

## Short Note

The Limehouse Cut, London, United Kingdom

# Grape harvest dates are poor indicators of summer warmth

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Received October 25, 2005; revised December 8, 2005; accepted December 17, 2005  
Published online May 16, 2006 © Springer-Verlag 2006

## Summary

It has recently been claimed that the April–August temperature in France, in any given year, can be estimated from the harvest date of grapes grown there. Based on this claim, it was asserted that 2003 was the warmest year in the last six centuries. Herein, it is shown that the grape-derived temperature estimates are highly unreliable, and thus that the assertion is unfounded.

## 1. Introduction

Chuine et al. (2004) present a mathematical model to estimate the April–August temperature in Dijon (Burgundy), France, for each year during 1370–2003. The model relies on the harvest dates of certain grapes, i.e. the estimate of the April–August temperature in a given year is a function of that year's harvest date. The earlier the harvest date, the higher the estimated temperature. (The details of the model are complicated and unimportant here.) Using the model and historical records of grape harvest dates, Chuine et al. conclude that 2003 was by far warmest year during 1370–2003.

The analysis of Chuine et al. thus makes a comparison of the (April–August) temperature in 2003 with the temperatures in other, individual, years. The analysis implicitly assumes that

the model-estimated temperatures for individual years are reasonably accurate. Herein, the validity of this assumption is examined.

## 2. Results

Chuine et al. (2004) use the (April–August) temperatures during 1960–1989 for a benchmark. The mean temperature during 1960–1989 was 15.92 °C (with standard deviation 0.72 °C).<sup>1</sup> The model-estimated temperature for 2003 is 5.86 °C (8.10 standard deviations) greater than the 1960–1989 mean temperature.<sup>2</sup>

For 2003, the observed temperature was only 3.50 °C (4.84 standard deviations) above the 1960–1989 mean temperature. That is, the model overestimated the temperature for 2003 by 2.36 °C (3.26 standard deviations). The three warmest years from the instrumental record prior to 2003 are listed in Table 1. As shown, the model underestimates the temperatures in all of those years so much that those years appear to be nearly average.

<sup>1</sup> All observational temperature data was supplied was by Météo France.

<sup>2</sup> Data for model-estimated temperatures was obtained from <http://www.ngdc.noaa.gov/paleo/pubs/chuine2004/chuine2004.html>.

**Table 1.** Temperature data (April–August) from Dijon for the three warmest years in the instrumental record prior to 2003. Column 2 shows how warm each year was (in °C), relative to the 1960–1989 mean temperature (15.92 °C); column 4 shows the same in standard deviations. Columns 3 and 5 are similar, except that they are for the model-estimated temperatures. (The instrumental record covers 1922–1939 and 1945–2003. Inaccurate data for other years back to 1883 is provisionally available [O. Mestre (Météo France), private communication, November 2005]; even if this additional data were accepted, the three tabled years would remain the warmest in the record.)

Year	Observed warming in °C	Modelled warming in °C	Observed warming in std. deviations	Modelled warming in std. deviations
1952	2.08	0.69	2.88	0.95
1947	2.62	0.85	3.62	1.18
1945	2.03	0.76	2.81	1.05

### 3. Conclusion

The model used by Chuine et al. (2004) has greatly overestimated the temperature of 2003 and greatly underestimated the temperatures of the warmest years in the instrumental record prior to then. These failures of the model imply that the model is inadequate for estimating the temperature in unusually warm years (although the model might give reasonable results on average).

### Reference

Chuine I, Yiou P, Viovy N, Seguin B, Daux V, Le Roy Ladurie E (2004) Grape ripening as a past climate indicator. *Nature* 432: 289–290

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