THE EVOLUTION OF GRAPE HARVEST DATES IN RELATION TO CLIMATE CHANGE

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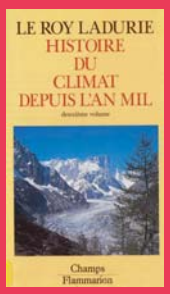


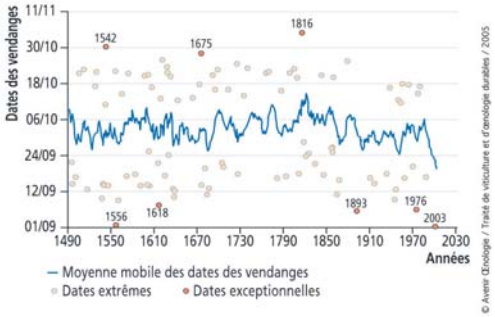
In his reference work, The History of the Climate Since the Year 1000, Emmanuel Le Roy Ladurie describes the evolution of climate data using a series of indicators, including harvest dates in northern zones. His approach is based on the historical data of various areas (Argenteuil, Burgundy, Champagne, the Jura, Switzerland). These data are calculated from the opening date of the grape harvest (number of days following September 1).
The collection of supplementary data has been carried out by ITV France (J. Rochard, J.R. Clement et al)

These data have been interpreted by calculating the moving average over 10 years according to the following method:

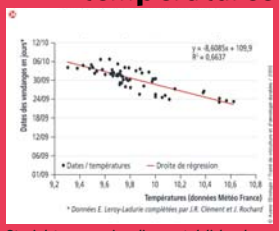
$$\text{RN (moving average)} = \frac{RN + RN\text{-}1 + \ldots\ldots + RN\text{-}9}{10}$$

Moving average of the grape harvest and extreme dates over the last 5 centuries (Burgundy Reference Point)

Données E. Leroy-Ladurie complétées par J.R. Clément et J. Rochard.



Correlation between grape harvest dates and average temperatures



Straight regression line established using harvest dates and temperature since 1943
J. Rochard and A. Srhiyeri, ITV France

A curve has been established using the dates of grape harvest ("Burgundy Reference Point" from Emmanuel Le Roy Ladurie) and the annual average temperatures since 1943 (data from Meteo France). The curve clearly underlines the inverse relationship between the two data groups.

The resulting straight regression underlines the correlation between average temperature and grape harvest date.

The effect of the volcanic activity on temperature and harvest dates

Upon reaching the layers of the atmosphere, eruptive aerosols have a cooling effect. A significant drop in temperature characterizes the months following major eruptions.

The volcanic index of explosiveness (I.E.V.) is the equivalent of the Richter scale for the volcanoes. Its scale extends from zero to eight in intensity.

Disease, starvation and late harvests have each been related to each major eruption.

Following The eruption of Tambora in 1815, the year 1816 has been very cold and the harvest date the latest in five centuries : the 25th of October.

Hypotheses for temperature change and for grape harvest dates during the 21st century

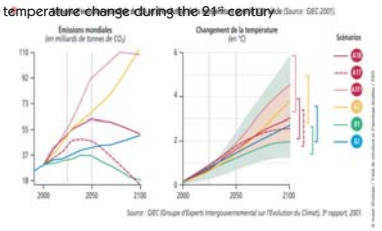
Based on the straight regression line of the historical data (since 1943), a projection has been established based on temperature evolution scenari drawn up by the GIEC.

In order to integrate the variability of the forecasts, the extreme scenari (B1 and AF1) and the median scenario (A1B) have been maintained.

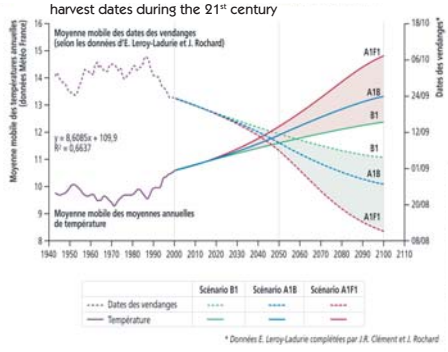
In comparison with the present date of the "Burgundy Reference Point"- September 18, 2004 (moving average over 10 years), the scenario in question would lead to average harvest dates of September 8 in 2050 (between the 6th and the 10th) and August 24 in 2100 (between August 14th and September 4th).

These dates could be used as indicators for other areas, by taking into account the relative relationship to the "Burgundy Reference Point" and local characteristics.

Scenario of world CO_2 emissions and temperature change during the 21st century



Hypotheses for temperature change and for grape harvest dates during the 21st century



* Données E. Leroy-Ladurie complétées par J.R. Clément et J. Rochard

Discussion

The use of past trends to discuss future possibilities is at best prone to numerous uncertainties. It does, however, have the merit of structuring the intellectual debate. Nevertheless, the objectivity of such an analysis depends on the ability of the authors to equally identify its inherent limits. For this study, sources of uncertainty include:

- Local variations
- Uncertainties concerning the climate change hypotheses
- Seasonal variations
- The modification of wine practices

ARVICLIM: a French observatory for climate change and its impacts on viticulture and fruit growing

In order to face new climate issues, ITV France has set up an observatory with different research institutes. Climate, physiological and grape data are collected to shape forecasts and models for wine and tree growing, harvest, quality of products and transformation.
The next step will be the extension of these observations to other wine-producing countries.

Conclusion

Predicting the future is a difficult exercise, in particular concerning the climate, which is influenced by so many interdependent factors. Hence the need for prudence in the interpretation of extrapolated data. Nevertheless, global warming appears to be inescapable.
By taking into account the present evolution (temperature increasing of about 0,5°C) foreseen for the last fifteen years, we can imagine significant changes concerning grape and wine issues over the next decades. The ability of the earth to adapt has been limited. Thus each of us will face the boomerang effect of planetary issues, directly related to the cumulative impacts of individual behaviour.

Short bibliography

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