

Il pleut, il pleut , sortons nos pluviomètres

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Introduction

Last year , in Southern France, important floodings happened once again.

The multiplication of this type of catastrophes in our region and in the neighbouring ones caught our attention .

We have tried to understand the reasons for these terrible weather events.

Our teachers have explained to us that climate change was provoking a quicker and shorter water cycle.

So as to verify that statement , we decided to concentrate on rainfalls and to measure them all through the year.

Experiments

First we worked on climate change from two points of view : science and geography. We learned all about the water cycle with our physics teacher , then about consequences of the climate change with our geography teacher. We decided to learn more about rainfalls by ourselves , and by experimenting.

List of material:

- a pair of scissors
- a pair of compasses
- bottles
- some soil
- some foil
- some cling film
- some tape
- a cutter

Protocol of experiment:

We have decided to make rain gauges to measure the amount of rain which falls on a certain surface during a certain length of time in Salon de Provence where our school is situated.

Making of our rain gauges:

- First, we took plastic bottles
- We put some soil inside to get a flat bottom
- We covered it with some foil and then we added cling film. We taped it to the bottle so that the water doesn't seep in the soil.
- We put one rain gauge up in a tree to check if the rain would fall through the leaves, we put the others upward and on ground.

Observation:

Each day of the week, a group was in charge of measuring the amount of rain in the rain gauges.

We observed that:

Because the soil absorbed the water, we couldn't manage to measure the exact quantity of fallen rain water.

The higher the rain gauge was set, the more water it collected.

The sheltered rain gauge collected less water.

The absence of graduation is a problem.

Second attempt:

We took new plastic bottles.

In order to avoid absorption problems, we decided to put nothing inside a bottles and to graduate each bottle. The graduations had to be in millimeters and not in centimeters. So, we had to make the following calculations.

We calculated the bottle volume:

$$V = A_b \times h$$

if base: a disc

$$A_b = R \times R \times \pi$$

$$M \quad V = AM^2 \times \pi$$

One millimeters of rain corresponds to one liter per square meter. We adapted the graduation to our bottles and we chose to graduate as follows: 1 graduation = 6 mm

We decided to set two new rain gauges in the best collections spots.



Results and Analysis

Recordings:

Every day; one pupil and one teacher have recorded the rain fall datas.

There were two cases:

For the first rain gauges, we measured the height in centimeters with a ruler.

For the second rain gauges, we counted the number of graduations and we multiplied by six to get the number of millimeters of fallen water.

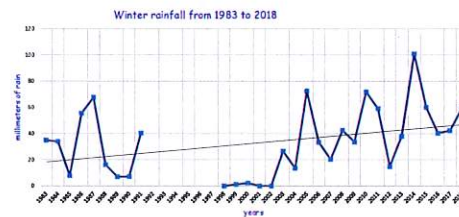
Analyzing datas:

We recorded with a computer the rainfall datas in the city of Salon de Provence for the previous thirty years. We transferred the datas in a spreadsheet by seasons and we drew the graphics about the evolution of rainfalls according to the years. Then we compared it with our results for which we drew another graphic. We did it during winter so we can compare the two of them.

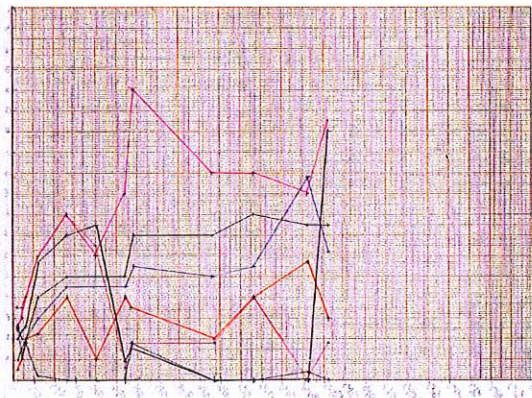
We had to work , with our Maths teachers about scales for our graphics.

We can see that over the years the rains are larger on average, but we have more and more days of drought. We had the same conclusion during our time of recordings. A few days of rains , but with a more important intensity. All this phenomenas seems related to climate change .

Graphic of Winter rainfalls from 1983 to 2018



Our recordings (each color represent one spot for one of our rain gauges)



Conclusions

Following our experiments, we can conclude that the rainfall episodes are longer but less frequent, that the seasons are more clearly marked and that the amount of rain is increasing.

In Salon de Provence, we have also observed these changes thanks to our measurements.

We enjoyed working on that project because we have learnt many things such as collaborating, understanding some climatic phenomena better, and following an experimental protocol from beginning to end.

We would all be willing to work on that project again next year.

Bibliography

<https://www.meteociel.fr>

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