Promoting innovations for quality and adaptation to climate change in the French wine industry

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RNI & EFET

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Promoting Innovations for quality and adaptation to climate change in the French wine industry

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eit Climate-KIC

Key message of this presentation:

Increasing environmental concerns and climate change are challenging the wine quality and the whole wine industry…

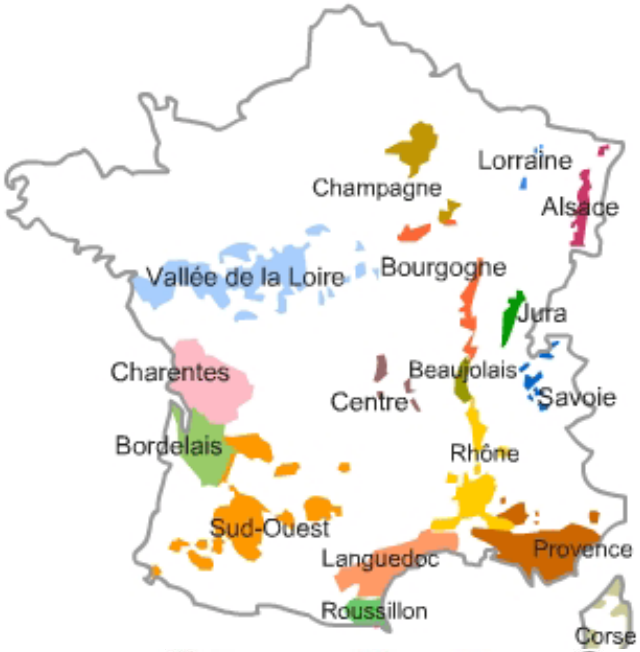
These challenges are not calling for new domains of innovation, but for a new way to innovate

Wines in France

A long history, initiated by the settlement of Greek migrants (6th century BC)…

Huge extension during XIX and XX centuries

Growth in volume, then in quality and value…



…leading to a strategic sector

40 millions hectoliters, 720 000 hectares

250 000 direct jobs

€ 13 billions in export (2018), second item !

Externalities on tourism, culture

…based on a strong regulation of quality

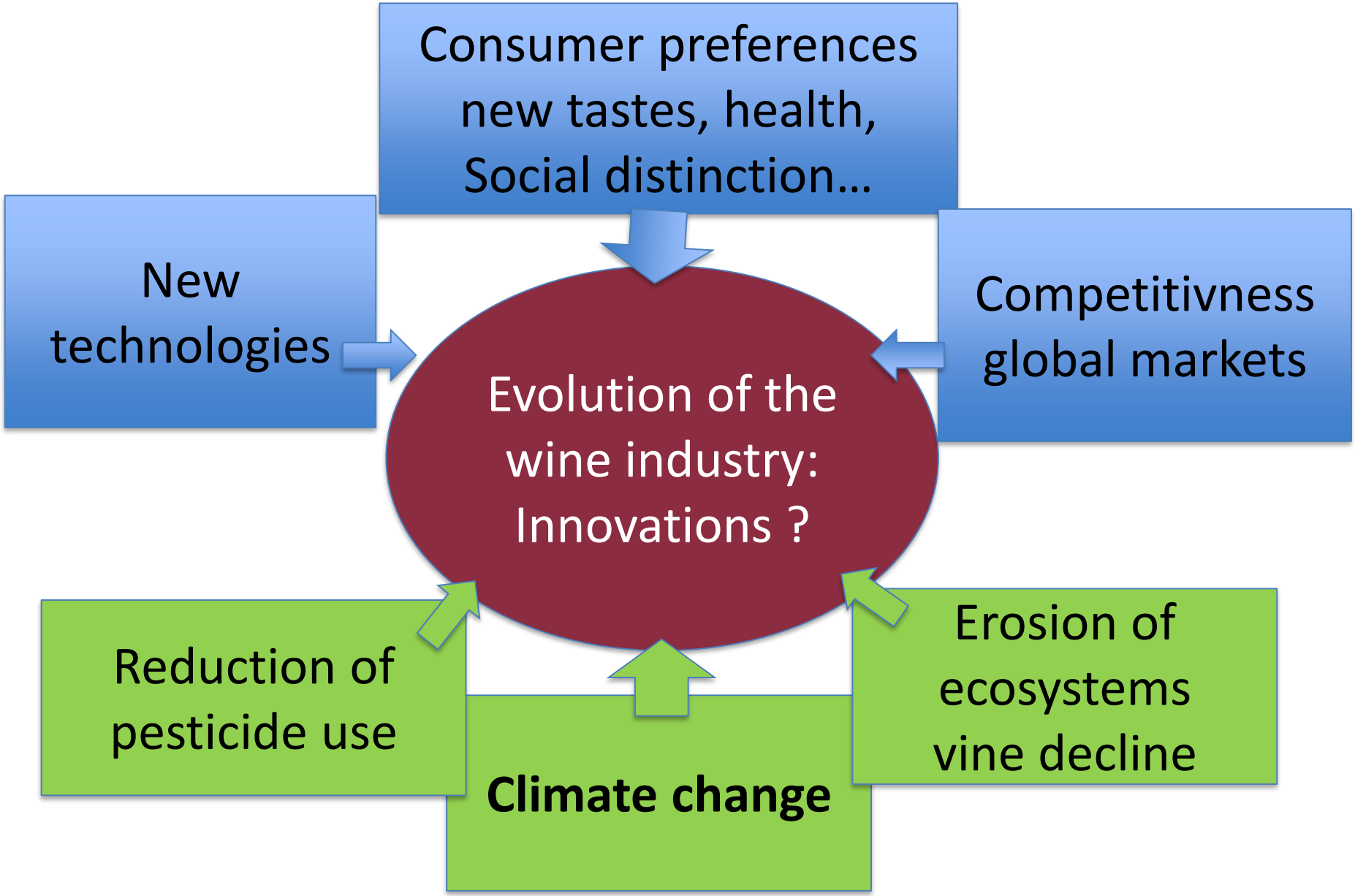
National organization INAO (PDO, PGI, Organic labels)

Powerful regional wine organizations

initiatives from each local wine producers union

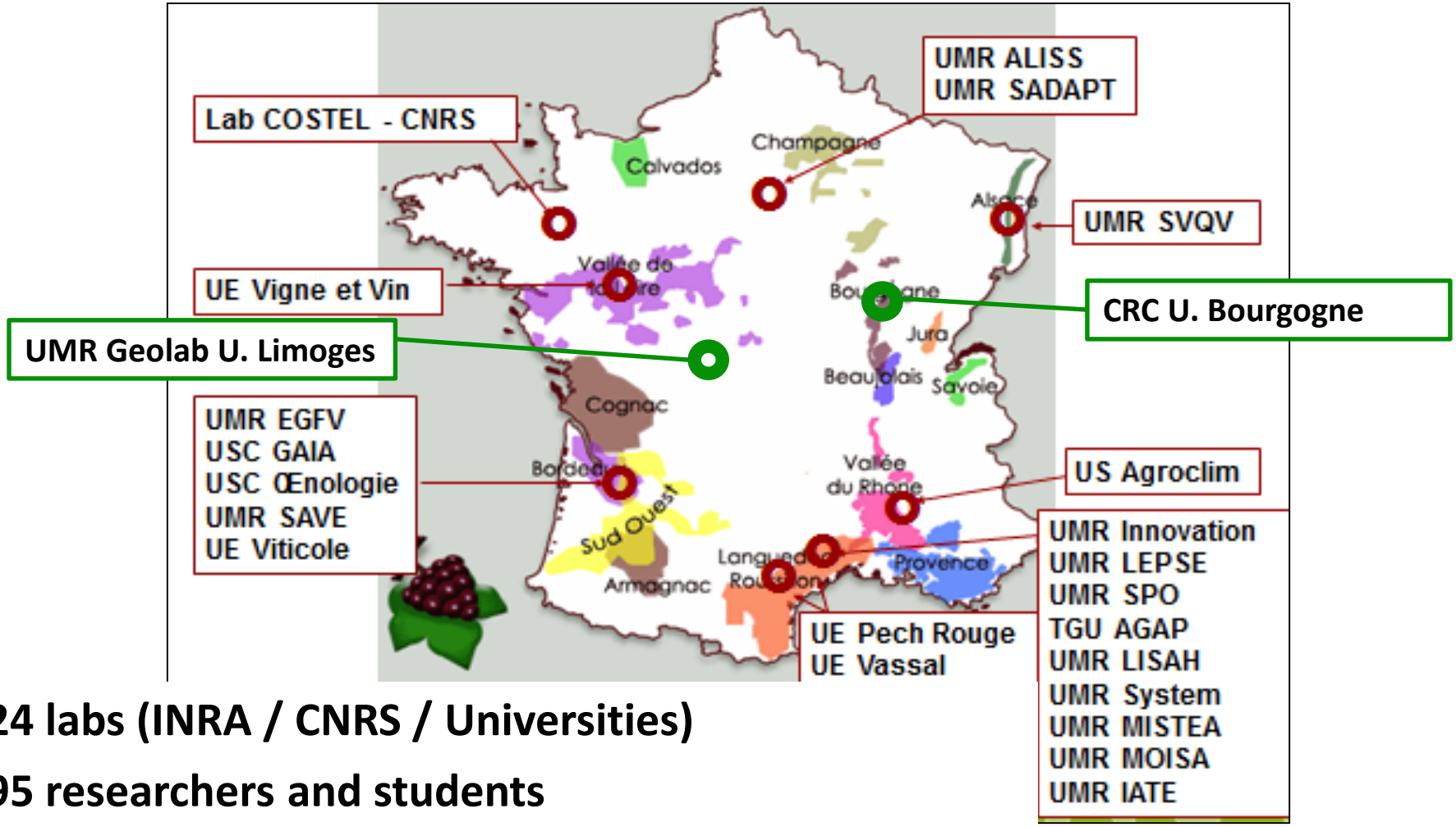
50% PDO (AOP) wines, 28% PGI (IGP), 15% brandies

The competitiveness of the sector is threatened !



LACCAVE project (2012-2016) (N. Ollat, J.-M.Touzard)

- Impacts of climate change on vine and wine
- Innovations for adaptation in the wine industry

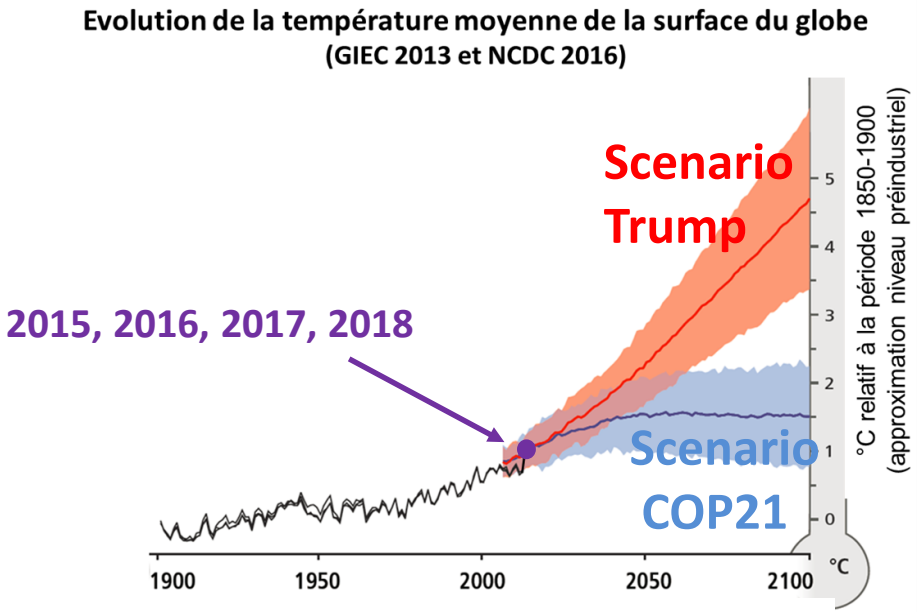


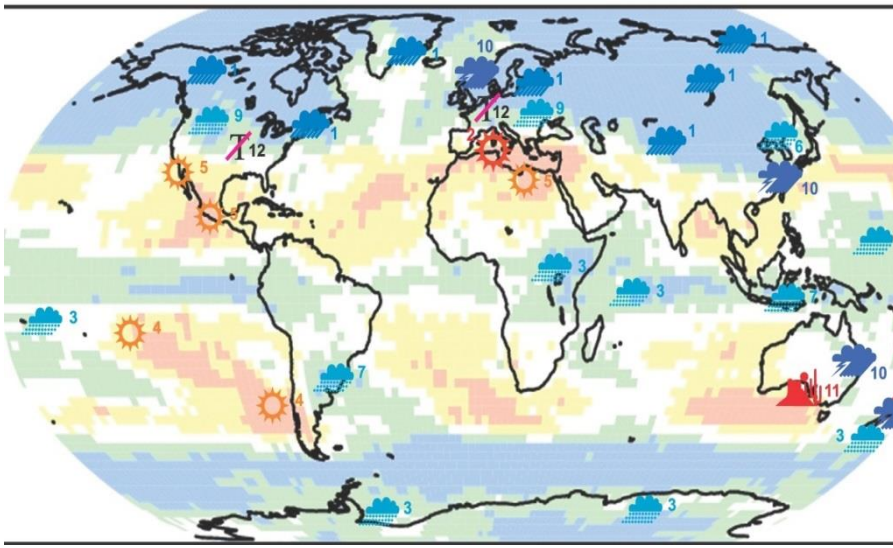
24 labs (INRA / CNRS / Universities)

95 researchers and students

Climatology, genetic, écophysiology, agronomy, œnology, économics, sociology….

Climate Change observed, simulated





1. Increase of average **temperature**

observed : + 1°C (+1,4°C in France)

between +1,5 and +2,5°C in 2050

till + 5,5°C en 2100

According to our GHG emissions

2. Modification of **rainfall**

first observed impacts, simulated:

- Increase North Europe
- Decrease South Europe

3. Evolution of Climate **variability**

Summer droughts

Interannual variations

Extrem events: hot waves, rain…

4. Indirect influences

Sea level, salinisation

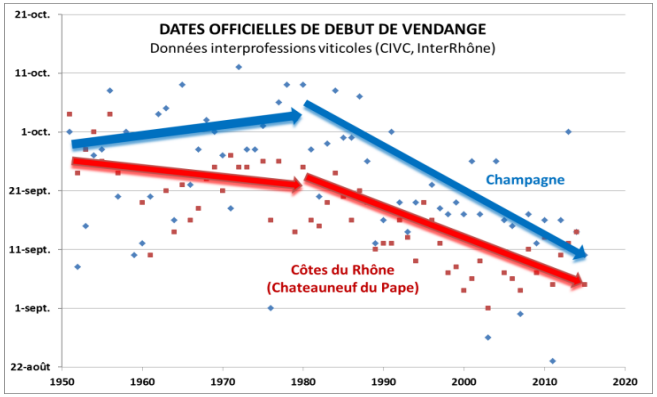
Erosion of biodiversity

Microorganisms, pests,

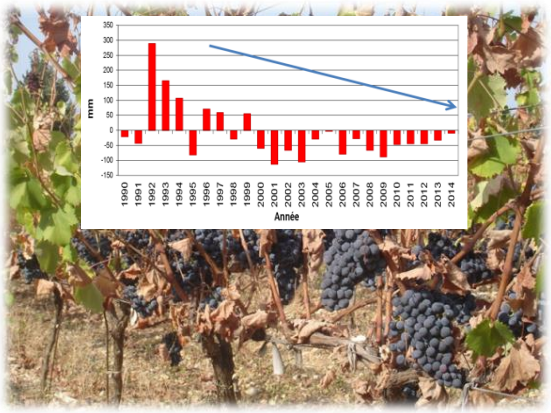
Ecosystems, soils, landscape…

Impacts of climate change on vine and wine

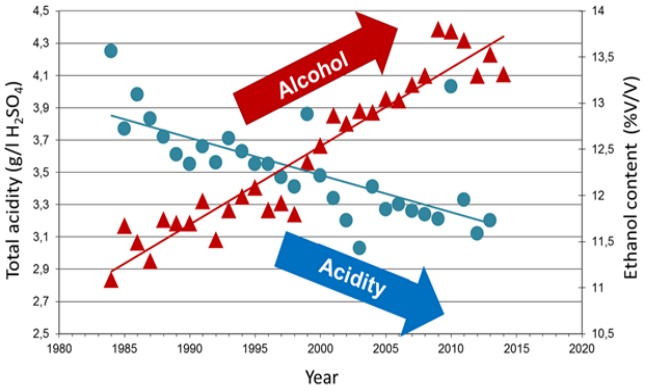
observed, simulated



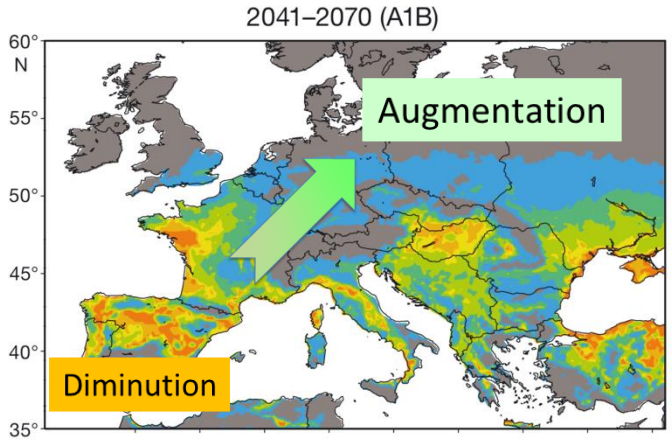
All development stages of vine are affected: earlier harvest



Water balance and stress
Affect yield (and quality)

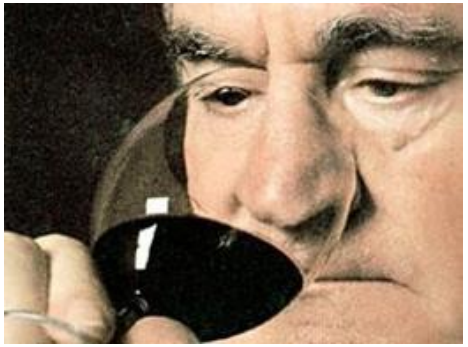


Change in berry composition
More sugar, less acidity
Modification of aromas



Evolution of potential planting areas

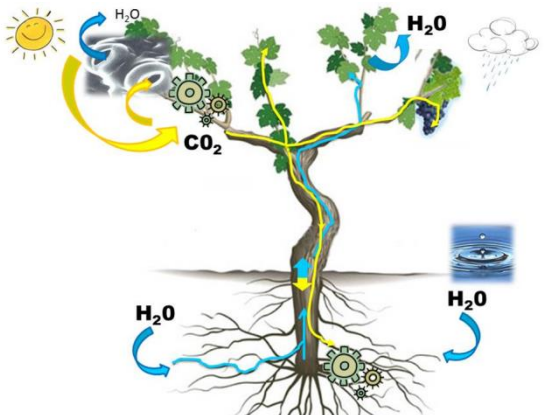
Economic impacts
Incomes, assets, competitivness

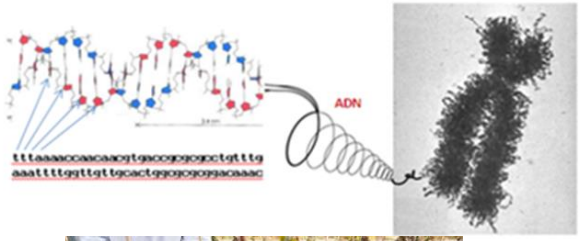


Perception of actors ?
consumption ?

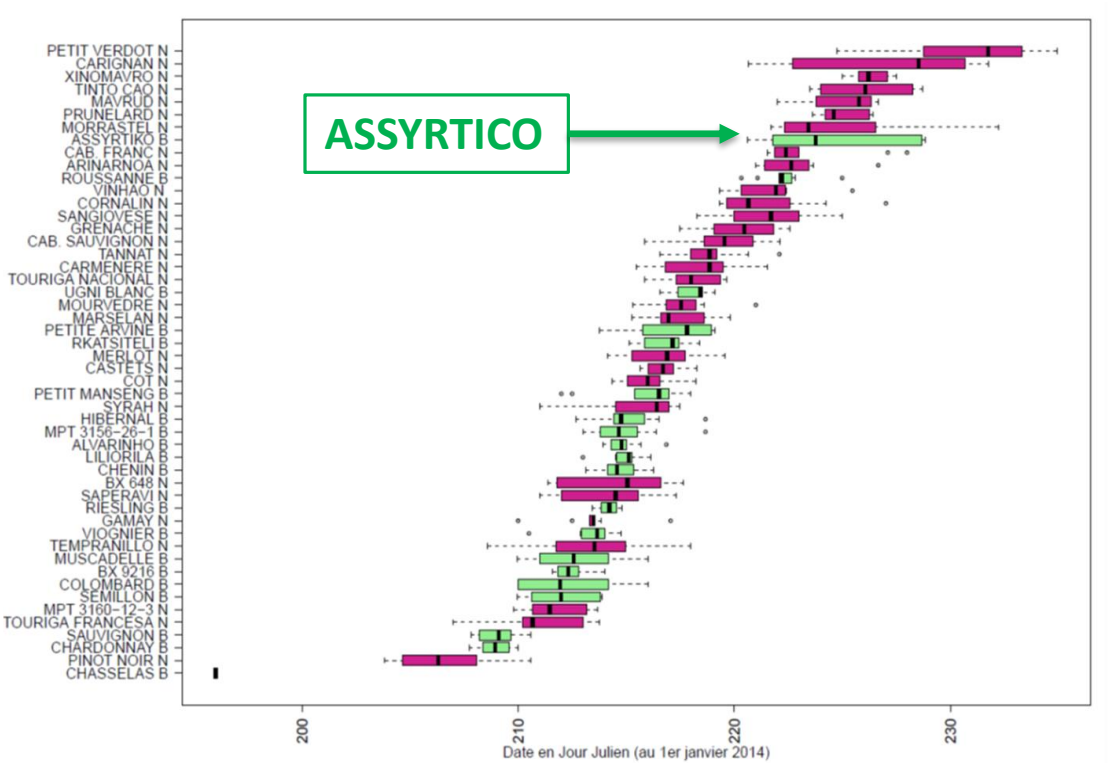
Adaptation 1. New vine varieties

Later varieties, resistant to dryness, high temperature and deseases producing less sugar, more acidity





New knowledge on genetic and Physiology
(Coupel-Ledru et al.PNAS, 2016)



Comparing existing varieties : date of maturity, acidity…

Different options :

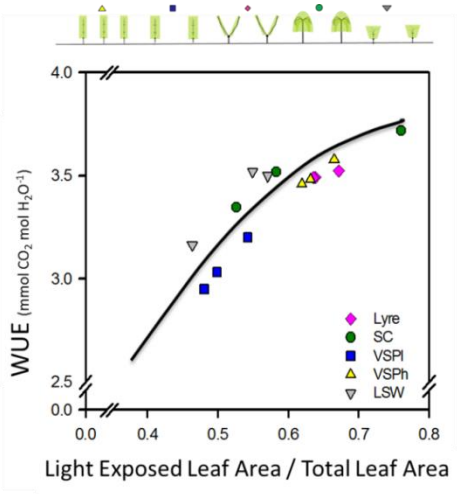
- **clones : variability in a same variety**
- **old varieties**
- **varieties cultivated in other regions/countries**
- **creation of new varieties (hybrids)**

Adaptation 2. New viticultural practices

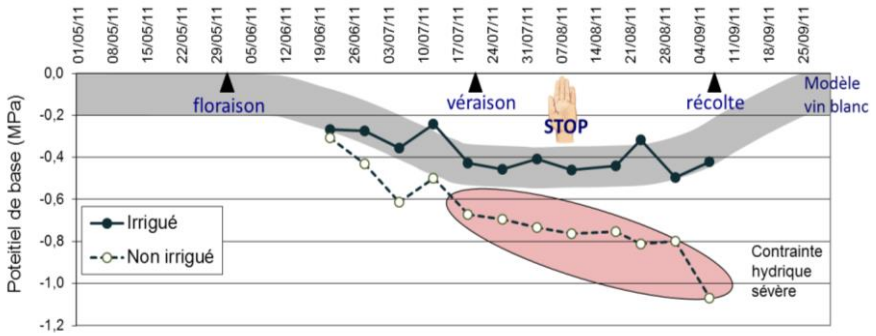
Tests and trade-off between practices

- stripping
- Density, pruning, hight of grapes
- Soil management and agroecology
- Agroforestry

3D scene Reconstruction



irrigation according
To the need of the vine,
goals of production
And available resource (Re-use)

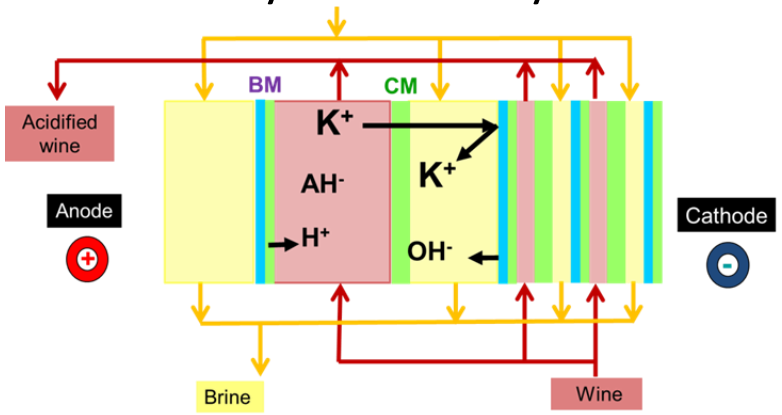


Irrigation according to « hydrical potential pathway »

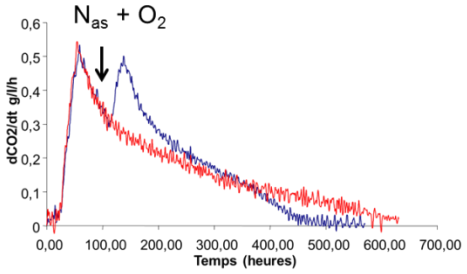
Adaptation 3. Enological technologies
= corrective solutions

Reducing ethanol with
semi permeable membranes

Adjusting Ph, Increasing acidity
by Electrodialysis

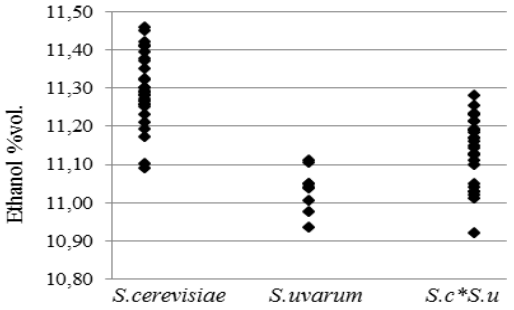


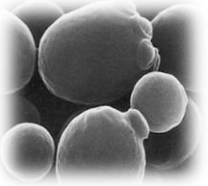
Better control of key winemaking operations



Limiting oxydation with Lower temperature
Management of nutrients for better fermentation

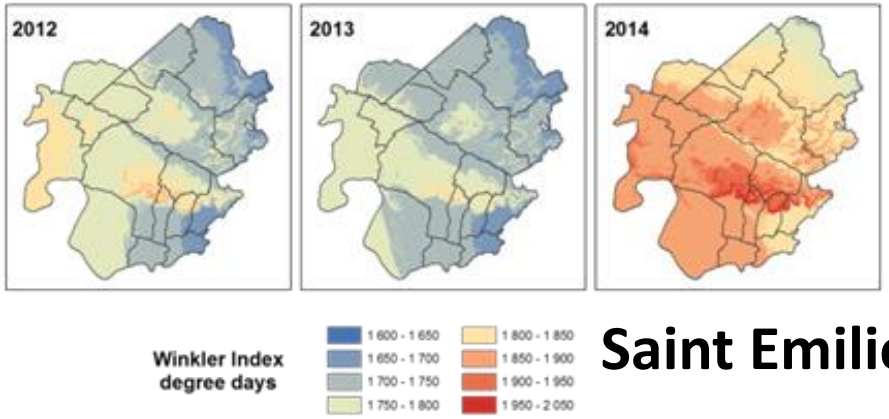
Selecting yeast for adaptation to CC





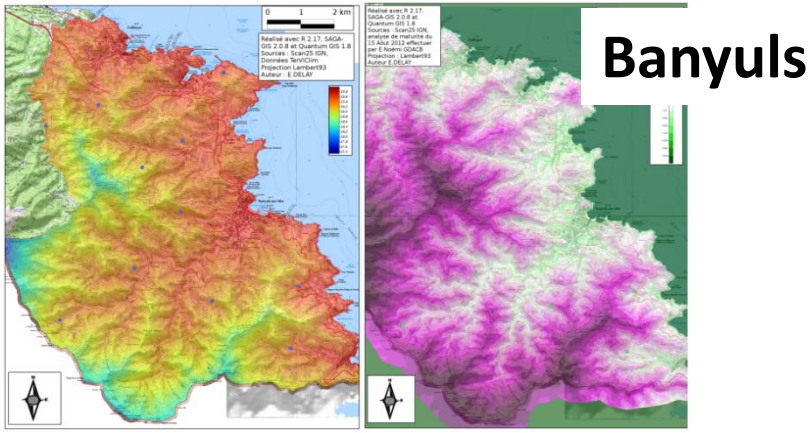
Decrease of ethanol : **0.6 – 1.3%**
Increase of total acidity

Adaptation 4 : changing the location of vines



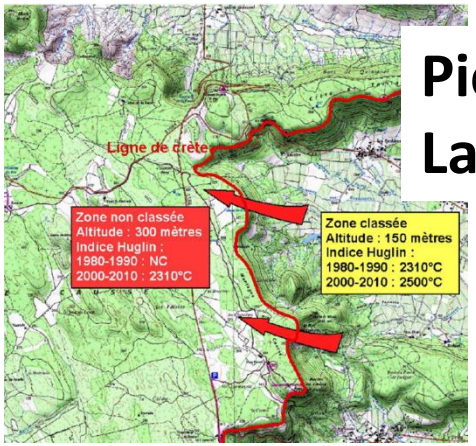
Saint Emilion

Better understanding of climate variabilty at local scale : relocation of vines in a same terroir



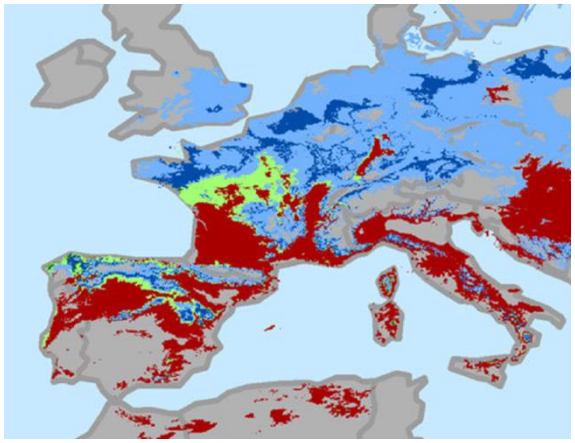
Banyuls

Simulation of climate change at local scale, with wine producers



Pic St Loup
Languedoc

Changing the delimitation of wine producing areas (AOP) : higher altitude



Creating new vineyards in north of France, Europe ?

Adaptation 5. Changing the institutions…

New varieties, practices and location are codified in rules and « code of practices ».

Support for climate services (capture of C by soils, agroforestry)

Tools for risk management
: insurances, investment management, wine storage and blending, local solidarity, Diversification of activities…

To improve R&D clusters in wine regions

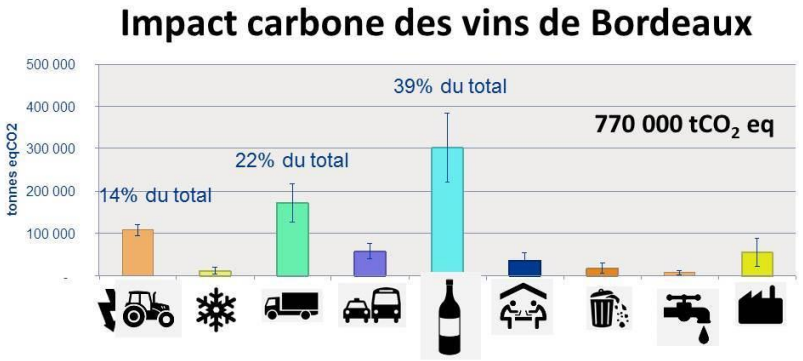
Adaptation 6. To co-construct knowledge by integrating consumers and citizens

To know the consumers **perceptions on** :

- CC impact on wine quality
- solutions adopted for adaptation

Experimental economics

To combine actions for **adaptation** and **mitigation,**
to communicate on that.



To **link the climate challenge with other issues** (income, quality, health, environment,…)
To discuss and **involve consumers and citizens**

Testing the acceptance of consumers Experimental Economics

xperimental conomics

First tasting : B > A
Repeated tasting : A > C >> B

De la Fuentes et al., 2016

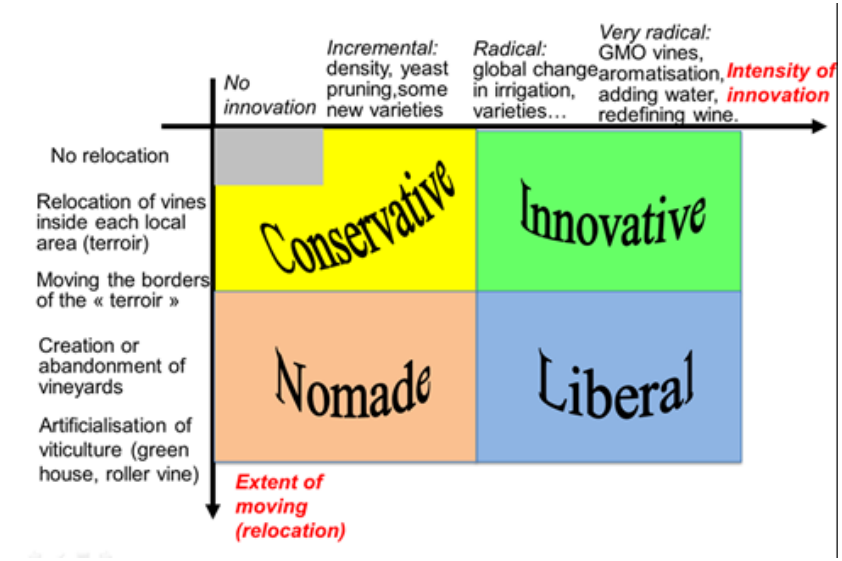
1. Consumers could be « seducted » by the novelty of the « wines of climate change » but they prefere current wines when they repeat their consumption

2. Different acceptances of the corrective technologies :
young and women vs old and men

How to combine these levers of adaptation in shared strategies and at different scales?

1. Prospective workshops In seven wine Regions

80-100 stakeholders react on first scenarios and propose strategies by using tablets available on discussion tables.



1) They **specified the pathways** leading to the four scenarios and explore their impacts (common vision)
2) They voted for **strategic attitudes** on each pathway
3) They suggest **concrete actions** to promote or avoid the scenarios

2. Co-construction of national climate strategy for the wine industry

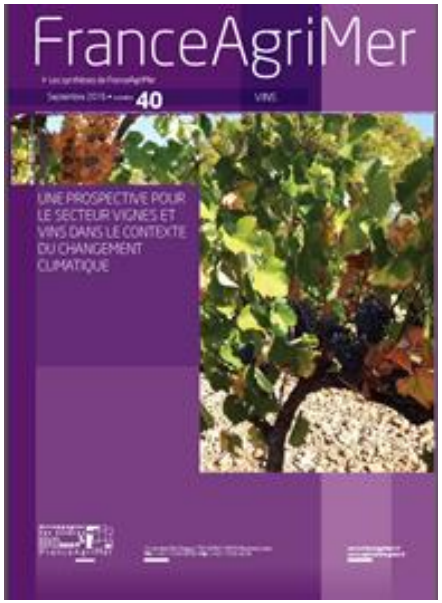
Presentation at the **National Assembly**
of the first results from the regional workshops

Setting up of a **national group** including researchers and the main Wine organizations

Specific analysis of the **2600 actions** proposed by the 7 regional worksops

Elaboration of **strategic document**
voted by the national wine organizations :

- Orientation of R&D policy
- Revision of regulations, code of practices
- Communication
- Support to local solutions, collective actions,



3. The first Hackhaton in a wine village

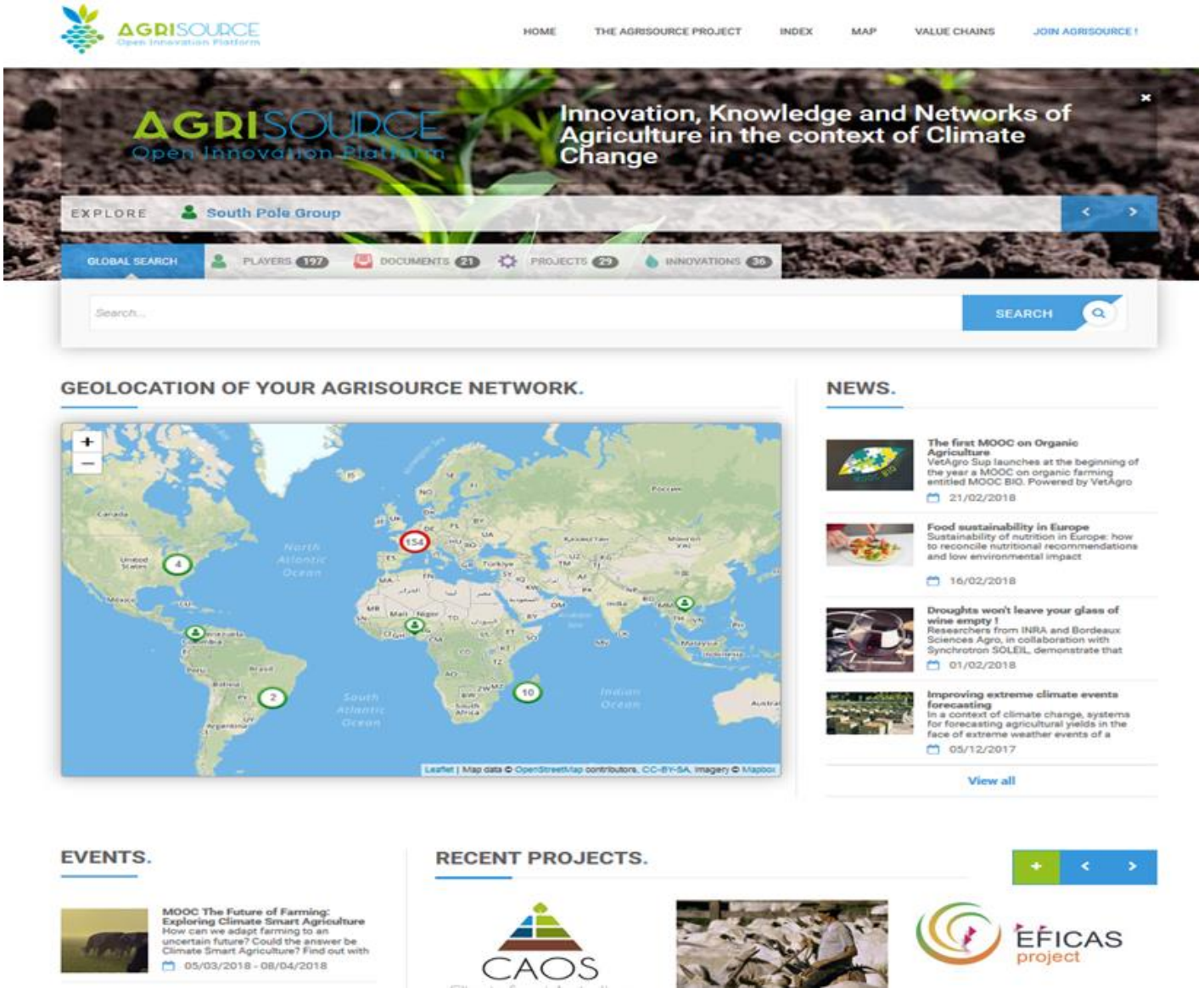
Design of a specific method to generate solutions

60 Participants from **all backgrounds** : vinegrowers, scientists, students, start-ups, local government…

Six **operational solutions**:
sustainable water management device, wine Agora , experimental vineyard, local certification of projects, livestock in the vineyards, collective startup….

4. Open innovation platform for climate smart agriculture

AGRISOURCE
Open Innovation Platform



5. New research project (2018-2020)
LACCAVE2.21 (Ollat, Touzard)

WP1 : Integrated expertise for adaptation

- Water management
- Biotic interactions
- Soils
- Varietal ideotypes
- Location of vineyards
- Data management
- Value chain assesment
- Definition of futur wine

Animation of LACCAVE think tank

WP2 : Tools for adapting viticultural systems

- Vineyard Agroclimatic Processing Chain
- Modeling for plant performance projections

Contribution To CC SAFE portal

WP3 : Co-construction of solutions for adaptation

- Toward a national strategy
- Co-design of cropping systems
- Tackling climate smart innovations

Contribution to the wine industry governance and the « Agrisource » Open Innovation platform

WP4: To build an European project on the adaptation of Mediterranean vineyards

Contribution to PRIMA EU initiative and international networking (OIV)

Conclusion (1)

1. Many innovations already exist, adaptation strategies could be reasonably implemented in all French vineyards if global warming stays below 2°C
2. Reduction of GHG emission is imperative, to stabilize the wine industry and limit the risks : “if you like wine you must support Paris COP21 agreements”
3. No single solution, but different combinations of technical innovations, spatial strategies and institutional changes.
4. Solutions are combining scientific knowledge and practical knowledge from different stakeholders

Conclusion (2)

5. The integration of solutions must be elaborated considering the value chain, including the consumers
6. The adaptation strategies must be coordinated at local and regional levels where climate impacts are specific and where the use of resources can be optimized
7. There is room to innovate in PDO wines, building differentiated quality according to sustainable management of local resources
8. To develop learning networks connecting researchers and stakeholders, and tools to facilitate ollaborative innovation at local, regional and national levels

= new way to innovate in food systems