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Birch pollination and climate change

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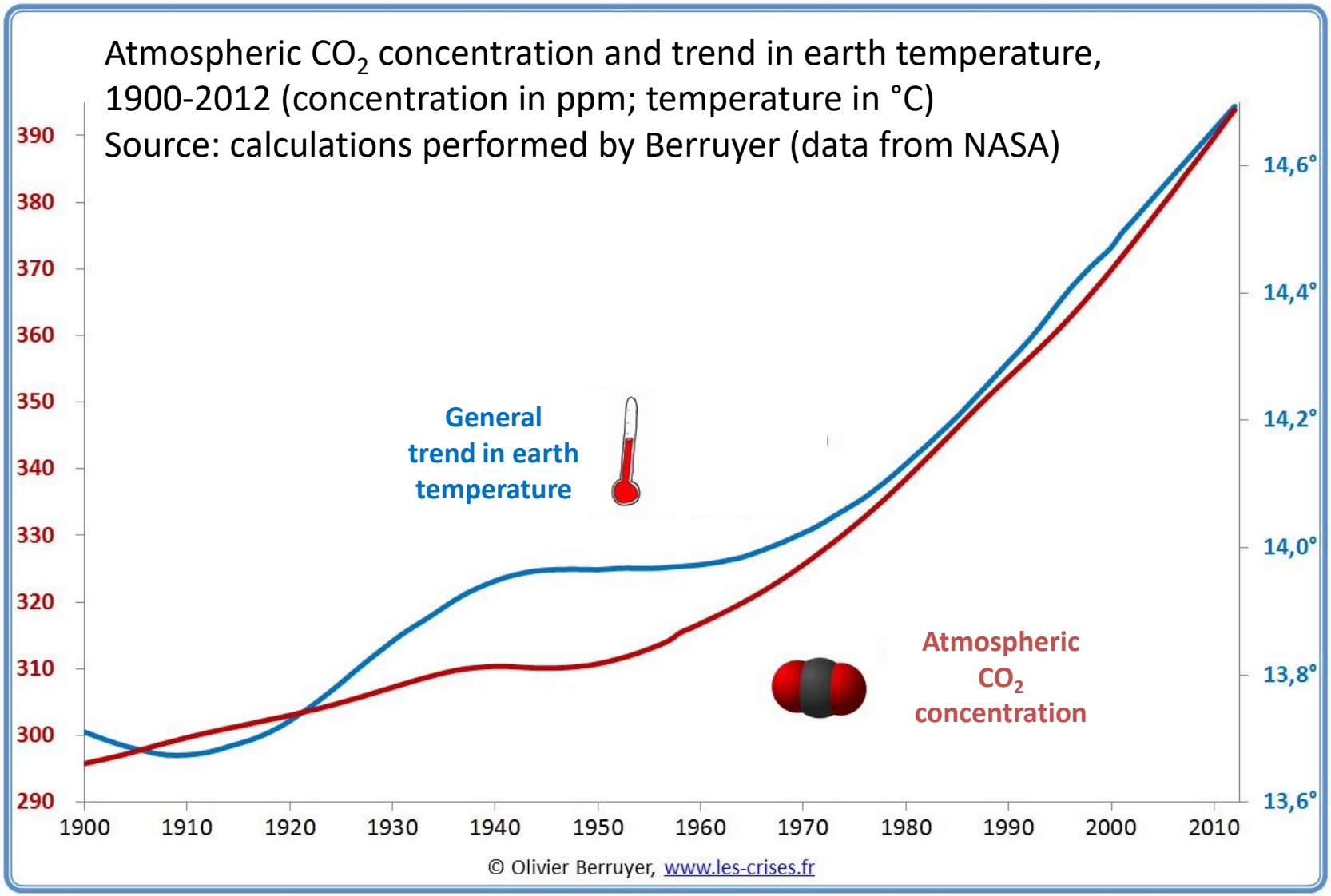
RNSA

Global warming/Climate change



Photosynthesis and CO_2

light

$CO_2 + H_2O$ → CH_2O (carbohydrate) + O_2

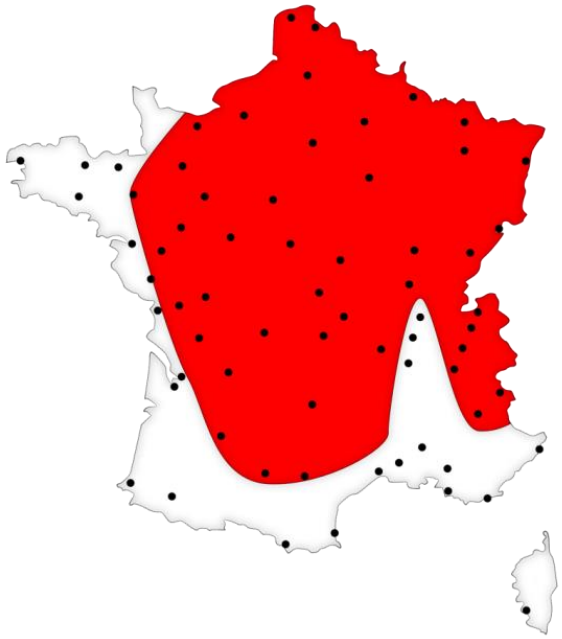
↗ CO_2 → effect on growth and physiology of the plant

↗ CO_2 → Probably higher pollen prodution

Study ONERC-RNSA :
Pollen, health indicator of climate change?

First step of the study → which taxa?

- ✓ Tree
- ✓ High allergy potency of the pollen
- ✓ Distribution on a large part of the territory



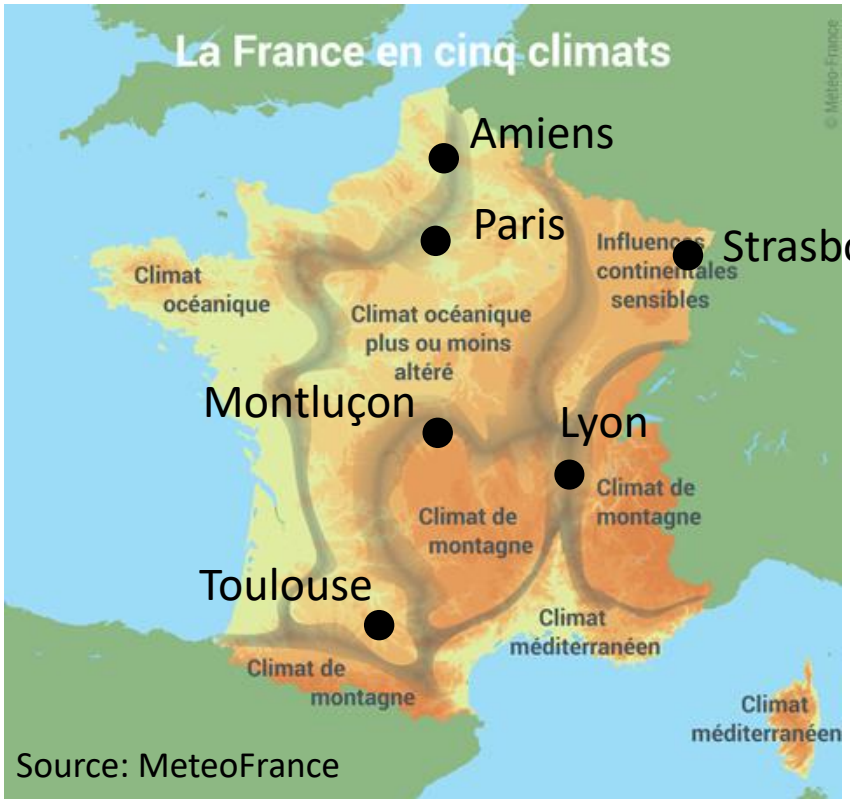
Study ONERC-RNSA :
Pollen, health indicator of climate change?

Second phase of the study → which stations?

- ✓ Representation of different climates
- ✓ Areas of birch presence
- ✓ Reliable data

Climates

- Oceanic
- Semi-Oceanic
- Semi-Continental
- Mountain
- Mediterranean

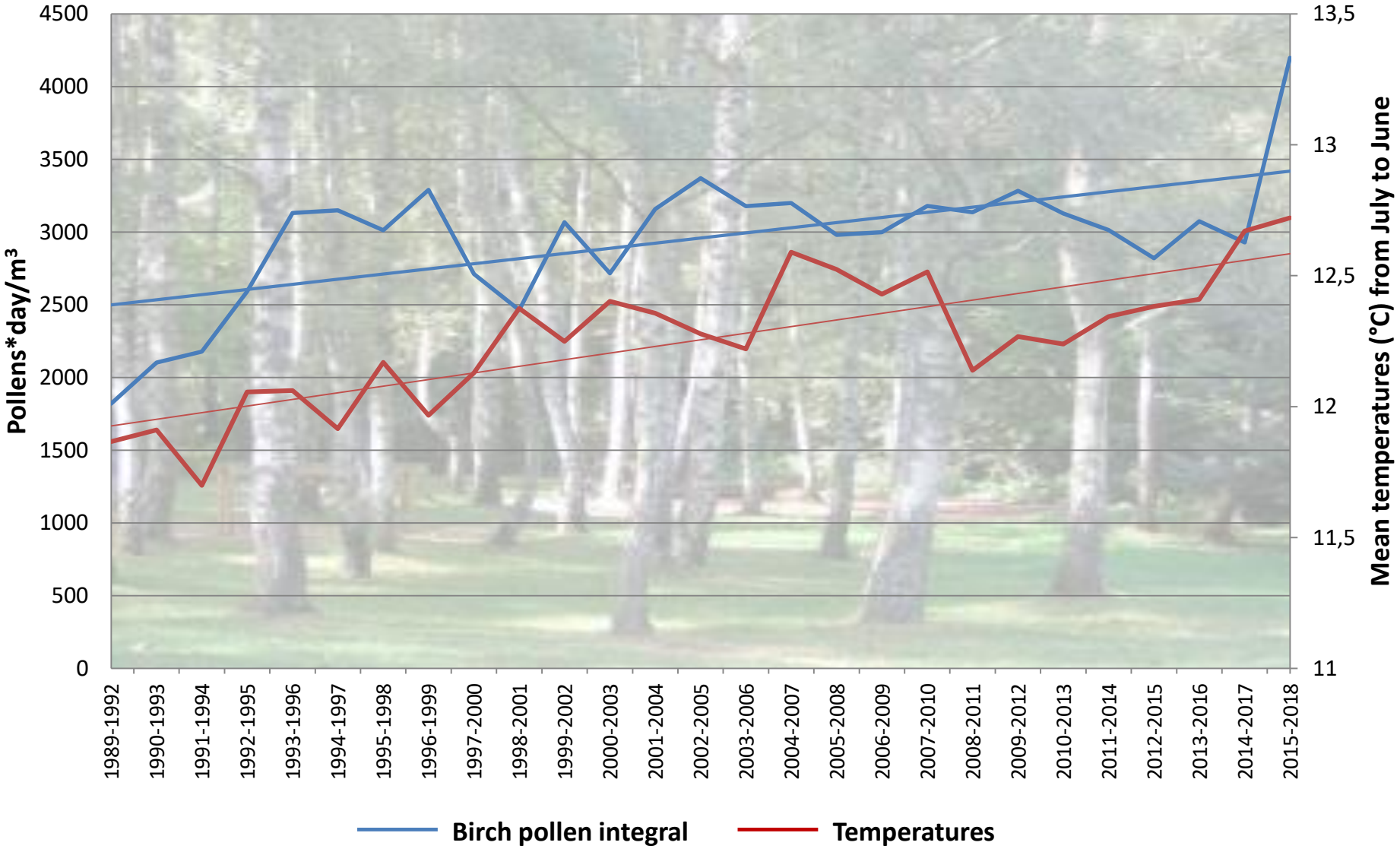


Study ONERC-RNSA :
Pollen, health indicator of climate change?

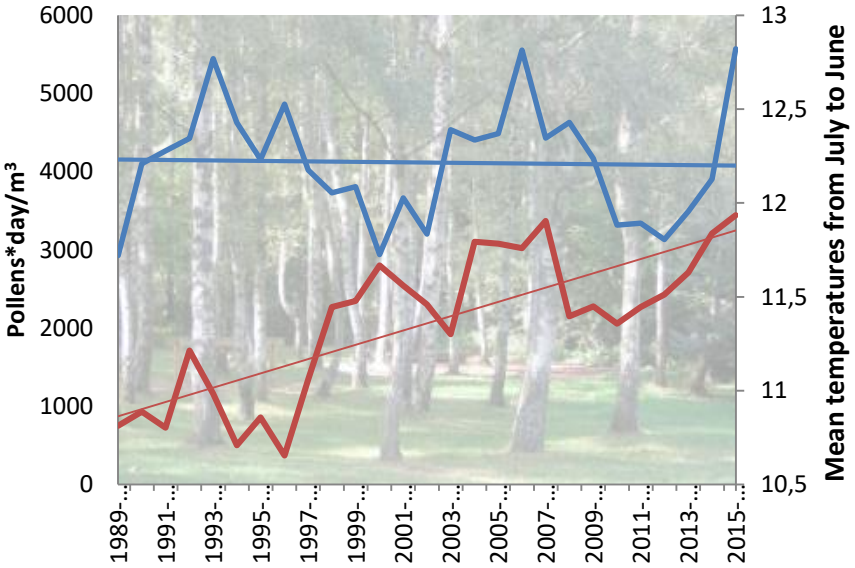
Third phase of the study → which time period?

The phenological year for birch is from July to June.
The birch pollen quantity which is released in March-April depends on temperatures from July of the previous year.

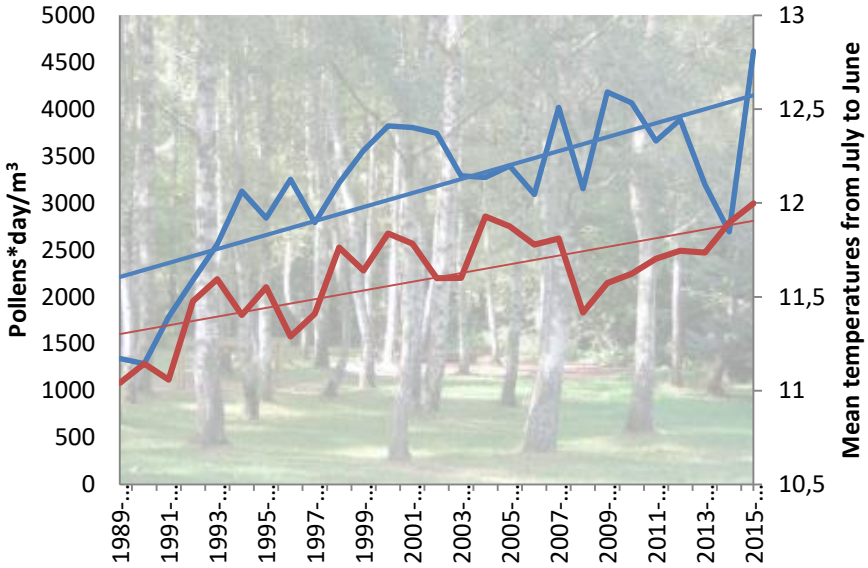
Annual birch pollens integral and temperatures
Moving average (- 4 years) for 6 French stations, from 1989 to 2018



Strasbourg



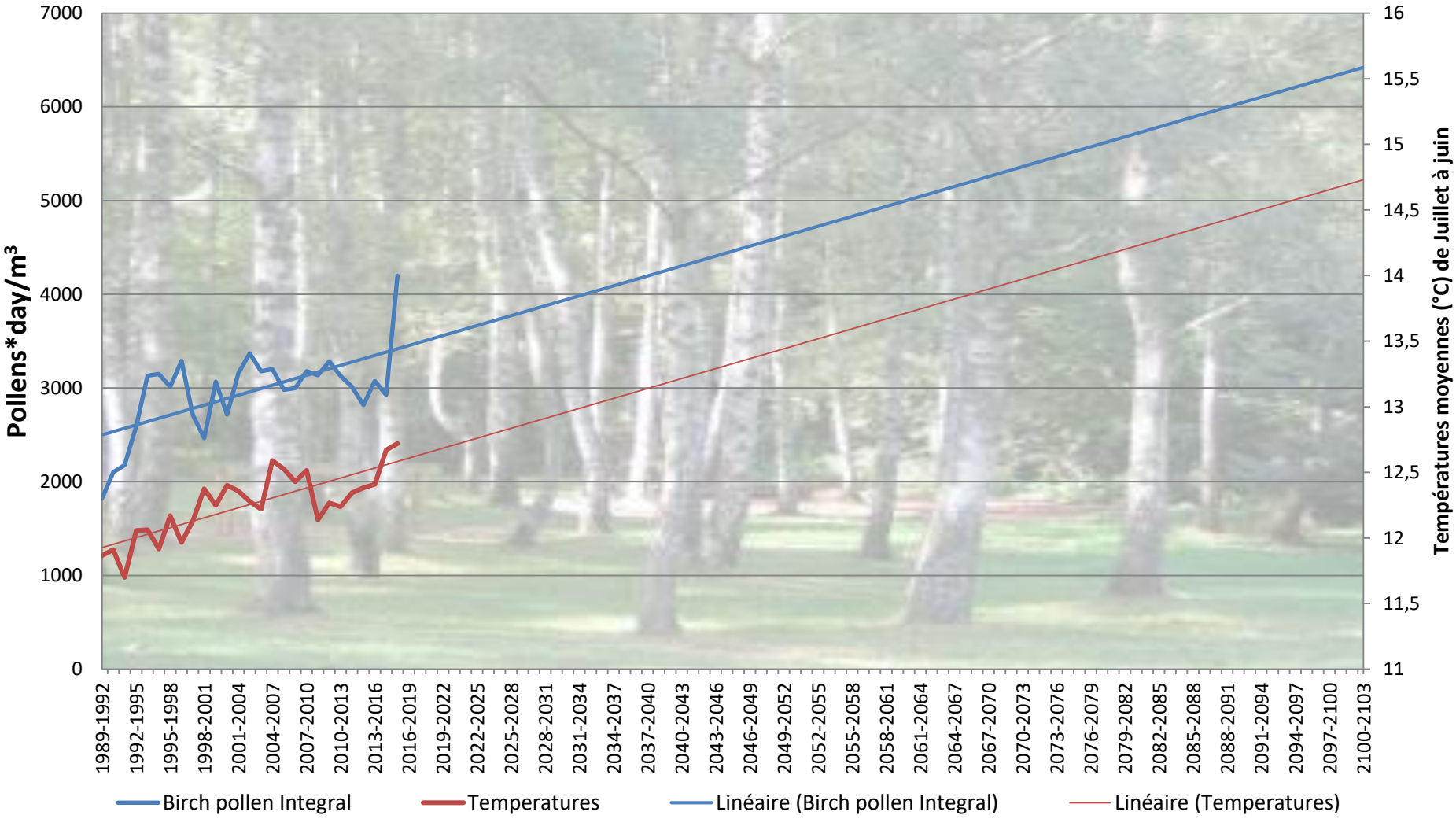
Montluçon



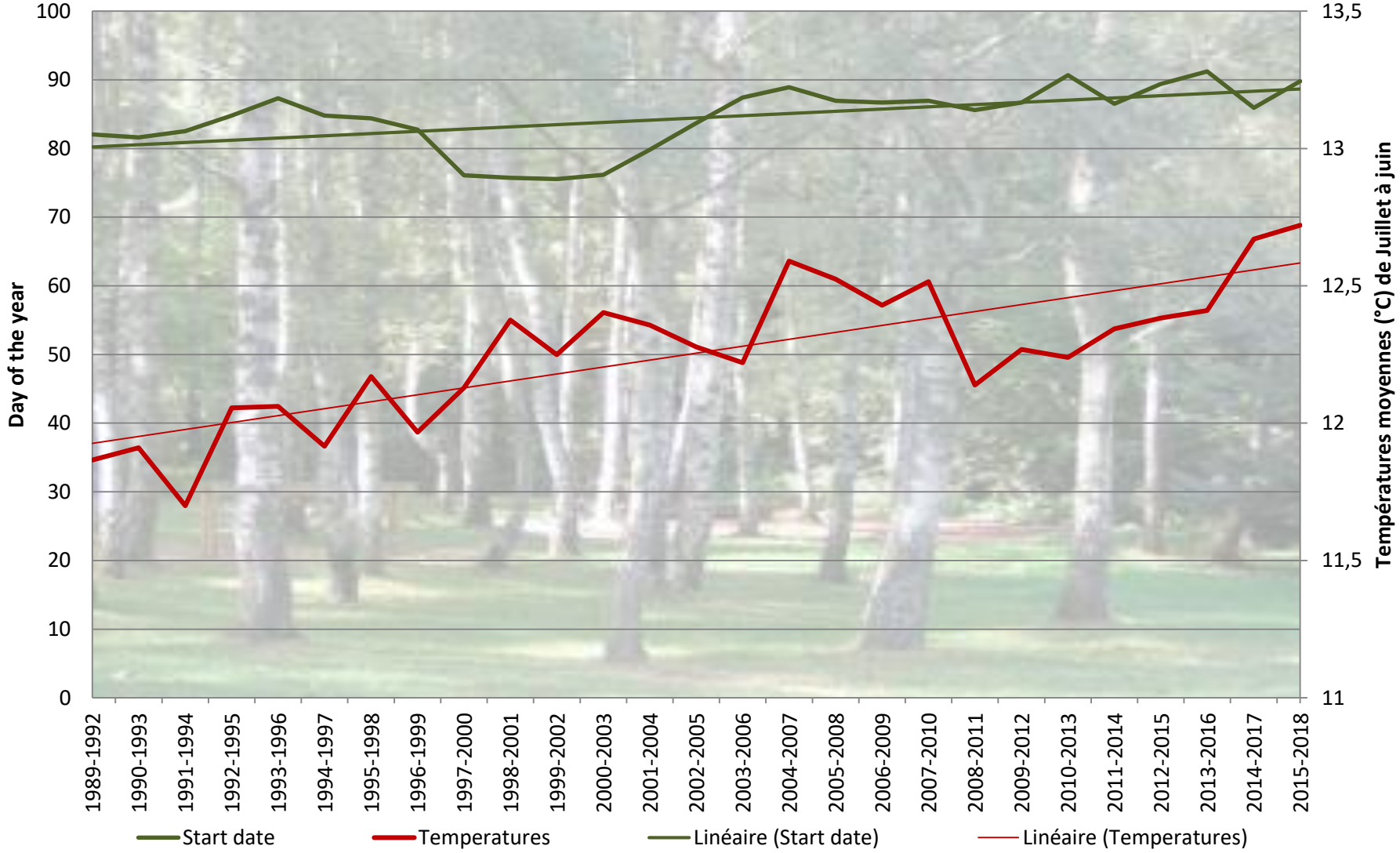
Birch pollen integral — Temperatures

Simulation/Projection

Annual birch pollens integral and temperatures
Moving average (- 4 years) for 6 French stations, from 1989 to 2100

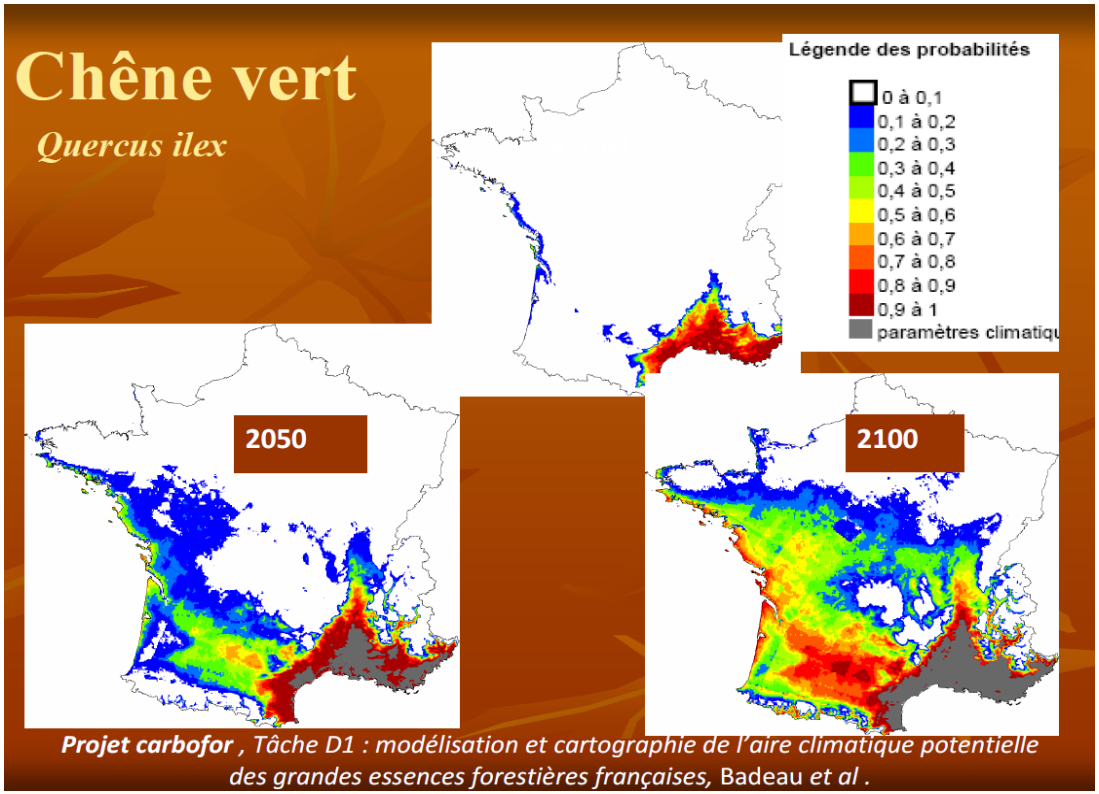


Start of birch pollination and temperatures
Moving average (- 4 years) for 6 French stations, from 1989 to 2018

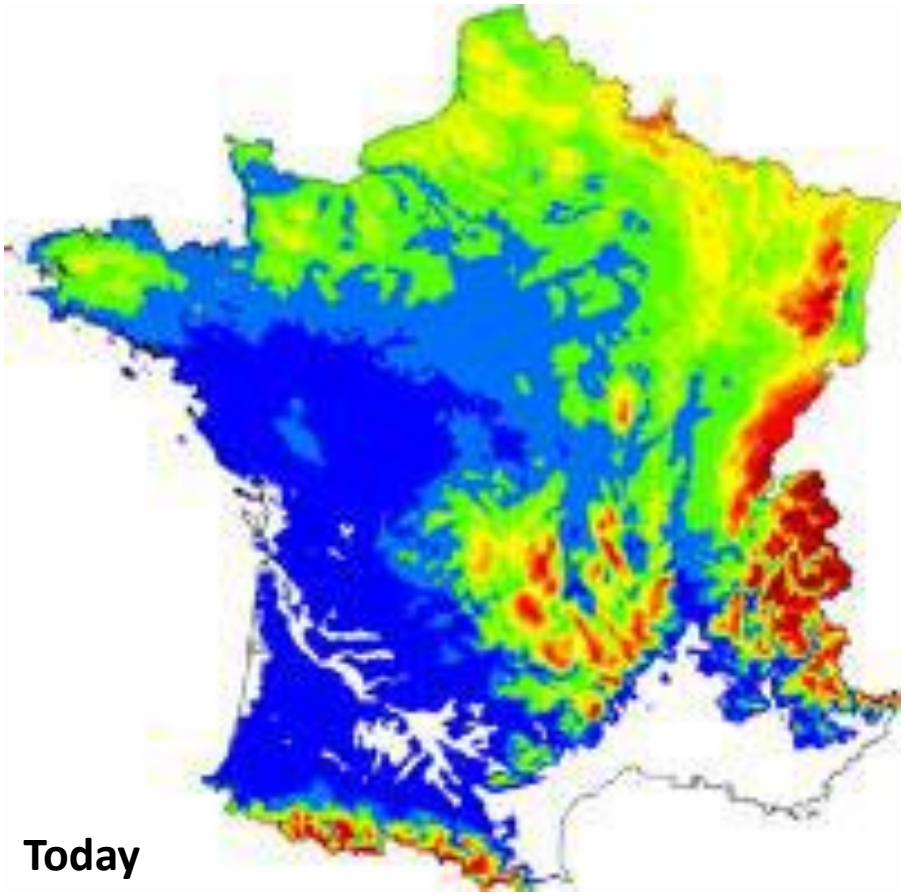


Other effects of climate change

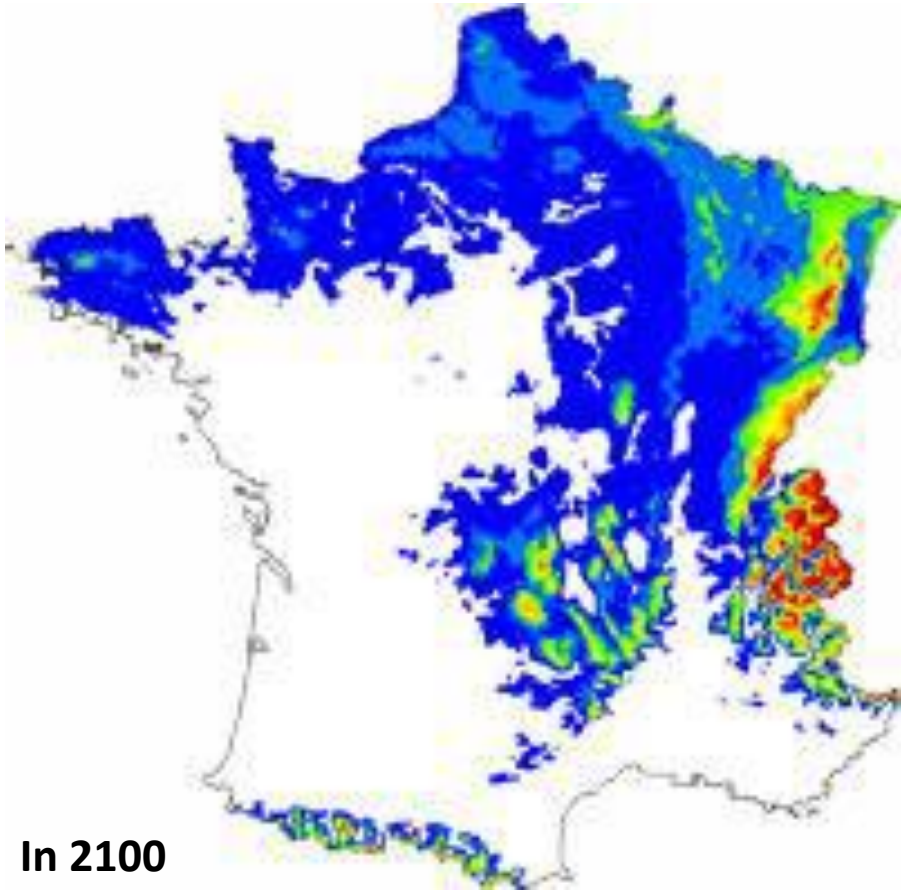
- Species migration from South to North (ragweed, trees, grasses, cypress and oak. ...).
- The area of green oak by 2050 could exceed a line Bordeaux-Saint-Etienne and cross the Loire by 2100.



Source INRA



Today



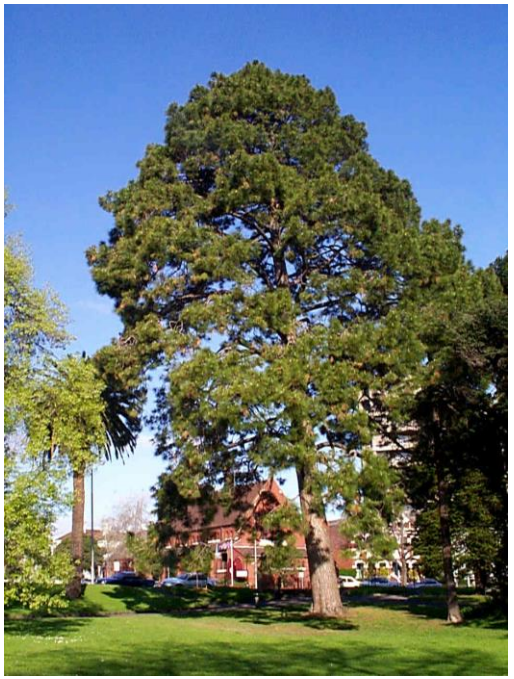
In 2100

The range of beech, by a hundred years, could significantly decrease due to higher summer temperatures and lower rainfall.
The same phenomenon could be observed for mountain species

Trees and pollution

Advantage :

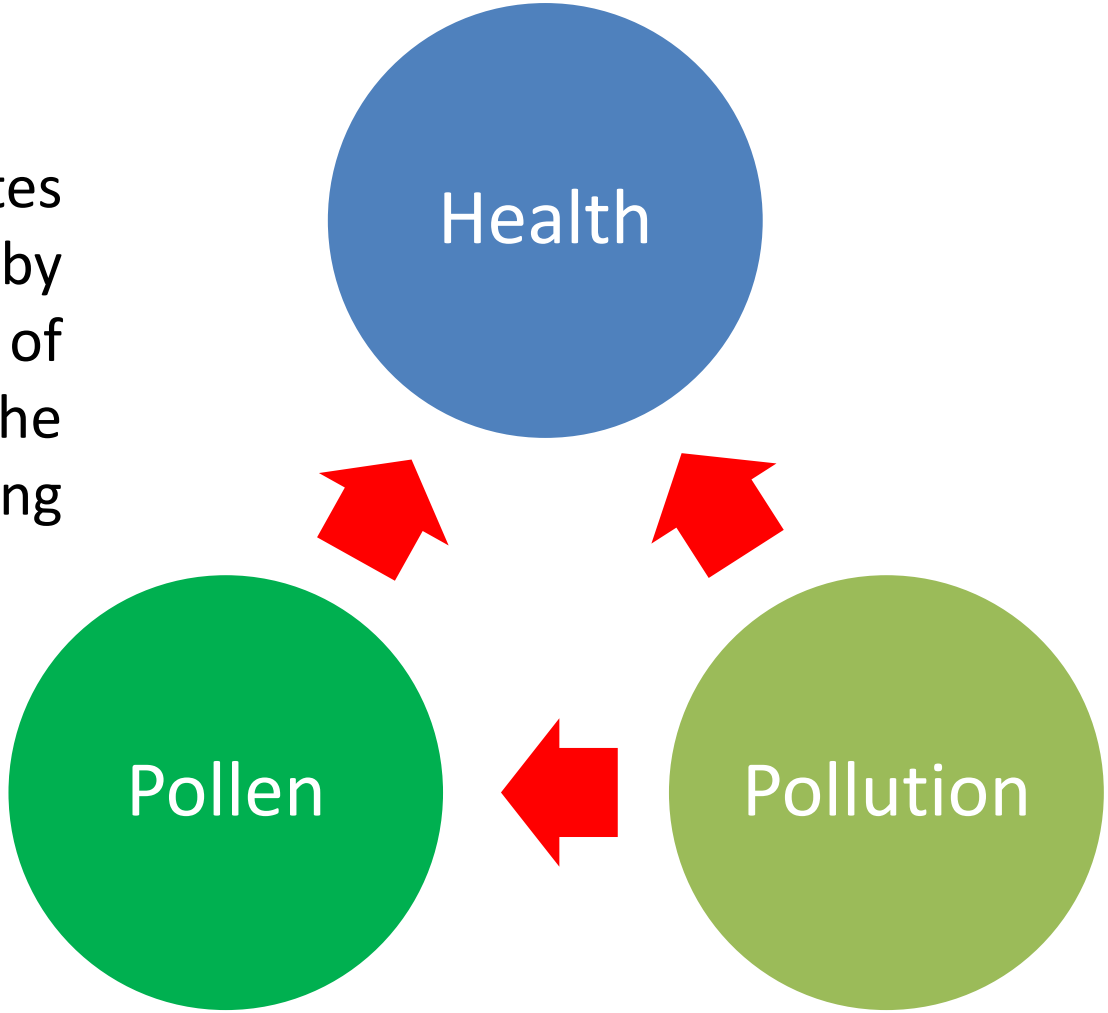
Planting trees in the city would have a protective effect because they reduce the presence of pollutants in the air by filtering and absorbing pollutants, small fine dust and aerosols suspended in the air.



Pollution and pollen

Disadvantage :

urban pollution aggravates allergenicity of pollens by weakening the surface of the grains and allowing the exit of granules containing allergenic proteins.



Conclusion

Effects of climate change:

- ✓ increase pollen production
- ✓ allow migration of some species from South to North of France
- ✓ decrease presence of some species
- ✓ planting more trees in towns to refresh atmosphere can increase number of allergies

→ the effects of climate change on pollen will continue and even probably intensify in the future and it is important to follow it and be aware of it

Thank you for your attention