of the food chain.

Satellites' measurements



Carbon dioxyde solubility

More over, some studies have been done about carbon dioxyde solubility in sea water according to temperature warming: we can see that when the temperature increases, the solubility of carbon dioxyde decreases.



Iron effect on carbon cycle

Phytoplankton needs carbon dioxyde to live and participates in the cycle of carbon.

Even if phytoplankton represents only 5% of the earth biomass, it participates for 33% in photosynthesis and, so, on the carbone dioxyde recycling.

It seems that iron would be an essential element in the biogeochemical cycle of carbon in ocean: iron would limitate the assimilation of carbon dioxyde by phytoplankton.

But this effect isn’t well known.

Our project for this year

- So, during this year, we would like to answer two questions:
- What is the effect of temperature on phytoplankton and on carbon dioxyde assimilation?
- What is the effect of iron aerosols on carbon dioxyde phyplankton's assimilation?

How can we do?

- We’re building an experimental sea aquarium with mediteranean sea water.
- After the physicochemical balance has been reached, we will modify each parameter one by one and we will see the effects on phytoplankton and on the mediteranean species.
- We’ll take off 10 litres of water and after filtration, we will count the number of phytoplanktons we’ll see on the microscope.
- We’ll put iron on our aquarium (very little concentration) to see his effect on phytoplankton.
- To study the iron concentration of our aquarium, we’ll use the chromatography or the precipitation technique (with sodium hydroxyde).
- To study the amount of aerosols, we’ll use the Globe protocol for aerosols, using solar photometers. To be sure of our measurements, we need Calipso satellite pictures.
- To study the impact of temperature increasing in the bay of Cannes , we’ll analyse Jason-2 picture.
- To study the phytoplankton movement, we’ll analyse Seastar picture (with seawifs) and try to find a correlation with former pictures of Calipso and Jason-1.

OUR PREVISION

- Carbon dioxyde is dissolved into water with this chemical reaction:

$$CO_2 + H_2O = CO_3^{2-} + H_30^+$$

- If Carbon dioxyde concentration increases, the balance will go towards the right, so, water pH will decrease.
- Carbone dioxyde can't completly dissolves into water. It depends on phytoplankton assimilation.
- We aren't sure if phytoplankton assimilate carbon dioxyde with the increasing of temperatures and the decreasing of pH.
- We don't know the effects of iron aerosols on carbon dioxyde assimilation.

OUR MOTIVATION

- We really feel concerned with the greehouse effect, the earth pollution, the aerosols problems, the parasol effect, the sea pollution.
- We would like to become citizens who respect the planet.
- We hope that everybody will feel as concerned as we are.