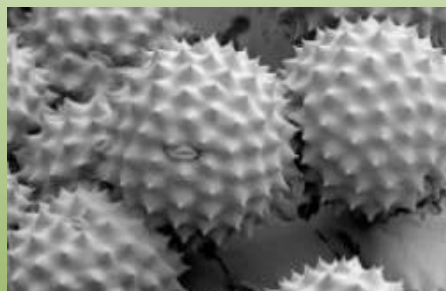




Health impact of pollen exposure and modifications related to climate change

S.Monnier – M.Thibaudon
RNSA, Brussieu, France



ONERC
Observatoire National sur les Effets
du Réchauffement Climatique

Aerobiology: a multidisciplinary approach



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Dispersion
&
Transportation

Emission

Deposition

Source



Impact

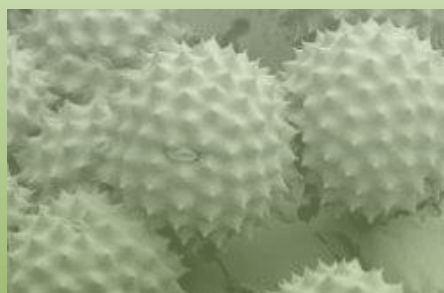
Atchoum!

Receiver



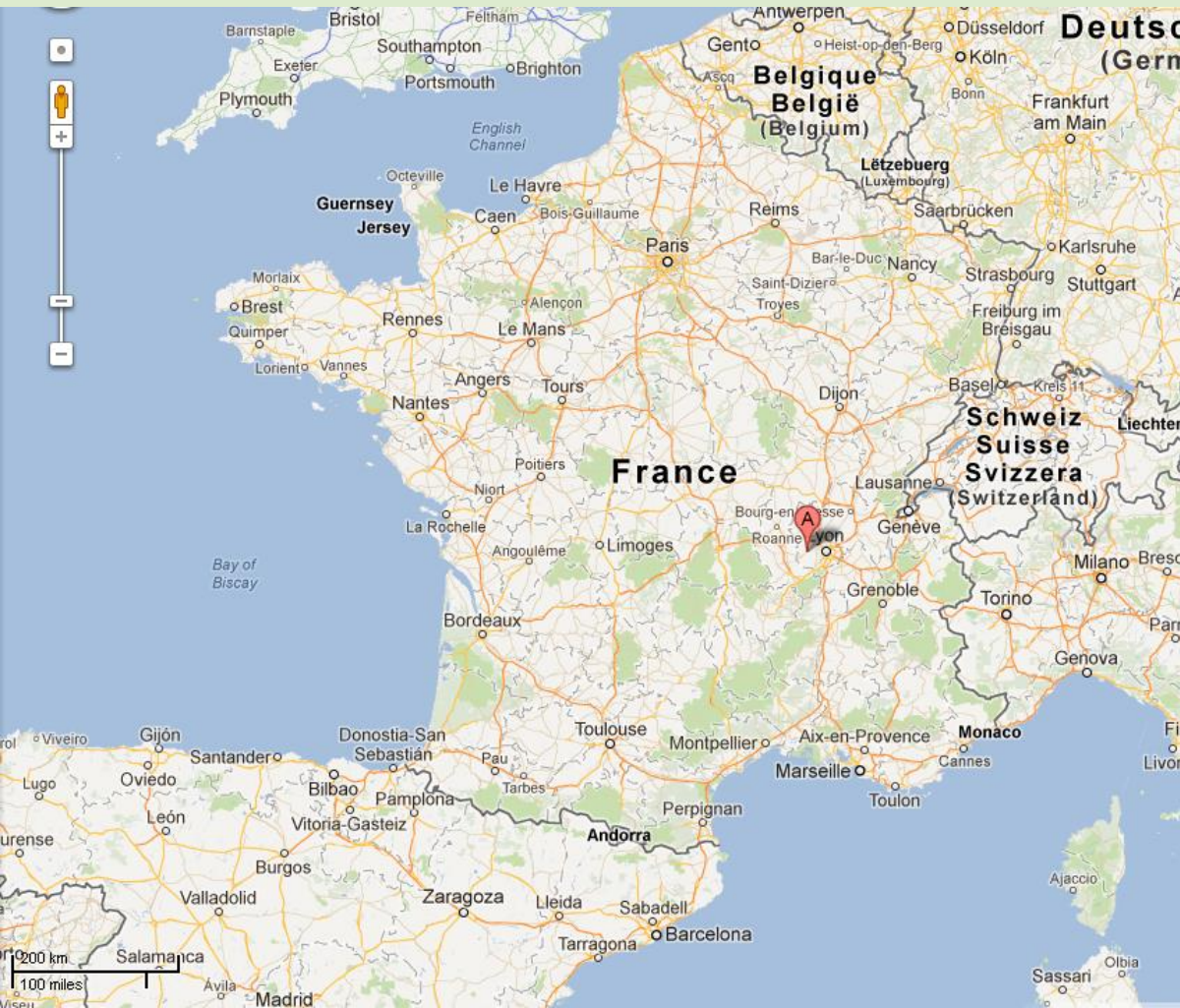
Contents

- ✓ RNSA presentation
- ✓ Pollen exposure measurement
- ✓ Health impact measurement
- ✓ Information and prevention
- ✓ Pollen : Health indicator of climate change
- ✓ The impact of global warming on vegetation
- ✓ Conclusions



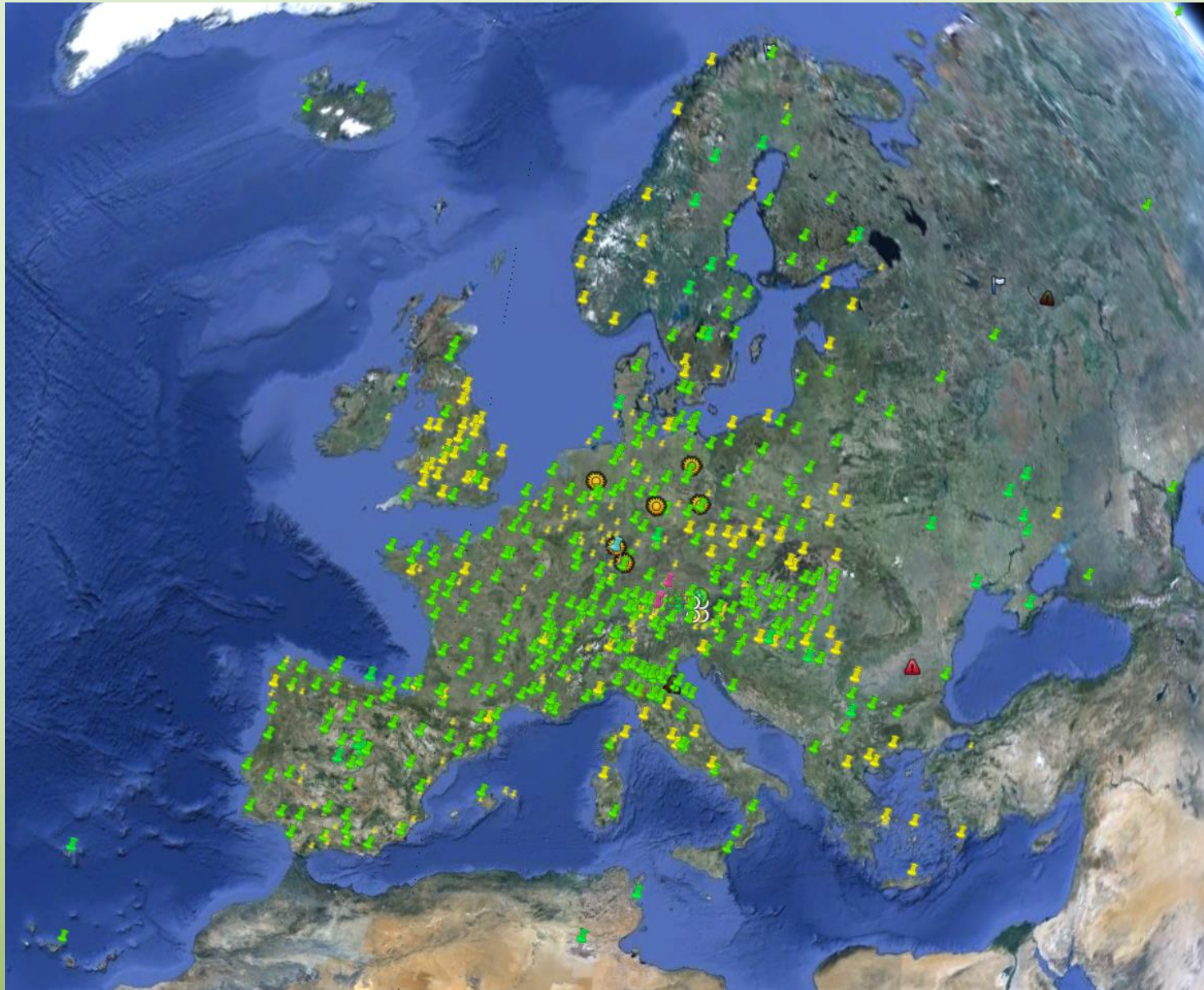
RNSA presentation

RNSA is the French aerobiology network in charge of the analysis of the content of the air in biological particles, and to give some information about their health impact.



The coordination center and training RNSA is located at Brussieu (69) in the heart of the Monts du Lyonnais, 40 km west of Lyon.

Pollen stations in Europe in 2014

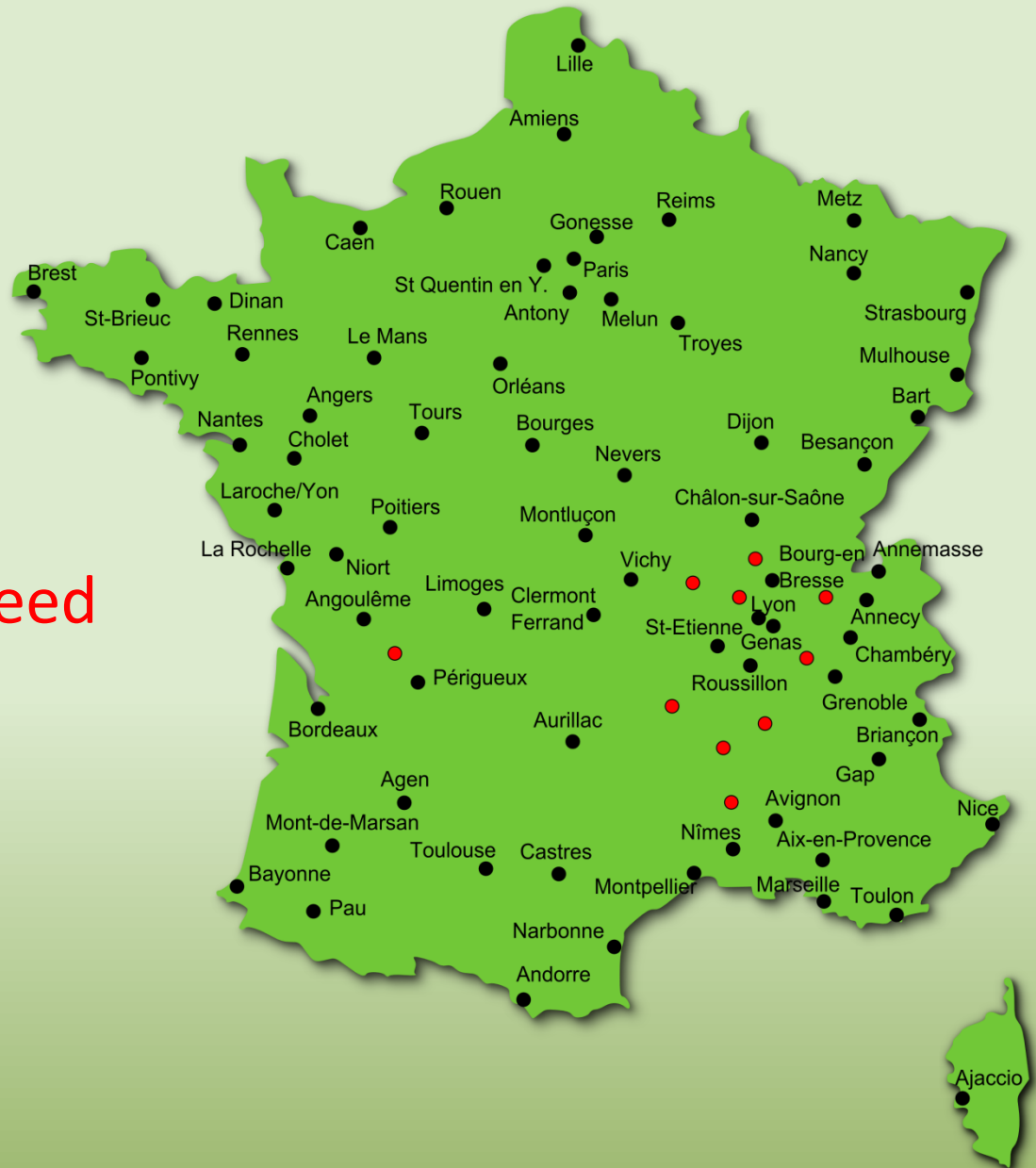


Pollen stations in France in 2014

70 stations

+

10 during ragweed
pollination



Pollen exposure measurement : pollen trap

Breathing orifice
(10 l. air/min)



Horizontal
reading

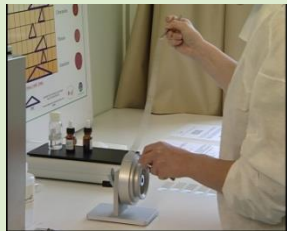


Adhesive band on the drum

↑
1h = 2mm

Measurements were made
with Hirst-type pollen traps.

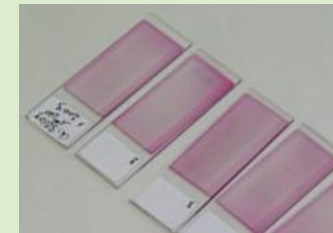
Pollen exposure measurement : analysis



Collection of the drum band



Dividing the band into daily sections



1 slide by day



Counting with a vocal recognition system



Daily amounts (grains/m³)

Health impact measurement



ça gratte



rhinite 90%

urticaire et eczéma 20%

ça démange



**je pleure
ça pique**

conjonctivite 75%



je tousse

trachéite,

asthme 50%



Health impact : clinical index



RNSA Clinical Report							
RNSA - Clinical Report 2008				Dr.	Week 31 - City of		
Pollinic Symptoms	Yes <input type="radio"/>	No <input checked="" type="radio"/>	Number of pollinoses <input type="text"/>	Evolution / previous week	Increase <input type="radio"/>	Stagnation <input checked="" type="radio"/>	Decrease <input type="radio"/>
Symptom Gravity	Null		Weak		Mean		Strong
Conjunctivitis	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Rhinitis	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Cough	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Asthma	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Cutaneous signs or other	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>

Symptom Gravity	Null	Weak	Mean	Strong
x1 Conjunctivitis	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
x2 Rhinitis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
x1 Cough	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
x1 Asthma	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
x1 Cutaneous signs or other	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

« Mean » conjunctivitis: $2 \times 1 = 2$

« Strong » rhinitis: $3 \times 2 = 6$

« Weak » cough: $1 \times 1 = 1$

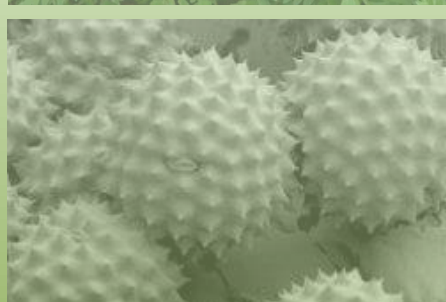
« Mean » asthma: $2 \times 1 = 2$

« Null » cutaneous signs: $0 \times 1 = 0$

Clinical index for:

- a doctor
- a town
- a region
- the country

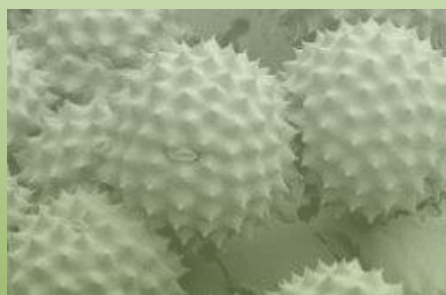
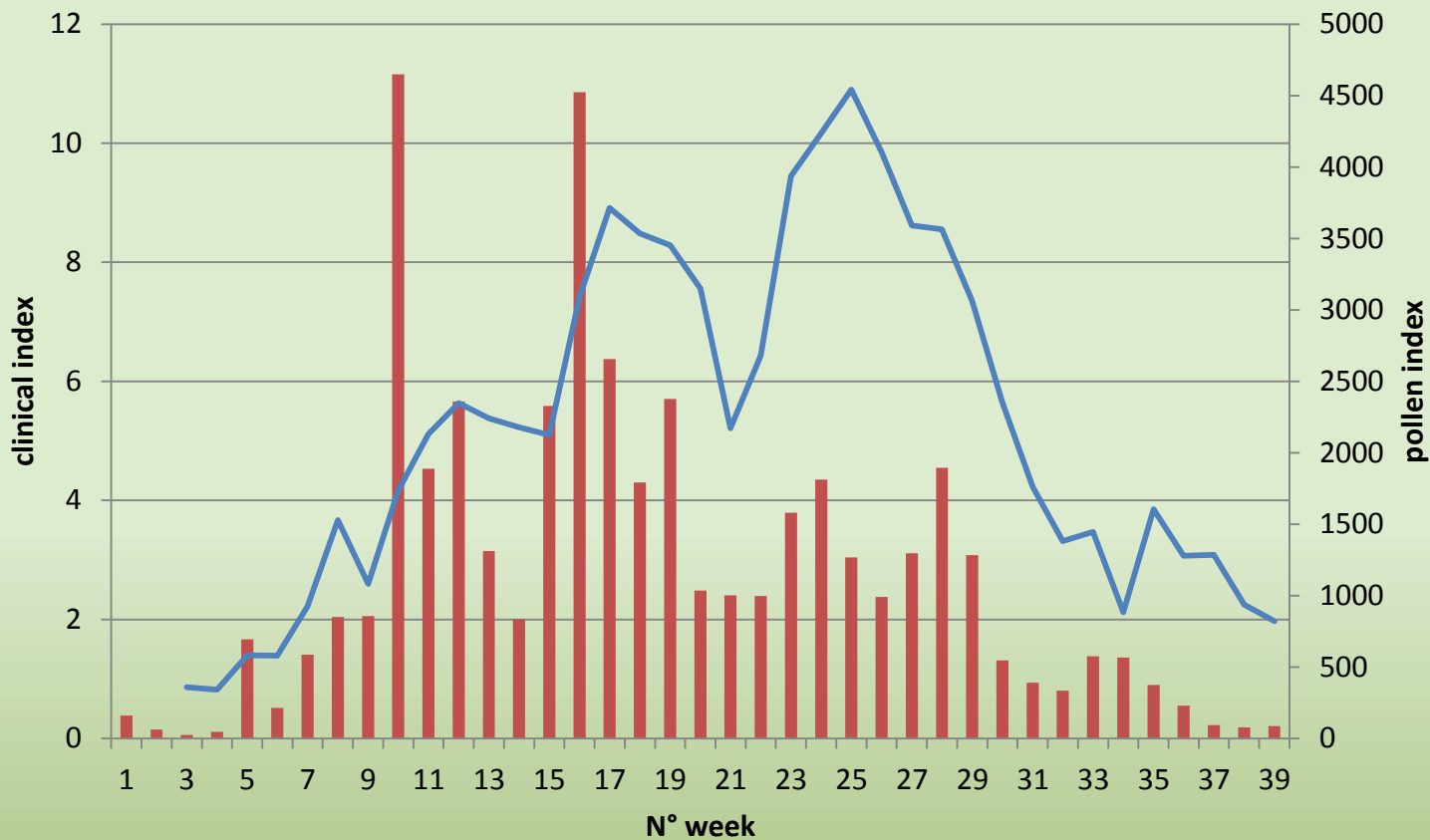
Clinical index \longrightarrow 11 / 18



Clinical index - Results

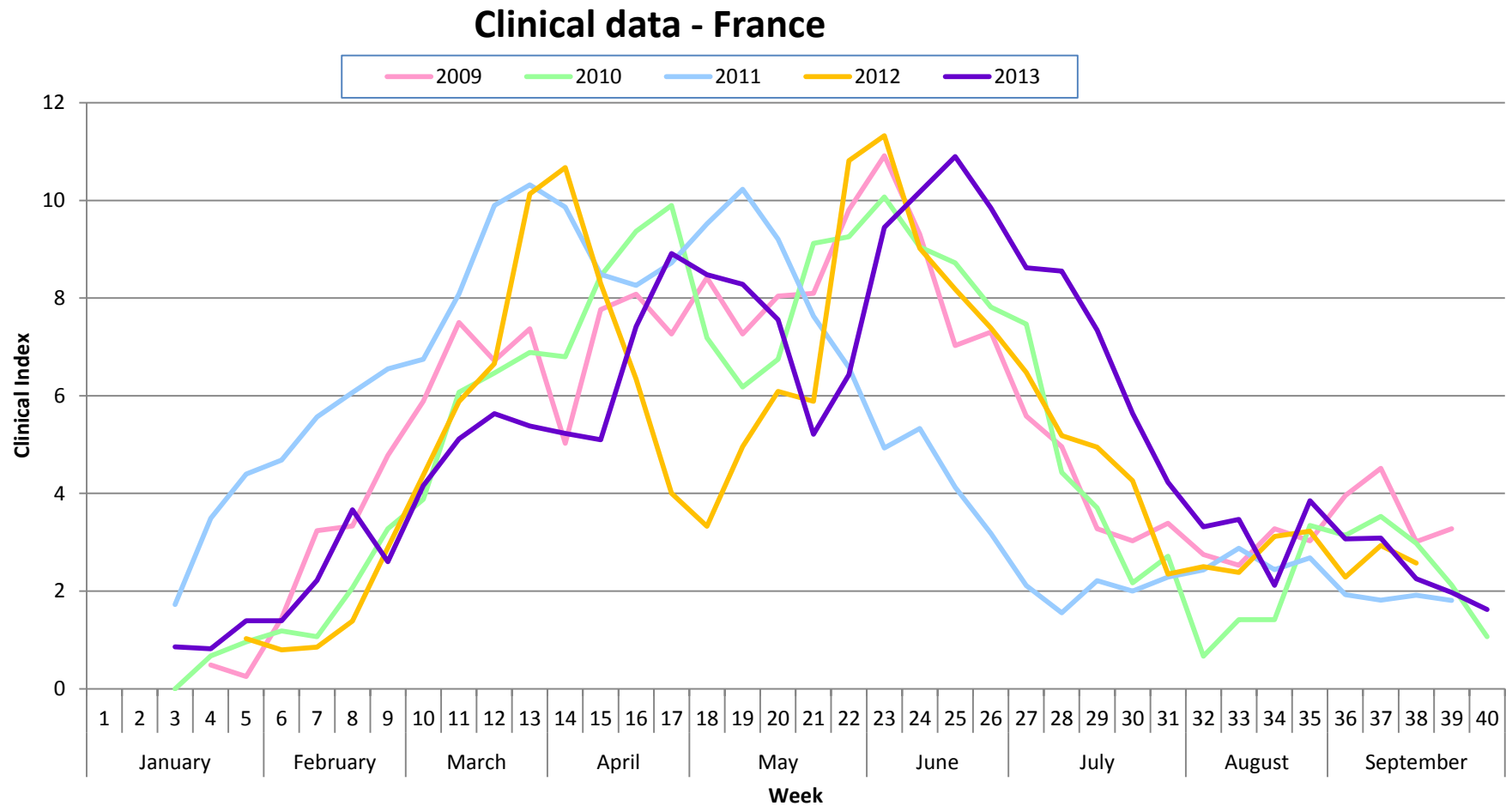
Clinical index and pollen index for France - 2013

■ pollen index — clinical index



Health impact : clinical index

Information of the clinical season



Health impact : PHD – Scores symptoms

PHD = Pollen Hayfever Diary

PHD = A recording daily symptoms in patients allergic to correlate exposure and health impact.

PHD interests :

- Establish scores symptoms arising directly from the patient felt.
- Establish individual levels of sensitivity of patients and averages of health impact of the exposure to ragweed pollens on an area.



pollendiary.com

rnsa@rnsa.fr

- Data Entry
- Visualisation
- History
- Settings
- Regions
- User Administration
- Logout

Immer informiert mit der Pollen App!

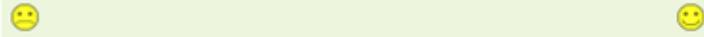
Version 2.0 jetzt verfügbar!

Unser gratis Pollen App bietet Ihnen aktuelle Werte für ganz Österreich und Deutschland, und nützliche Informationen rund ums Thema Pollenallergie für unterwegs.

Klicken Sie **hier** für weitere Informationen.

Data Entry - March 20, 2014 (yesterday)

Overall Symptom Score very poor normal very good



Location

Country France

Place ?

Eyes

Problems	<input checked="" type="radio"/> None <input type="radio"/> Mild <input type="radio"/> Moderate <input type="radio"/> Severe	Symptoms	<input type="checkbox"/> Itching <input type="checkbox"/> Foreign body sensation <input type="checkbox"/> Redness <input type="checkbox"/> Watering
-----------------	---	-----------------	--

Nose

Problems	<input checked="" type="radio"/> None <input type="radio"/> Mild <input type="radio"/> Moderate <input type="radio"/> Severe	Symptoms	<input type="checkbox"/> Nose Itching <input type="checkbox"/> Sneezing <input type="checkbox"/> Nose Running <input type="checkbox"/> Nose Blocked
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Lungs

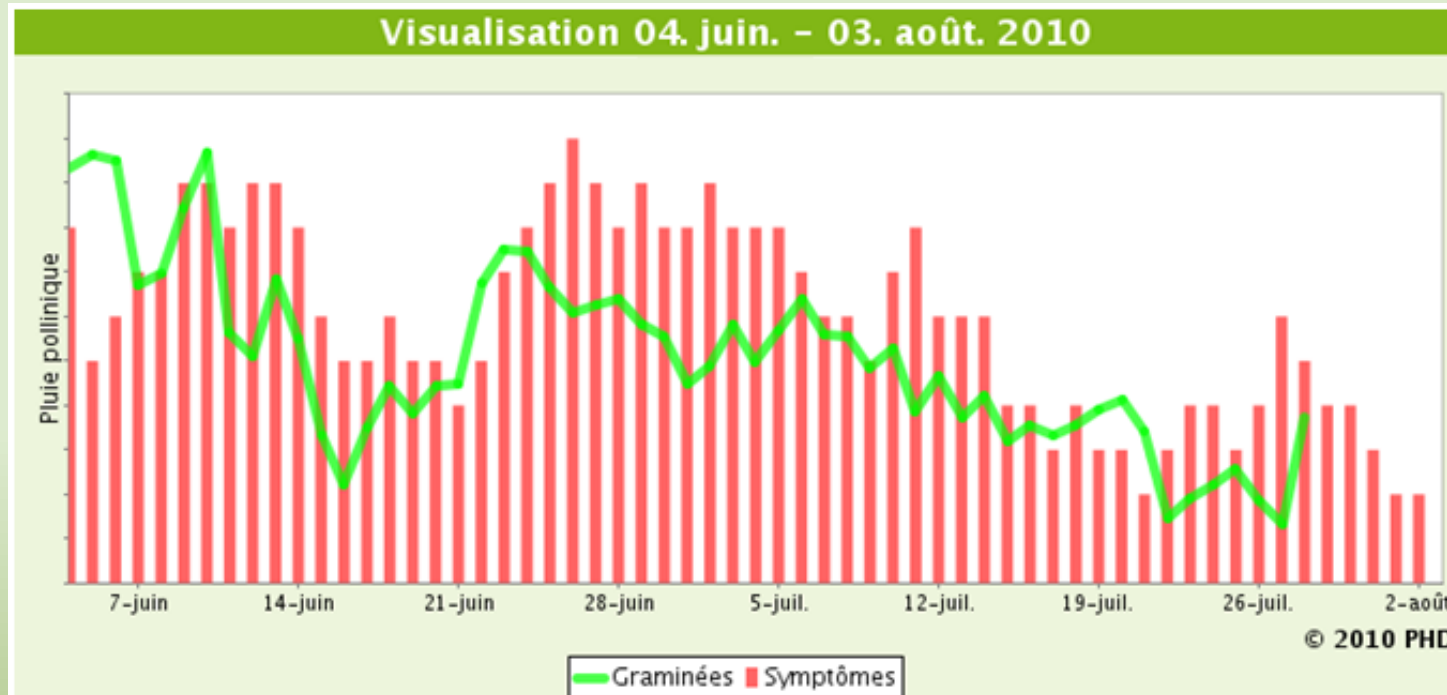
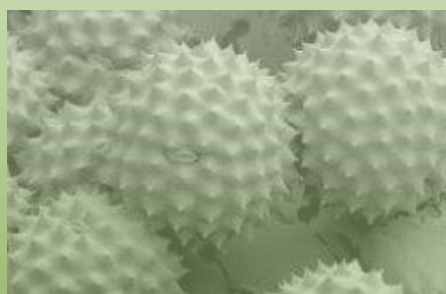
Problems	<input checked="" type="radio"/> None <input type="radio"/> Mild <input type="radio"/> Moderate <input type="radio"/> Severe	Symptoms	<input type="checkbox"/> Wheezing <input type="checkbox"/> Shortness of Breath <input type="checkbox"/> Cough <input type="checkbox"/> Asthma
-----------------	---	-----------------	--

Medicines

<input type="checkbox"/> None <input type="checkbox"/> Eye Drops <input type="checkbox"/> Nose Drops (or Spray) <input type="checkbox"/> Anti-Allergy Tablets <input type="checkbox"/> Homeopathic Remedy <input type="checkbox"/> Other	Please mark the medicines you have taken, or "None" if no medicine was necessary.
---	---

Comments

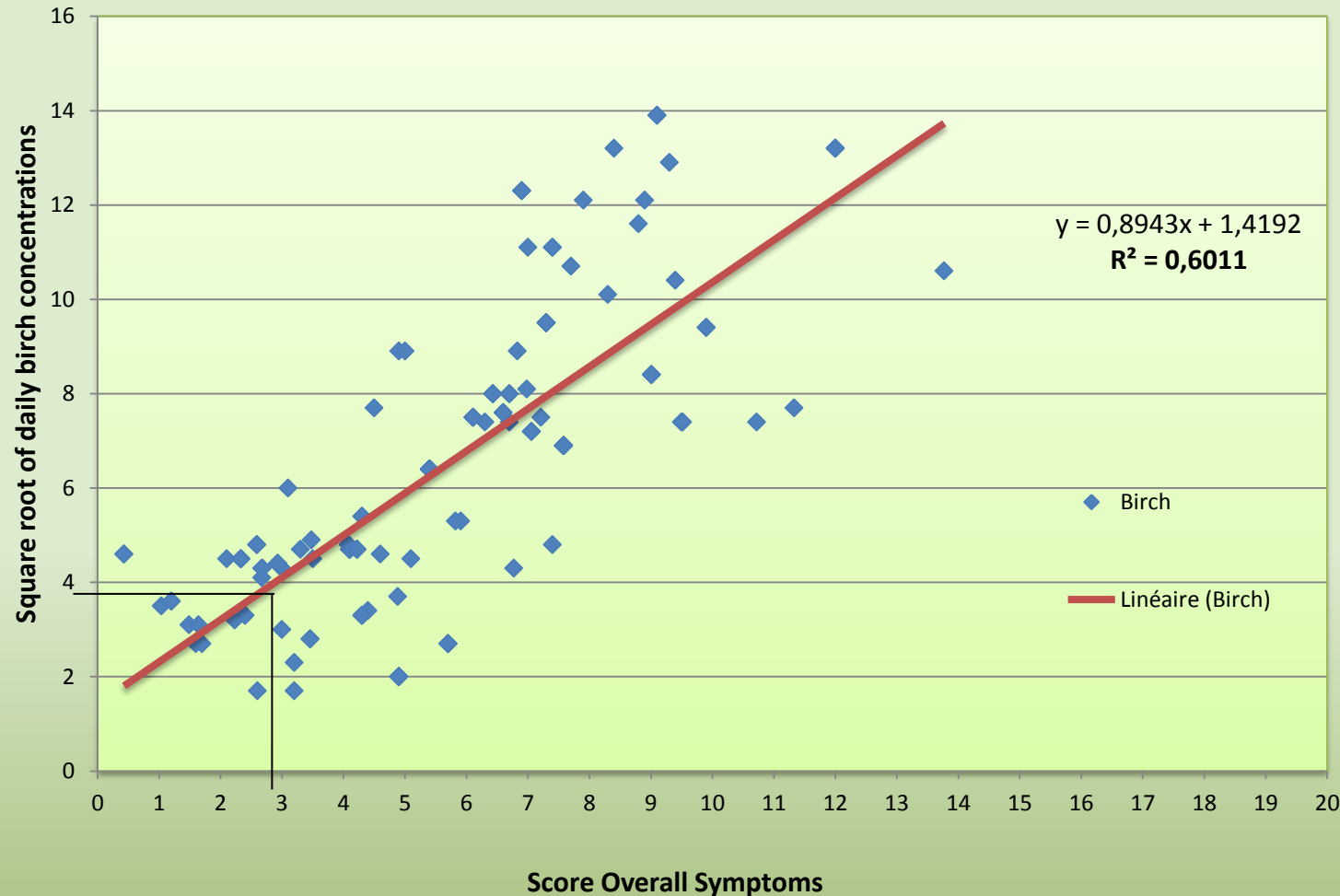
Correlation exposure and health impact



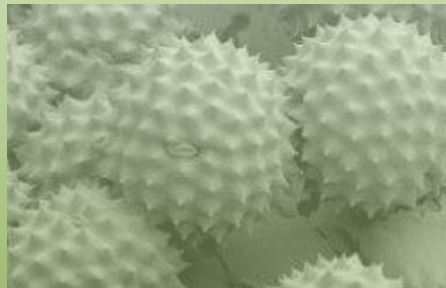
PHD – Scores symptoms – Study – Results

Birch

Birch pollen according to score overall symptoms- 2010 à 2012



Birch pollens and score-symptom in France (2010-2012)



Information and prevention

Le site français des allergies aux pollens

RNSA
RÉSEAU NATIONAL DE SURVEILLANCE AÉROBIOLOGIQUE

Alertes Pollens Cliquez ici

Pour vous connecter à l'espace adhérents cliquez ici

Pour vous inscrire au bulletin d'alerte cliquez ici

Accueil Le réseau Les bulletins Les risques MedAeroNet Les événements Nos partenaires Nous contacter

18 avril : Les données en temps réel sur notre site de Lyon nous permettent de prévoir un risque allergi

- Le réseau
 - Les capteurs
 - L'allergie
 - Les pollens
 - Les bulletins
 - Bulletin allergo-pollinique
 - Bulletin moisissures
 - Bulletin phénologique
 - Base de données
 - Alertes pollens
 - Les risques
 - Les risques par ville
 - Les risques par pollen
 - Les historiques
 - MedAeroNet
 - Les événements
 - Nos partenaires
 - Nous contacter
 - Liens
 - Rechercher
- Le RNSA**
(Réseau National de Surveillance Aérobiologique) vous offre la possibilité de recevoir chaque semaine par e-mail les prévisions du risque allergique des départements de votre choix.
- Inscription**

Accueil > Les bulletins > Bulletin Allergo Pollinique

Bulletin Allergo Pollinique

Bulletin allergo-pollinique n°16 du 18 avril 2014
Valable jusqu'au 25 avril

Les pollens de Pâques !

Entre les oeufs, les chocolats ou l'agneau Pascal, les pollens se bousculent pour profiter des Fêtes de Pâques.

Les pluies des prochains jours aideront à se débarrasser des derniers pollens de saule, charme, peuplier et frêne qui pourront encore localement provoquer un risque allergique faible.

Les quantités de pollens de platane oscillent au son des cloches, le risque allergique sera globalement moyen sur l'ensemble du territoire, mais pourra localement atteindre un niveau élevé, voire très élevé comme sur Castres.

Les pollens de bouleau se font douceurs enrobées de chocolat, le risque allergique est moyen sur une large moitié Nord de Nantes à Grenoble, très faible à faible de Lyon à La Roche sur Yon en passant par Castres et au milieu de cet enrobage sur le Sud de l'Auvergne et une partie du Limousin se cache un coeur de pollens de bouleau où le risque est élevé à localement très élevé.

Les pollens de chêne participeront à toutes les chasses aux oeufs avec un risque allergique globalement moyen à élevé sur le Centre, l'Ouest de la Bourgogne, une partie du Limousin et de l'Aquitaine au Languedoc Roussillon.

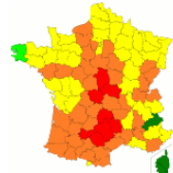
Pour les herbacées, une alternance entre pluie et soleil, avec des températures de saison, sera propice à leur développement. Les pariétaires distribueront des pollens au lieu de chocolat sur le pourtour méditerranéen avec un risque allergique pouvant atteindre un niveau moyen. Plantain et oseille se cachent entre les herbes et pourront provoquer un risque localement très faible. Les pollens de graminées eux seront de plus en plus présents, avec un risque allergique qui sera moyen de l'Aquitaine à la Vallée du Rhône jusqu'au Sud de Lyon en passant par Castres et Nîmes et très faible à faible entre les averses partout ailleurs.

Si les pluies prévues la semaine prochaine apporteront quelques répit aux allergiques, ceux-ci doivent rester vigilants et suivre leur traitement en prévision de chaque période ensoleillée.

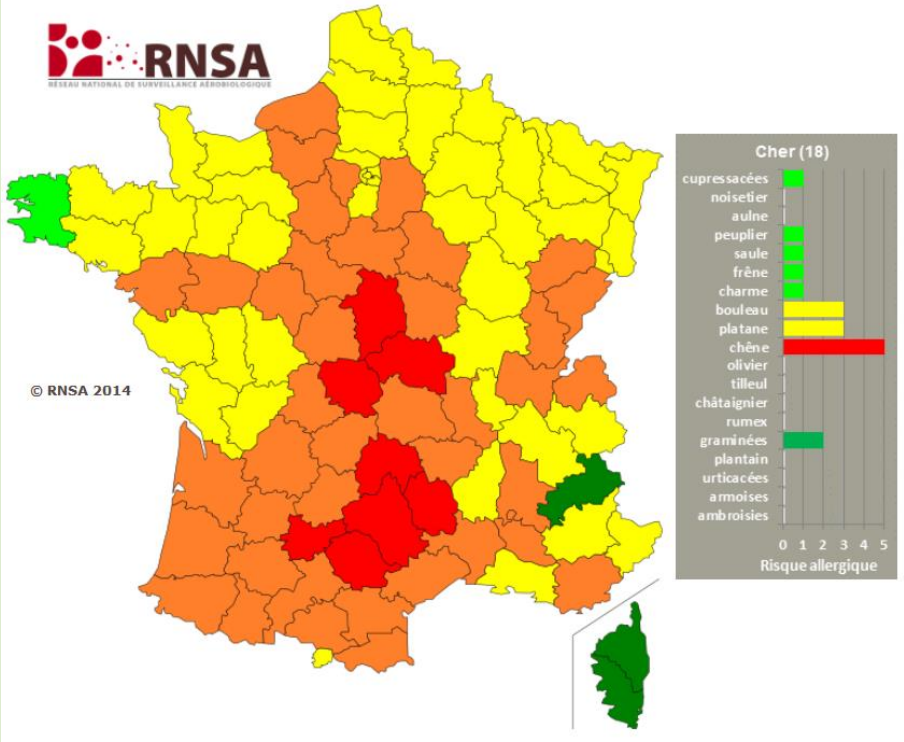
Charlotte Sindt

Michel THIBAUDON,
Directeur du RNSA

Prévisions à 3 jours de la pollinisation des bouleaux sur la France



Végétation en ville.
Guide d'information sur les plantes à pollen allergisant



Vigilance map

Pollinic and mould bulletins

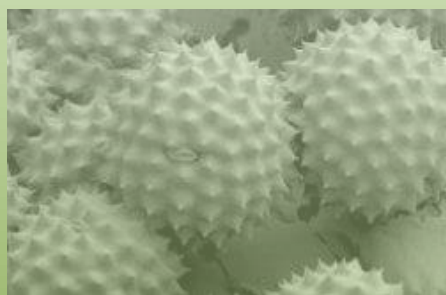
www.vegetation-en-ville.org

Arbres & Arbustes • Plantes & Herbacées

GUIDE D'INFORMATION
Végétation en ville

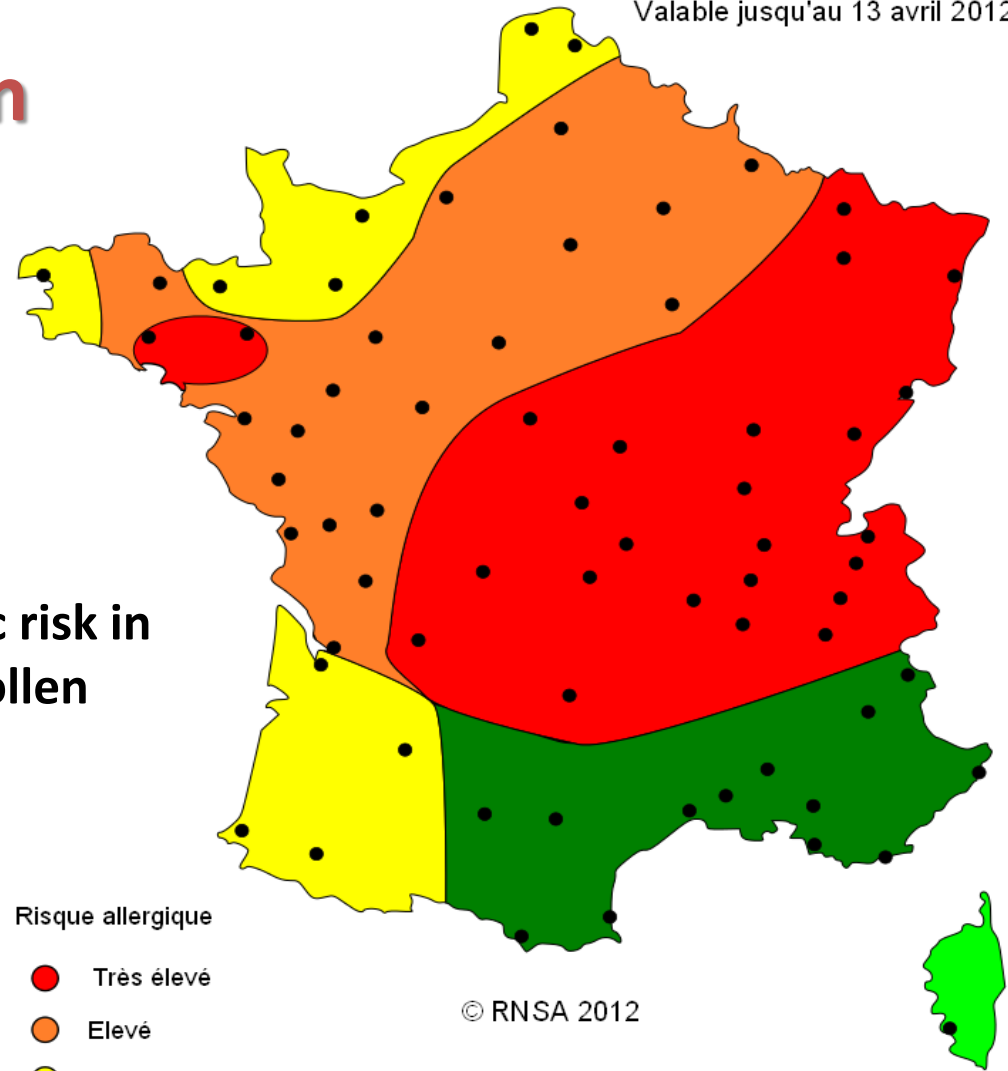
Passer l'écran d'accueil

Information and prevention



Map of the allergic risk in France for Birch pollen

Valable jusqu'au 13 avril 2012



Risque allergique

- Très élevé
- Élevé
- Moyen
- Faible
- Très faible
- Nul

© RNSA 2012

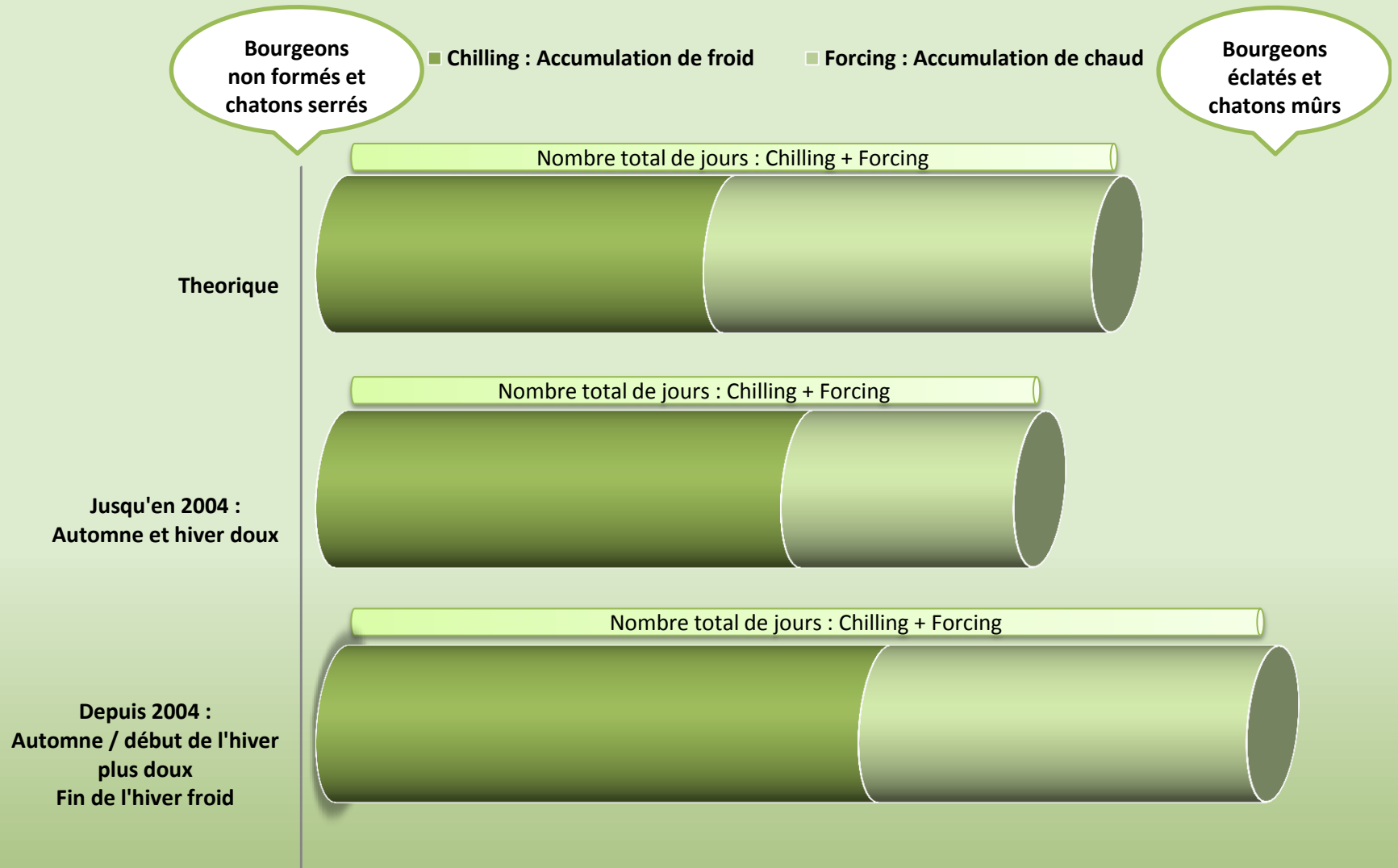
Pollen : Health indicator of climate change



Phases phénologiques des arbres

Source : GLOBE Suisse

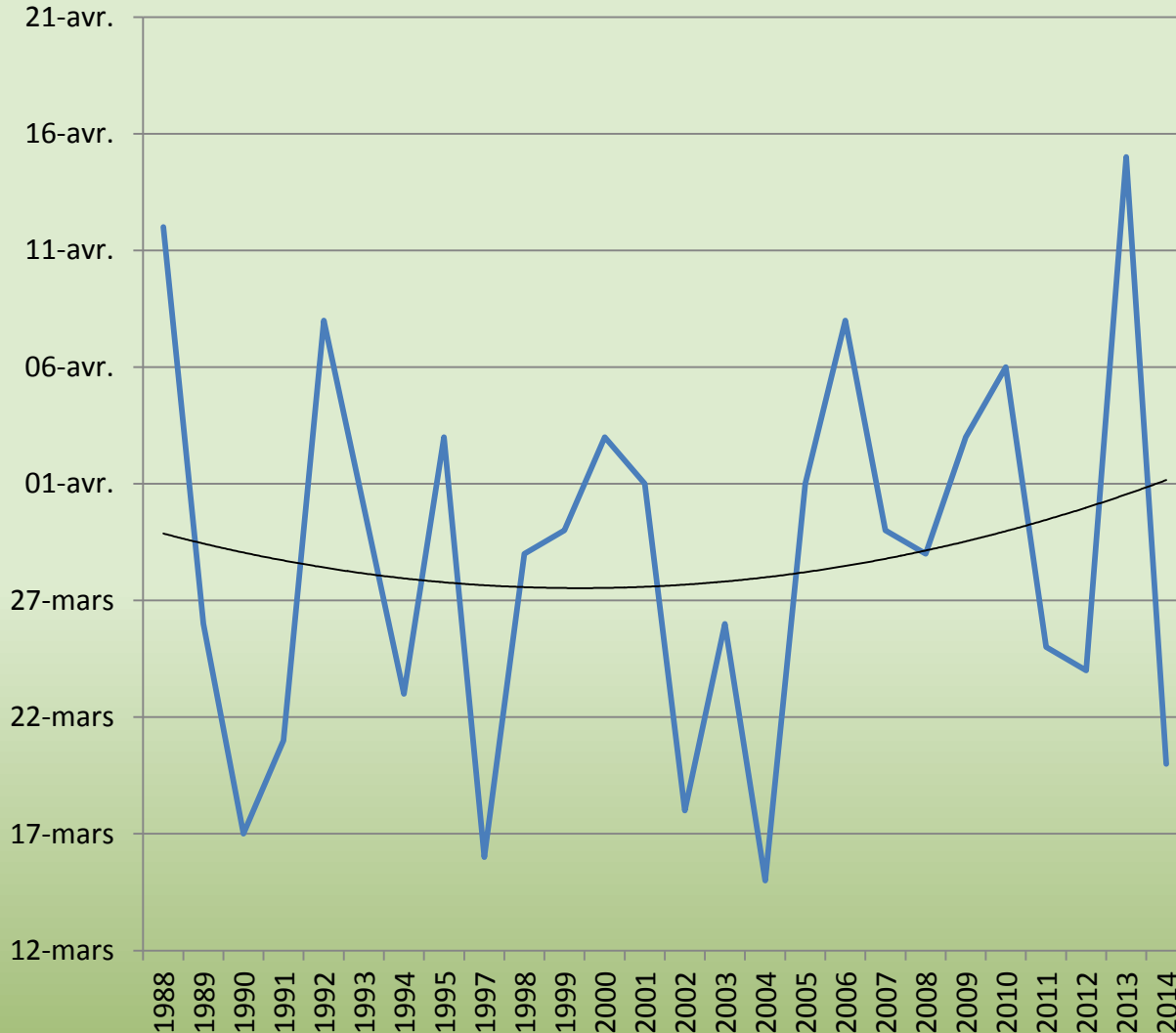
Evolution du nombre de jours nécessaires à la maturation des bourgeons et des chatons de bouleau au fil des années



Source : RNSA

Exemple of the chilling and forcing effect over the beginning of pollination :

Beginning of birch pollination at Strasbourg from 1988 to 2014



For birch the criterion marking the start of the pollen season is the date on which a daily average concentration of 30 grains / m³ / day is reached for the first time.

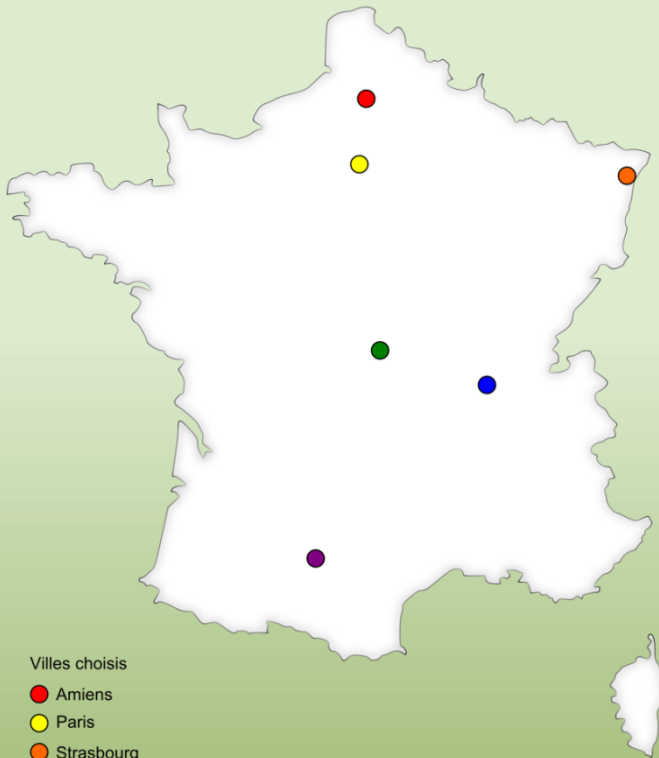
This limit is considered in many countries as the trigger allergic symptoms in most people concerned.

— Début de la pollinisation du Bouleau à Strasbourg de 1988 à 2014
— Poly. (Début de la pollinisation du Bouleau à Strasbourg de 1988 à 2014)

Study ONERC-RNSA : Pollen : Health indicator of climate change

First phase of the study → taxon choice:

- ✓ Tree
- ✓ High allergenic potential
- ✓ Representation on a large part of the territory

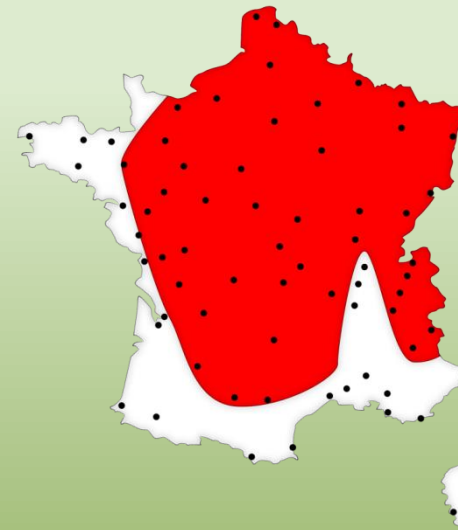


Villes choisies

- Amiens
- Paris
- Strasbourg
- Montluçon
- Lyon
- Toulouse

Second phase of the study → cities choice:

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



Map of France of the distribution of birch pollen

Study ONERC-RNSA : Pollen : Health indicator of climate change

Third phase of the study → period choice :

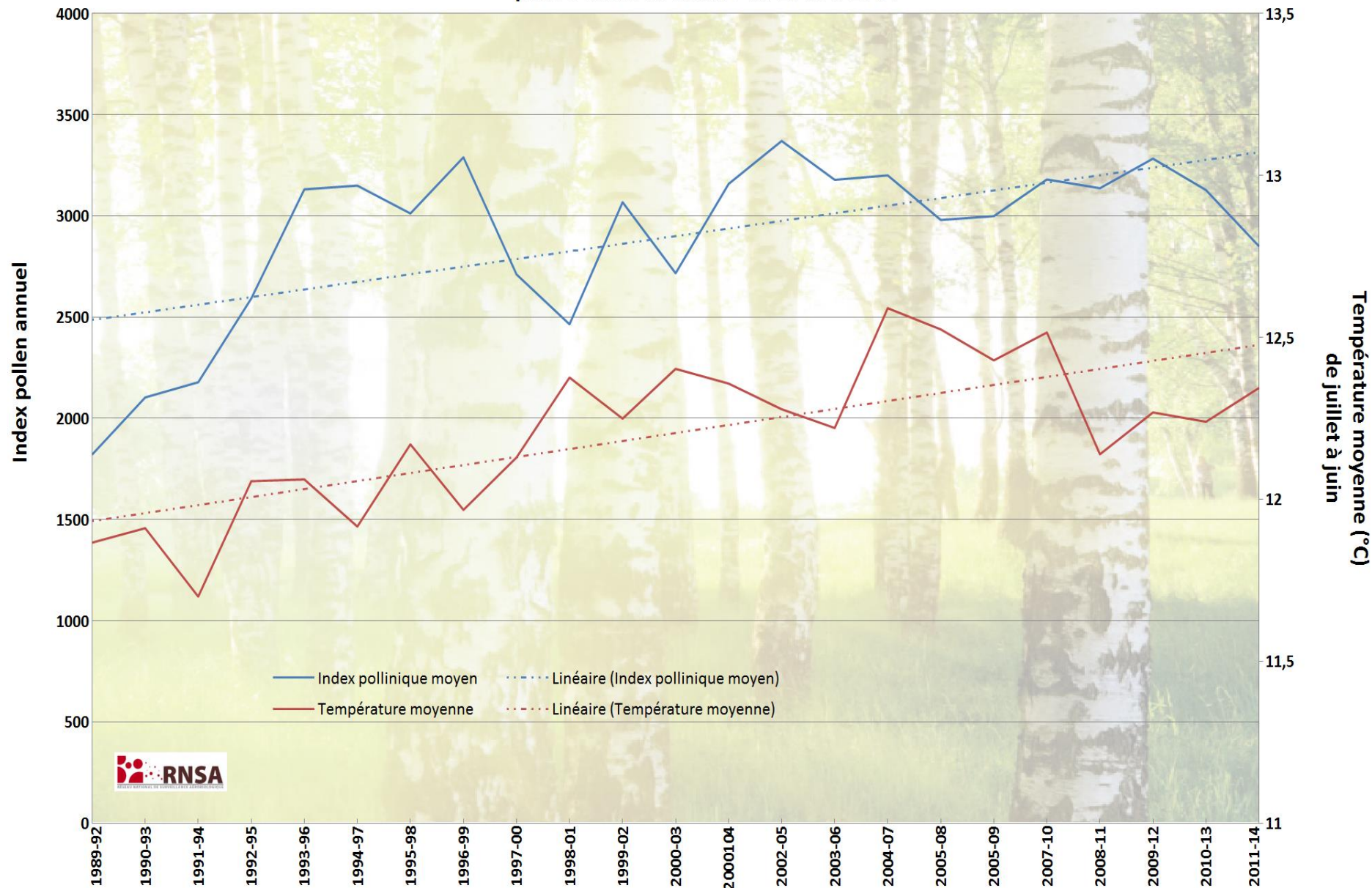
The phenological year for birch is from July to June.

The birch pollen quantity which are released in March-April depends on the temperatures and weather he has done before, since july of last year.

The period July-June (year N+1) has been chosen.



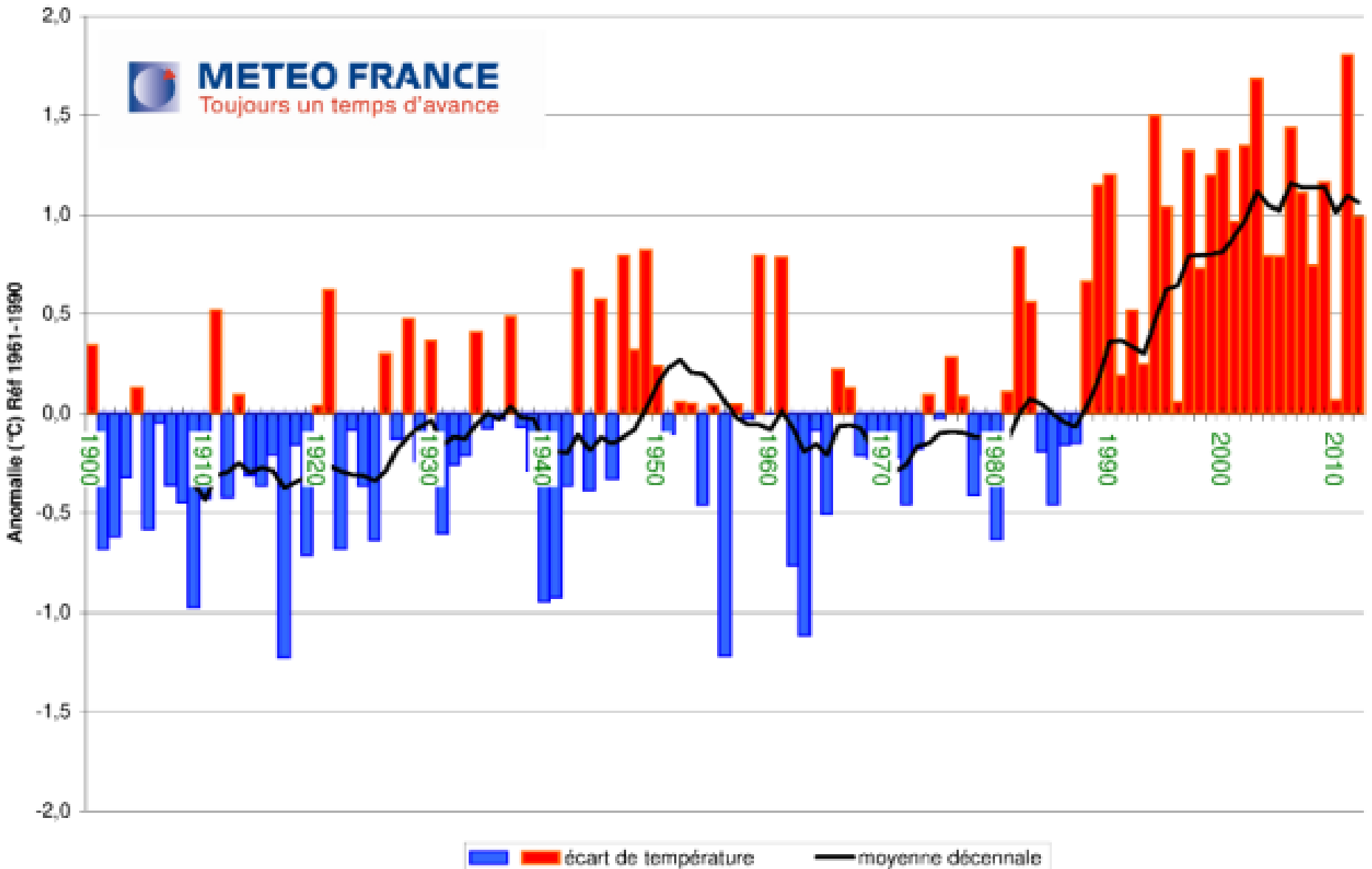
Moyenne mobile (4 ans) quantité pollen de Bouleau et T° annuelles Juillet-Juin pour 6 villes de France de 1989 à 2014

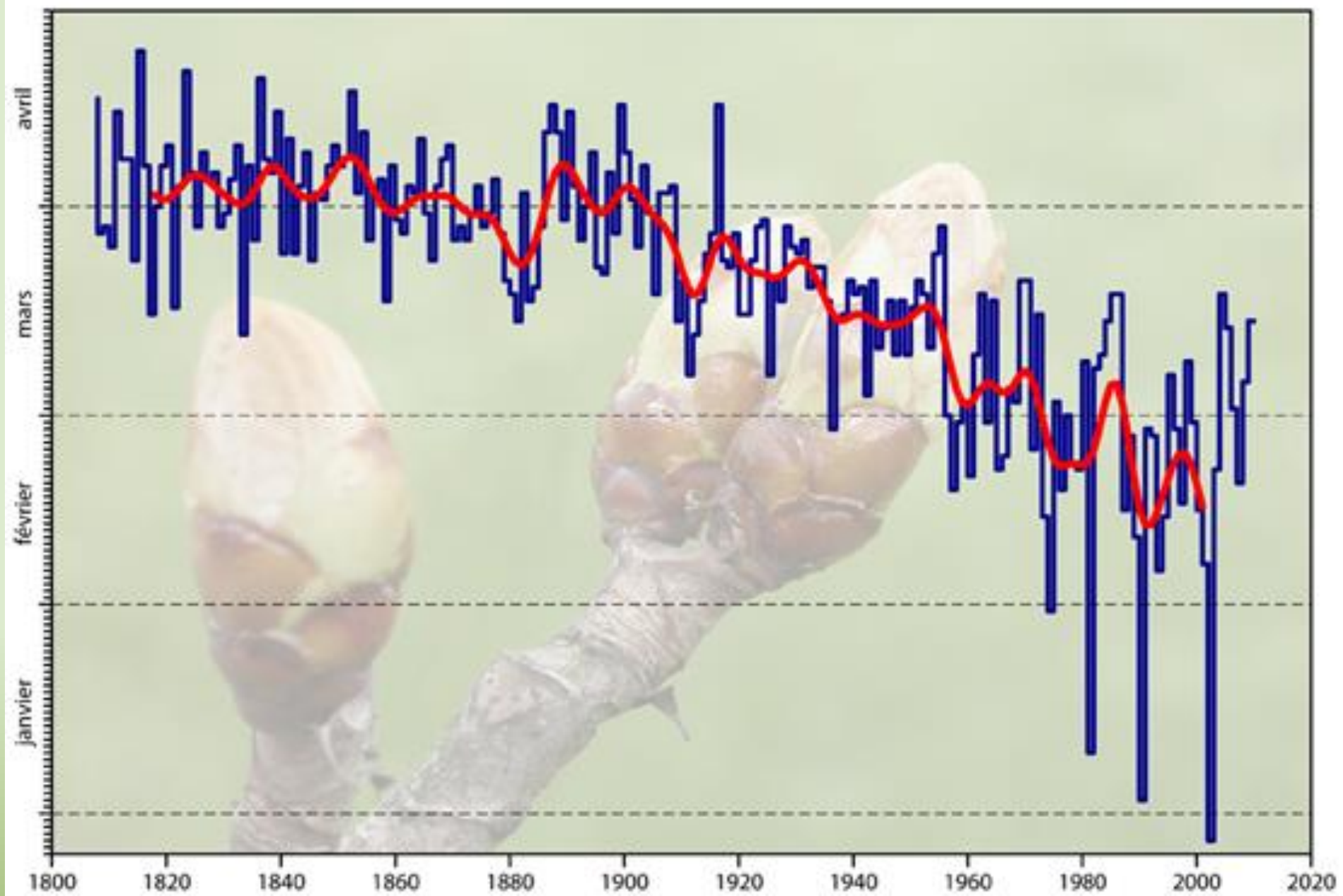


The impact of global warming on vegetation



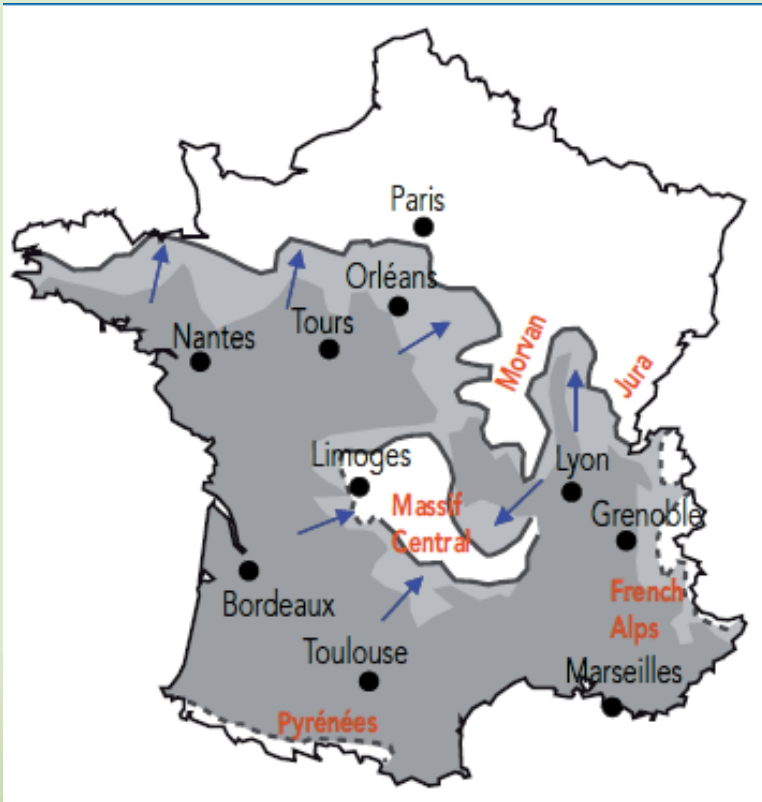
Evolution of the average temperature in metropolitan France from 1900 to 2013





Date of onset of the first sheet of chestnut in Geneva since 1808

Theories



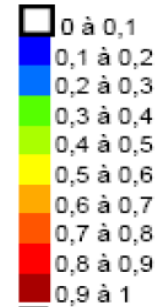
According biologists :
The increase of 1 °C in mean annual temperature is equivalent to a translation of plant species 200 km to the north or to a rise up of about 150 m in altitude.
Source : Science & Vie, 2003

- Species migration from South to North (ragweed, trees, grasses, cypress and oak. ...).
- Forecast: warming of 3.5 °C by 2100.
- The area of green oak by 2050 could exceed a line Bordeaux-Saint-Etienne and cross the Loire cross by 2100.

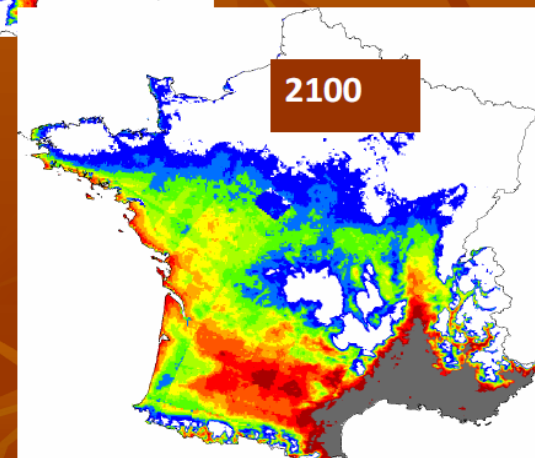
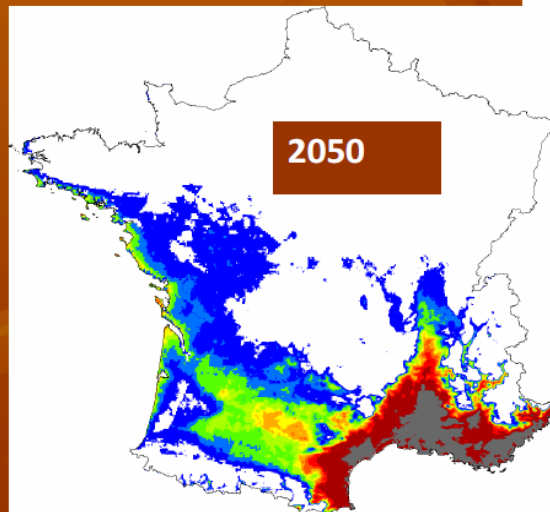
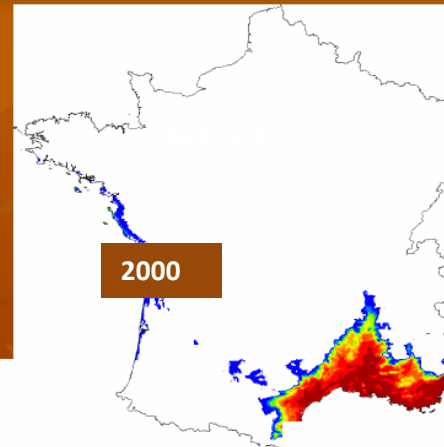
Chêne vert

Quercus ilex

Légende des probabilités



paramètres climatiq

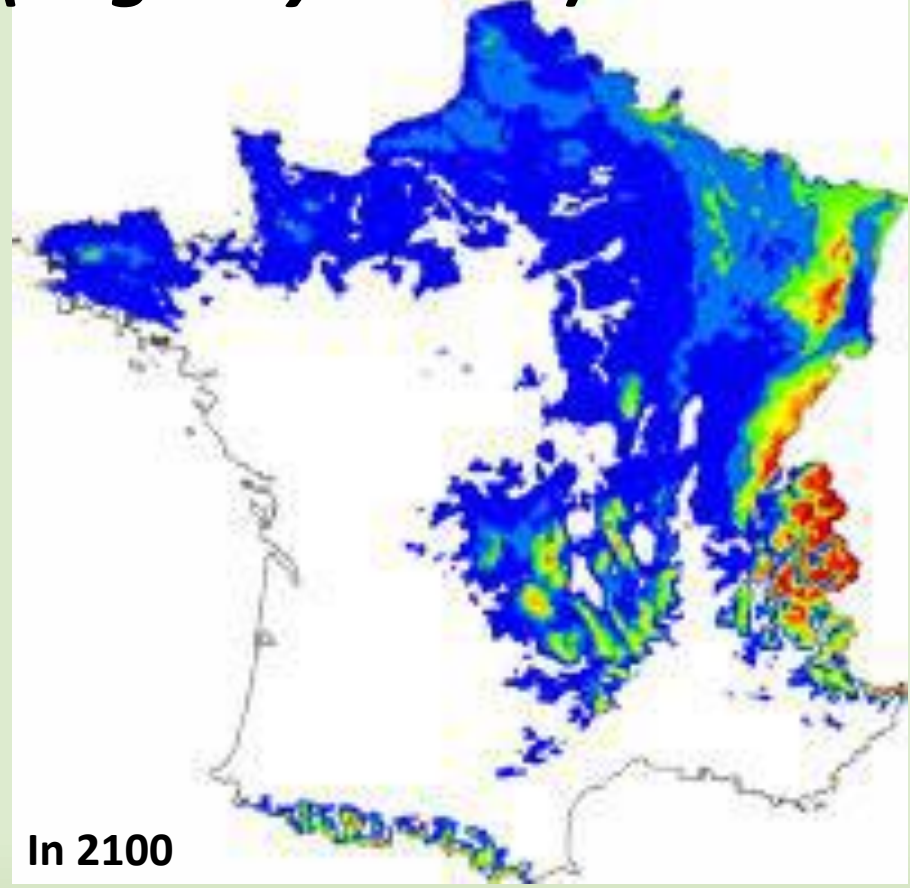
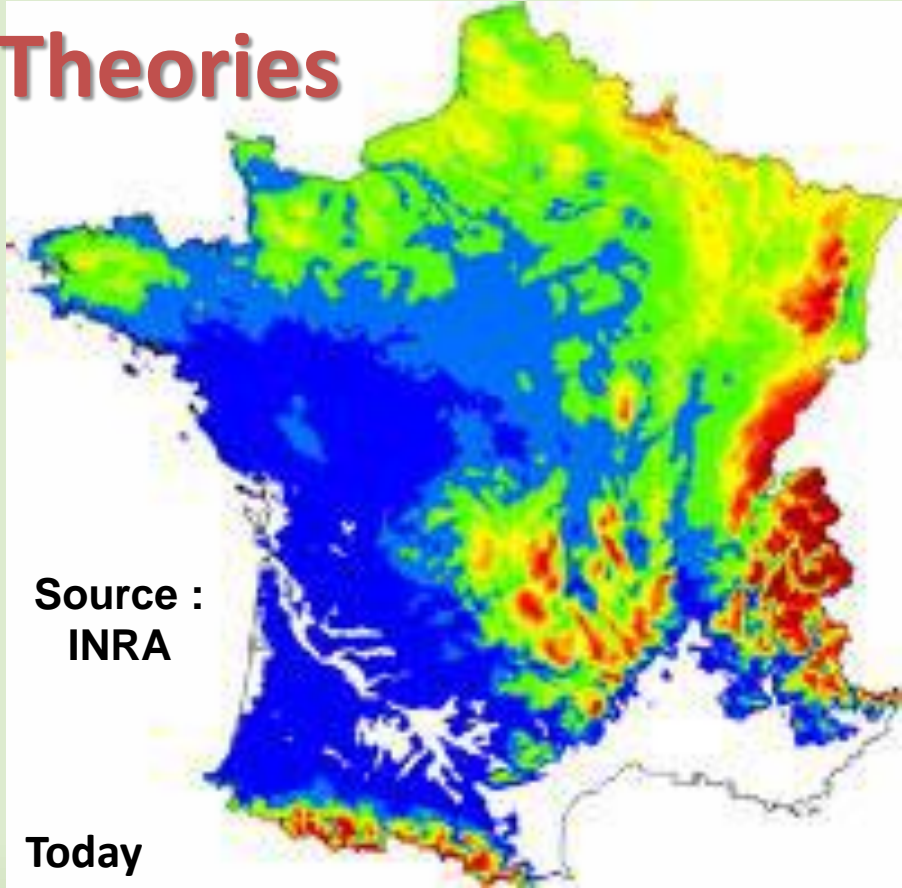


Source :
INRA

Projet carbofor , Tâche D1 : modélisation et cartographie de l'aire climatique potentielle des grandes essences forestières françaises, Badeau et al .

Common beech (*Fagus sylvatica*)

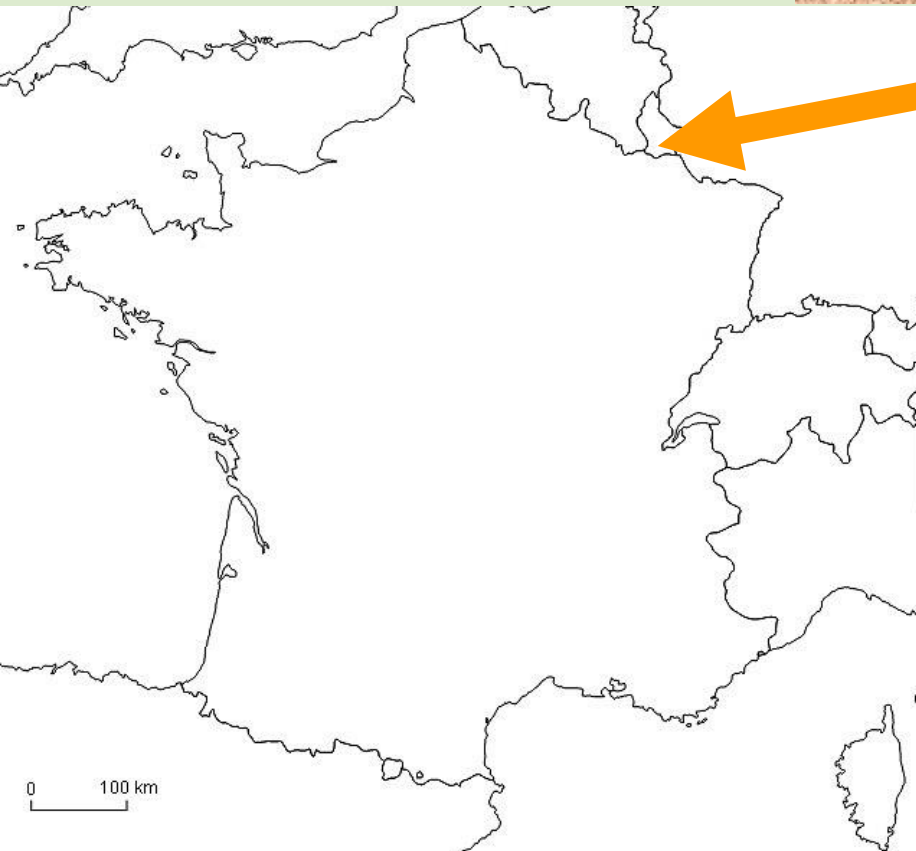
Theories



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: Larix, Abies, Picea ...

Theories

Olive tree

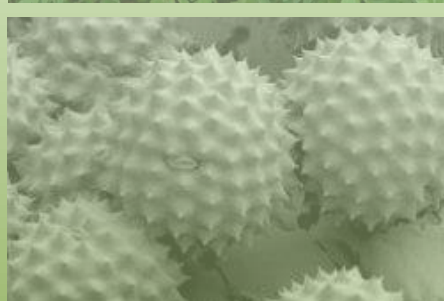


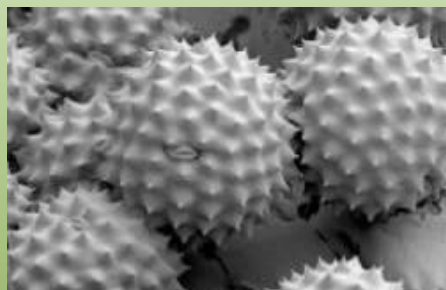
With a warming of 3.5°C by 2100 the Olive tree could go back to the gates of Luxembourg.

Because of the Photoperiod which is an essential element for plants it will certainly never happen

Conclusions

- **The consequences of global warming are:**
 - Higher concentrations of pollen
 - A change in the dates of flowering and pollination
 - An increase of the duration of the pollen season
 - An increase in the allergen content of pollen grains
 - A simulation of the plant growth by the CO₂ which causes an increase in the number of pollen grains in the air
 - A greater impact on health (stronger and more frequent allergenic symptoms)
 - More people with allergies
 - A northward shift or elevation of the extension area of some species





Thank you for your
attention !