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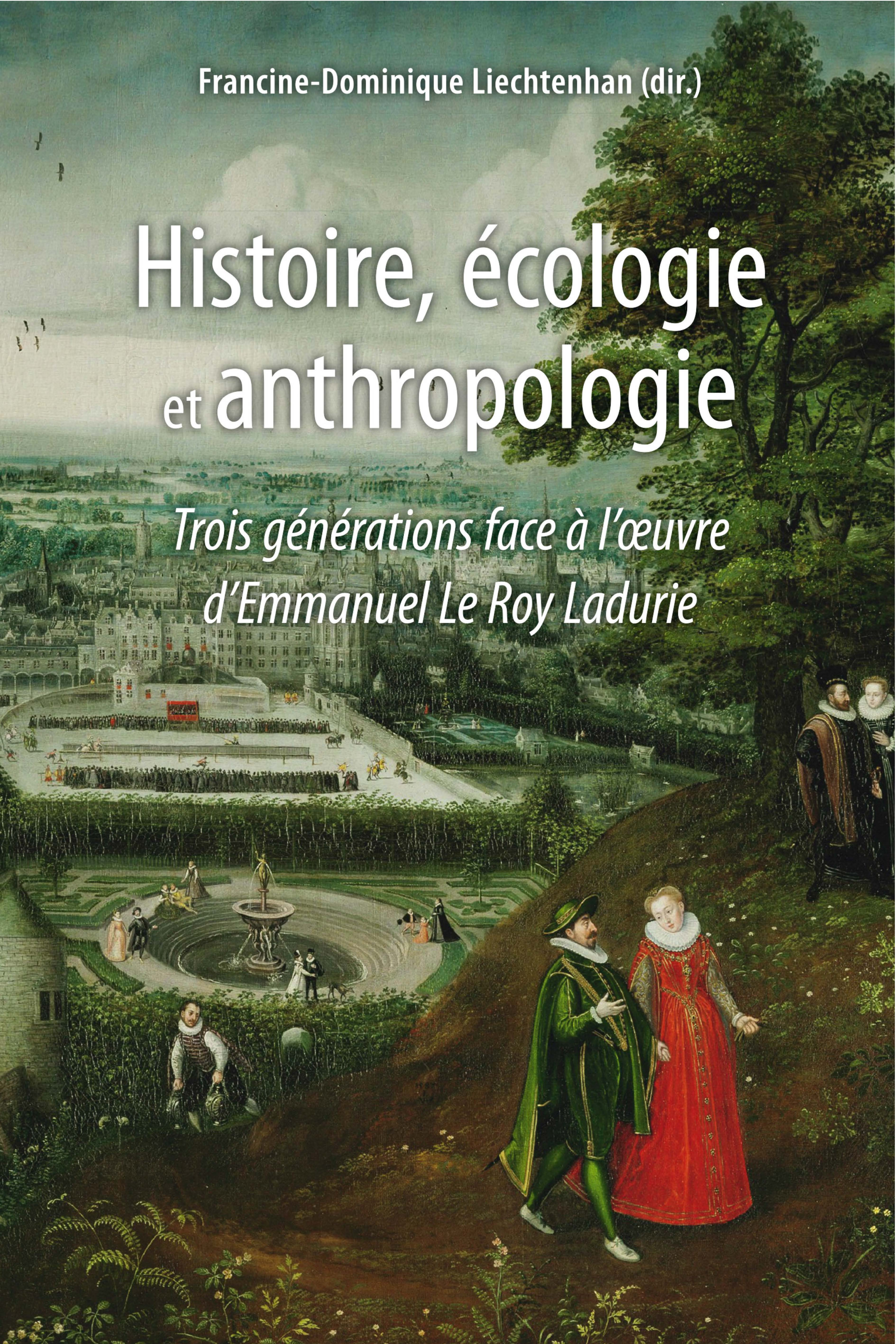
Trois générations face à l'œuvre d'Emmanuel Le Roy Ladurie



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Histoire, écologie et anthropologie

Trois générations face à l'œuvre d'Emmanuel Le Roy Ladurie

PUPS

AVANT-PROPOS

Francine-Dominique Liechtenhan
Centre Roland Mousnier, CNRS

Le 19 juillet 2009, Emmanuel Le Roy Ladurie fêta son quatre-vingtième anniversaire dans l'intimité familiale. Pour ses amis, collègues et élèves, auxquels s'associa une jeune génération de chercheurs inspirés de l'œuvre de ce grand historien, l'organisation d'un colloque en son hommage s'imposait. Nous affrontions cependant une difficulté majeure ; face à l'immensité de l'œuvre d'Emmanuel Le Roy Ladurie, la chronologie couvrant plus d'un millénaire, il fallait faire des choix thématiques.

Au fil de sa longue carrière, et de nos jours encore, rien n'échappe à la curiosité d'Emmanuel Le Roy Ladurie, des registres d'inquisition d'un abbé promis à devenir pape d'Avignon, aux récits de voyage d'une famille suisse, les Platter, aux *Mémoires* de Saint-Simon – et nous nous contentons de ne citer que ces trois sujets de son immense bibliographie – il offre toujours une vision pluridimensionnelle de l'époque choisie en y associant d'autres disciplines, la géographie, la climatologie, l'anthropologie ou encore la sociologie. Il cherche son inspiration dans les champs les plus divers, les combine, les associe et donne ainsi lieu à de nouvelles impulsions historiographiques. Ses travaux sur le climat, débutés sur un mode prémonitoire dans les années 1970, trouvent leur apogée en ce début du XXIe siècle avec les quatre magistraux volumes sur *l'Histoire du climat*, retraçant, à l'échelle européenne, plus de mille ans de fluctuations des températures, d'intempéries, de sécheresses et leurs suites comme les mauvaises récoltes, les disettes, les épidémies et le réchauffement climatique. Il l'a réalisé avec des équipes de météorologues, de climatologues, de géographes et bien sûr d'historiens, témoignant une fois de plus de l'exceptionnelle pluridisciplinarité de sa recherche et de son esprit d'ouverture. Nous avons ainsi choisi des champs thématiques qui s'articulent autour de ses plus récents ouvrages : l'histoire du climat indissociable d'une approche basée sur des moyens techniques récents, Emmanuel Le Roy Ladurie étant un des pionniers de l'utilisation de l'informatique pour cerner les événements les plus lointains ; la saga des Platter retraçant, à travers les récits autobiographiques de trois générations, la montée d'une famille d'origine valaisanne dans la bonne bourgeoisie de Bâle, ville universitaire importante au XVI^{e} siècles ; enfin, nous avons retenu cette société de cour chère à Saint-Simon. Emmanuel Le Roy Ladurie aborda les réseaux établis par le petit duc grâce à la statistique et par un recours à l'anthropologie hiérarchique, l'une et l'autre le situant sur un territoire différent de celui qu'avait exploré Norbert Élias.

Les actes du colloque organisé en l'honneur d'Emmanuel Le Roy Ladurie, intitulés « Histoire, écologie et anthropologie », réunissent trois générations de chercheurs venus de plusieurs pays : des collègues de sa génération, ou presque, dont l'œuvre a évolué simultanément avec la sienne, ses élèves et de très jeunes doctorants ou post-doctorants qui le connaissent par leurs lectures ou l'influence de leurs directeurs de thèse. Il nous paraissait particulièrement important d'y associer des chercheurs venus d'Europe méridionale ou orientale où, dans ce dernier cas, les livres d'E. Le Roy Ladurie furent tardivement traduits ; leur influence pèse actuellement de tout leur poids sur une historiographie en pleine transformation. Les articles consacrés à son œuvre présentent à la fois des bilans et des ouvertures vers de nouvelles recherches, la thématique s'échelonnant du Moyen Âge à l'époque contemporaine avec la parution d'une nouvelle synthèse sur l'histoire du climat. Ce recueil s'ouvre sur une étude inédite d'Emmanuel Le Roy Ladurie consacrée aux minorités françaises, un périple à travers les régions de France qui crée un pendant avec la dernière partie de l'ouvrage, les Itinérances, qui nous font voyager à travers la fortune de l'œuvre de ce célèbre historien.

Le présent ouvrage tient compte des sujets évoqués ci-dessous. Une large place est ainsi accordée aux problèmes climatiques et à leur histoire ; la culture du vin, l'évolution de sa qualité, forment un premier volet associé à des sujets chers à Emmanuel Le Roy Ladurie, comme la glaciologie, la démographie et l'anthropométrie.

La deuxième partie de ces hommages est consacrée au *Siècle des Platter*, en particulier aux thèmes centraux qui s'en dégagent : l'héritage d'Erasme ou les guerres de religion dont père et fils furent les témoins privilégiés. Les journaux intimes et les relations de voyage de cette fratrie se prêtent aussi à l'histoire comparée, ou à l'analyse d'une certaine altérité, leurs récits offrant d'impressionnants tableaux de la France méridionale, de l'Espagne, des Flandres et de l'Angleterre à une époque de troubles religieux.

Une importante partie du volume reprend une idée majeure d'Emmanuel Le Roy Ladurie : le système de cour qu'il avait étudié en s'appuyant sur l'œuvre de Saint-Simon. Outre la présentation d'un manuscrit inédit, une attention particulière est portée aux femmes dans la hiérarchie princière, au cérémonial et à un autre aspect plus futile, mais seulement en apparence, du système de cour : la perruque, signe d'appartenance sociale, de richesse et de dignité. Le contrecoup révolutionnaire, avec sa critique de la royauté, s'articule logiquement avec une analyse dépréciative du système de cour.

Ce recueil se clôt sur des réflexions sur les retombées de l'œuvre d'Emmanuel Le Roy Ladurie à l'étranger, en particulier en Europe de l'Est où sa pluridisciplinarité déconcerta des générations d'historiens férus de positivisme. Ces actes sont ainsi destinés à montrer l'influence de l'œuvre d'Emmanuel Le Roy Ladurie sur plusieurs générations d'historiens, influence destinée à se poursuivre dans la recherche française et bien au-delà, dans les pays les plus lointains.

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Toute notre reconnaissance va à Hélène Carrère d'Encausse, secrétaire perpétuel de l'Académie française, qui a accepté d'inaugurer ce colloque ; elle a aussi créé le lien qui nous a permis d'organiser cette rencontre en ce lieu prestigieux qu'est la Fondation Singer-Polignac. Nous ne saurions assez remercier son président Yves Pouliquen et son équipe de la parfaite organisation de ces journées mémorables. La contribution efficace des présidents de séance nous ont permis de respecter la discipline indispensable à la réussite d'une telle rencontre internationale. Notre reconnaissance va ainsi, selon l'ordre de leur intervention, au président Jean-Robert Pitte (de l'Institut), à Dominique Bourel (Centre Roland Mousnier, CNRS), Maurice Aymard (Maison des sciences de l'Homme, Paris), Bernard Cottret (Université de Versailles Saint-Quentin), Bernard Garnier (Centre d'histoire quantitative, Caen), Reynald Abad (Centre Roland Mousnier, Université Paris-Sorbonne), Daniel Roche (Collège de France) et à celui qui, depuis des années, a suivi et édité les œuvres d'Emmanuel Le Roy Ladurie : Denis Maraval qui signe aussi la postface de ce présent recueil. Enfin, nous ne saurions oublier Xavier Labat Saint Vincent qui a contribué, par ses relectures, à préparer l'édition de ces actes.

PREMIÈRE PARTIE

Le Climat, l’Histoire et le Chiffre

CLIMATE CHANGE: OBSERVATIONS, PROJECTIONS, AND GENERAL IMPLICATIONS FOR VITICULTURE AND WINE PRODUCTION[1]

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CLIMATE CHANGE, VITICULTURE, AND WINE

The grapevine is one of the oldest cultivated plants that, along with the process of making wine, have resulted in a rich geographical and cultural history of development[2]. Today's viticultural regions for quality wine production are located in relatively narrow geographical and therefore climatic niches that put them at greater risk from both short-term climate variability and long-term climate change than other more broad acre crops. In general, the overall wine style that a region produces is a result of the baseline climate, while climate variability determines vintage quality differences. Climatic changes, which influence both variability and average conditions, therefore have the potential to bring about changes in wine styles. Our understanding of climate change and the potential impacts on viticulture and wine production has become increasingly important as changing levels of greenhouse gases and alterations in Earth surface characteristics bring about changes in the Earth's radiation budget, atmospheric circulation, and hydrologic cycle (IPCC, 2001[3]). Observed warming trends over the last hundred years have been found to be asymmetric with respect to seasonal and diurnal cycles with greatest warming occurring during the winter

1 This paper was originally presented at the Climate and Viticulture Congress sponsored by the International Organization of Vine and Wine (OIV) in Zaragoza, Spain April 10-14, 2007 and published in the proceedings of the congress.
2 H. Johnson, *The World Atlas of Wine*, 3rd ed., New York, Simon and Schuster, 1985 ; E. Penning-Roswell, *Wines of Bordeaux*, 6th ed., London/New York, Penguin Books, 1989 ; T. Unwin, *Wine and the Vine: An Historical Geography of Viticulture and the Wine Trade*, London/New York, Routledge, 1991.
3 IPCC (2001) : J.T. Houghton *et al.*, *Climate Change 2001: The Scientific Basis. Contribution of the Working Group 1 to the Third Assessment of the Intergovernmental Panel on Climate Change*, Cambridge, Cambridge University Press, 2001.

and spring and at night[4]. The observed trends in temperatures have been related to agricultural production viability by impacting winter hardening potential, frost occurrence, and growing season lengths[5].

To place viticulture and wine production in the context of climate suitability and the potential impacts from climate change, various temperature-based metrics (e.g., degree-days, mean temperature of the warmest month, average growing season temperatures, etc.) can be used for establishing optimum regions[6]. For example, average growing season temperatures typically define the climate-maturity ripening potential for premium quality wine varieties grown in cool, intermediate, warm, and hot climates[7] (**fig. 1**). For example, Cabernet Sauvignon is grown in regions that span from intermediate to hot climates with growing seasons that range from roughly 16.5-19.5°C (e.g., Bordeaux or Napa). For cooler climate varieties such as Pinot Noir, they are typically grown in regions that span from cool to lower intermediate climates with growing seasons that range from roughly 14.0-16.0°C (e.g., Northern Oregon or Burgundy). From the general bounds that cool to hot climate suitability places on high quality wine production, it is clear that the impacts of climate change are not likely to be uniform across all varieties and regions, but are more likely to be related to climatic thresholds whereby any continued warming would push a region outside the ability to produce quality wine with existing varieties. For example, if a region has an average growing season average temperature of 15°C and the climate warms by 1°C, then that region is climatically more conducive to ripening some varieties, while potentially less for others. If the magnitude of the warming is 2°C or larger, then a region may potentially shift into another climate maturity type (e.g., from

4 T.R. Karl *et al.*, « A New Perspective on Global Warming: Asymmetric Trends of Daily Maximum and Minimum Temperature », *Bulletin of the American Meteorological Society*, 74, 1993, p. 1007-1023 ; D.R. Easterling *et al.*, « Observed Variability and Trends in Extreme Climate Events: A Brief Review », *Bull. Am. Meteorol. Soc.*, 81, 2000, p. 417-425.

5 T.R. Carter, M.L. Parry, J.H. Porter, « Climatic Change and Future Agroclimatic Potential in Europe », *Int. J. Climatol.*, 11, 1991, p. 251-269 ; A. Menzel and P. Fabian, « Growing Season Extended in Europe », *Nature*, 397, 1999, p. 659 ; D.R. Easterling *et al.*, « Observed Variability and Trends in Extreme Climate Events: A Brief Review », art. cit. ; R.R. Nemani, M.A. White, D.R. Cayan *et al.*, « Asymmetric Climatic Warming Improves California Vintages », *Climate Research*, Nov. 22, 19(1), 2001, p. 25-34 ; A.C. Moonen, L. Ercoli, M. Mariotti and A. Masoni, « Climate Change in Italy Indicated by Agrometeorological Indices Over 122 years »,*Agri. Forest Meteorol.*, 111, 2002, p. 13-27 ; G.V. Jones, « Climate Change in the Western United States Grape Growing Regions », *Acta Horticulturae (ISHS)*, 689, 2005, p. 41-60.

6 J. Gladstones, *Viticulture and Environment*, Adelaide, Winetitles, 1992.

7 G.V. Jones, « Climate and Terroir: Impacts of Climate Variability and Change on Wine », dans*Fine Wine and Terroir – The Geoscience Perspective*, *Geoscience Canada Reprint Series Number 9*, dir. R.W. Macqueen and L.D. Meinert, St. John's (Newfoundland), Geological Association of Canada, 2006.

intermediate to warm). While the range of potential varieties that a region can ripen will expand in many cases, if a region is a hot climate maturity type and warms beyond what is considered viable, then grape growing becomes challenging and maybe even impossible.

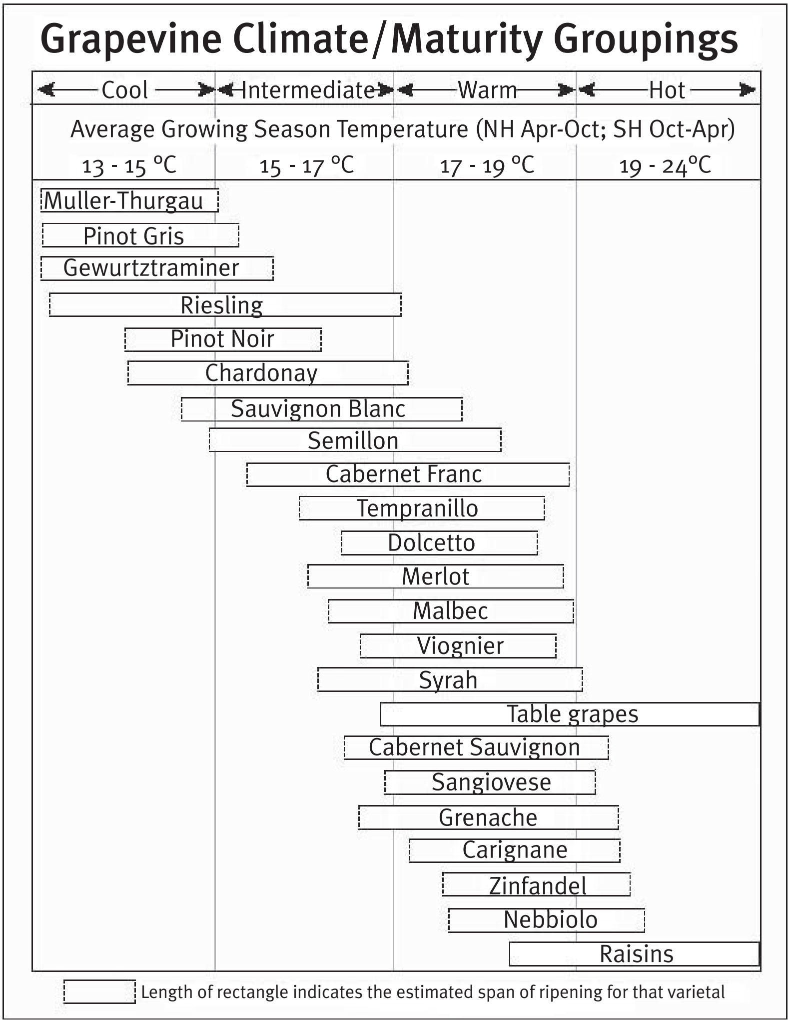

Fig. 1 – The climate-maturity groupings given in this figure are based on relationships between phenological requirements and climate for high to premium quality wine production in the world's benchmark regions for each variety. The dashed line at the end of the bars indicates that some adjustments may occur as more data become available, but changes of more than +/– 0.2-0.6°C are highly unlikely. The figure and the research behind it are a work in progress (G.V. Jones, « Climate and Terroir: Impacts of Climate Variability and Change on Wine »)

Furthermore, observations and modeling has shown that climate change will not just be manifested in changes in the mean, but also in the variance where there are likely to be more extreme heat occurrences, but still swings to extremely cold conditions. Therefore, even if average climate structure gets better in some regions, variability will still be very evident and possibly even more limiting than what is observed today.

Overall the wine quality impacts and challenges related to climate change and shifts in climate maturity potential will likely be evidenced mostly through more rapid plant growth and out of balance ripening profiles. For example, if a region currently experiences a maturation period (véraison to harvest) that allows sugars to accumulate to favorable levels, maintains acid structure, and produces the optimum flavor profile for that variety, then balanced wines result. In a warmer than ideal environment, the grapevine will go through its phenological events more rapidly resulting in earlier and likely higher sugar ripeness and, while the grower or winemaker is waiting for flavors to develop, the acidity is lost through respiration resulting in unbalanced wines without greater after-harvest inputs or adjustments in the winery. As a result higher alcohol levels have been observed in many regions, for example Duchêne and Schneider[8] found that potential alcohol levels of Riesling at harvest in Alsace have increased by 2.5 % (by volume) over the last 30 years and was highly correlated to significantly warmer ripening periods and earlier phenology. Godden and Gishen[9] summarize trends in composition for Australian wines, and while not attributing any influence to the much warmer conditions experienced in Australia today[10], they show increases in the alcohol content of 12.3 % to 13.9 % for red wines and 12.2 % to 13.2 % for white wines from 1984-2004. For Napa, average alcohol levels have risen from 12.5 % to 14.8 % from 1971-2001 while acid levels fell and the pH climbed[11]. While Vierra argues that this trend is due to the tendency for bigger, bolder wines driven by wine critics

8 E. Duchêne and C. Schneider, « Grapevine and Climatic Changes: a Glance at the Situation in Alsace », *Agron. Sustain. Dev.*, 24, 2005, p. 93-99.

9 P. Godden and M. Gishen, « Trends in the Composition of Australian Wine », *The Australian and New Zealand Wine Industry Journal*, 20(5), 2005, p. 21-46.

10 K.L. McInnes, P.H. Whetton, L. Webb and K.J. Hennessy, « Climate Change Projections for Australian Viticultural Regions », *The Australian and New Zealand Grapegrower and Winemaker*, v. February 2003, p. 40-47 ; L.B. Webb, P.H. Whetton and E.W.R. Barlow, « Impact on Australian Viticulture from Greenhouse Induced Temperature Change », dans *MODSIM 2005. International Congress on Modelling and Simulation*, dir. A. Zerger and R.M. Argent, Townsville, Modelling and Simulation Society of Australia and New Zealand, December 2005, p. 170-176.

11 G. Vierra, « Pretenders at the Table – Are Table Wines no Longer Food Friendly? », *Wine Business Monthly*, 11(7), July 2004.

and the economics of vintage rating systems, Jones and Jones *et al.*[12] find that climate variability and change are likely responsible for over 50 % of the trend in alcohol levels. Besides changes in wine styles, one of the more germane issues related to higher alcohol levels is that wines typically will not age as well or as long as wines with lower alcohol levels. Finally, harvests that occur earlier in the summer, in a warmer part of the growing season (e.g., August or September instead of October in the Northern Hemisphere) will result in hotter harvested fruit and potentially desiccated fruit without greater irrigation inputs.

HISTORICAL OBSERVATIONS OF WINE REGION CLIMATES

History has shown that winegrape growing regions developed when the climate was most conducive and that shifts in viable wine-producing regions have occurred due to climate changes, making production more difficult or easier[13]. In Europe, records of dates of harvest and yield have been kept for nearly a thousand years[14], revealing periods with more beneficial growing season temperatures, greater productivity, and arguably better quality in some regions. Other evidence has shown that vineyards were planted as far north as the coastal zones of the Baltic Sea and southern England during the medieval "Little Optimum" period (roughly 900-1300 AD) when temperatures were up to 1°C warmer[15]. During the High Middle Ages (12th and 13th centuries) harvesting occurred in early September as compared to early to mid October today and growing season temperatures must have been at least 1.7°C warmer than those experienced today[16]. However during the 14th century dramatic temperature declines lead to the "Little Ice Age" (extending into the late 19th century), which resulted in most of the northern vineyards dying out and growing seasons so short that harvesting grapes in much of the rest of Europe was difficult. In addition, research has used contemporary grape harvest dates from Burgundy to reconstruct spring-summer temperatures from 1370 to 2003 and, while the results indicate that temperatures as high as those reached in the

12 G.V. Jones, « How Hot is Too Hot? », *Wine Business Monthly*, 12(2), February 2005.

13 E. Le Roy Ladurie, *Times of Feast, Times of Famine: A History of Climate Since the Year 1000*, New York, Doubleday/Garden City, 1971 ; C. Pfister, « Variations in the Spring-Summer Climate of Central Europe from the High Middle Ages to 1850 », dans *Long and Short Term Variability of Climate*, dir. H. Wanner and U. Siegenthaler, Berlin, Springer-Verlag, 1988, p. 57-82 ; J. Gladstones, *Viticulture and Environment*, *op. cit.*

14 E. Penning-Roswell, *Wines of Bordeaux*, *op. cit.* ; E. Le Roy Ladurie, *Times of Feast, Times of Famine*, *op. cit.*

15 J. Gladstones, *Viticulture and Environment*, *op. cit.*

16 C. Pfister, « Variations in the Spring-Summer Climate of Central Europe from the High Middle Ages to 1850 », art. cit. ; J. Gladstones, *Viticulture and Environment*, *op. cit.*

warm 1990s have occurred several times in the region since 1370, the extremely warm summer of 2003 appears to have been higher than in any other year since 1370[17].

More recent research of the impacts of climate change on wine quality[18] analyzed growing season temperatures in 27 of arguably the best wine producing regions in the world and found that average growing season temperatures warmed 1.3°C over the last 50 years. However, the warming was not uniform across the regions with greater magnitudes in the western U.S. and Europe, and less warming in Chile, South Africa, and Australia. The greatest warming was seen in the Iberian Peninsula, Southern France, and parts of Washington and California with warming greater than 2.5°C. Figure 2 provides examples of the observed warming for the Burgundy (Beaujolais), Rhine Valley, Barolo, and Bordeaux regions with 1950-1999 warming trends ranging from 0.7-1.8ºC. The study also found that vintage ratings in these same regions (Sotheby's and the Wine Enthusiast[19]) have shown trends of increasing overall quality with less vintage-to-vintage variation and that growing season temperatures were important factors in vintage ratings across many regions, albeit not uniform across the regions and not always linear. Depending on the region and wine type, the marginal effects of the growing season temperatures show that a 1°C warmer vintage can result in 10-22 ratings point increases[20]. However, the research also notes that the role of factors other than growing season temperatures such as technology and familiarity are important factors in vintage ratings. Furthermore, the research found that climate thresholds are evident in many regions where, once past a given growing season temperature, quality declines are seen. Therefore, the general rule of thumb "the warmer the better" does not apply for all wine regions where some are near or at the optimum growing season temperatures for achieving the highest quality wine.

17 I. Chuine, P. Yiou, N. Viovy, B. Seguin, V. Daux and E. Le Roy Ladurie, « Grape Ripening as a Past Climate Indicator », *Nature*, 432, 2004, p. 289-290.

18 G.V. Jones, M.A. White, O.R. Cooper and K. Storchmann, « Climate Change and Global Wine Quality », *Climatic Change*, 73(3), 2005, p. 319-343.

19 T. Stevenson, *New Sothebys Wine Encyclopedia: A Comprehensive Reference Guide to the Wines of the World*, 3rd ed., London, Dorling Kindersley, 2001 ; M. Mazur, « Wine Enthusiast's 2002 Vintage Chart », *The Wine Enthusiast Magazine* , 2002, <www.winemag.com/vintage.cfm>.

20 G.V. Jones, M.A. White, O.R. Cooper, and K. Storchmann, « Climate Change and Global Wine Quality », art. cit.

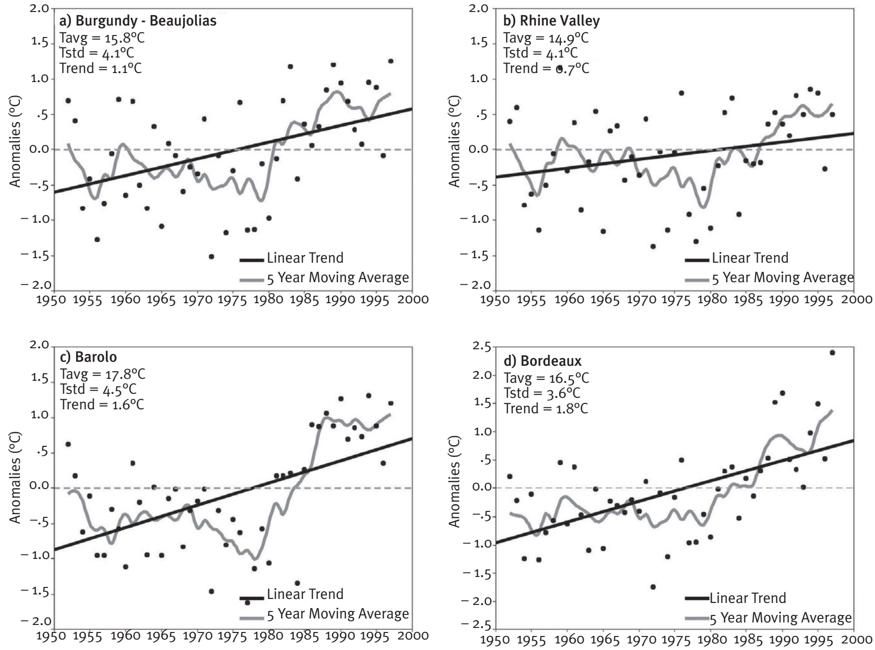

Fig. 2. Observed growing season average temperature anomalies for a) the Beaujolais region of Burgundy, b) the Rhine Valley, c) Barolo, and d) Bordeaux as analyzed by Jones *et al.* (v. « Climate Change and Global Wine Quality ». The temperature data are monthly values extracted from a 0.5° x 0.5° grid centered over the wine producing regions for 1950-1999. Tavg is the average growing season temperature (Apr-Oct in the Northern Hemisphere and Oct-Apr in the Southern Hemisphere), Tstd is the standard deviation of monthly temperatures during the growing season, and the Trend is over the 50-year period

More regionally specific and temporally resolved analyses concur with the global observations of wine region temperature trends[21]. Overall, during the last 30-70 years many of the world's wine regions have experienced a decline in frost frequency, shifts in the timing of frosts, and warmer growing seasons with greater heat accumulation. In North America research has shown significant changes in growing season climates, especially in the western U.S. For example, during 1948-2002 in the main grape growing regions of California, Oregon, and Washington, growing seasons have warmed by 0.9°C, driven mostly by changes in minimum temperatures, with greater heat accumulation, a decline

21 G.V. Jones and R.E. Davis, « Climate Influences on Grapevine Phenology, Grape Composition, and Wine Production and Quality for Bordeaux, France », *Am. J. Viti. Enol.*, 51, 2000, p. 249-261 ; G.V. Jones, E. Duchene, D. Tomasi *et al.*, « Changes in European Winegrape Phenology and Relationships with Climate », GESCO, 2005 ; G.V. Jones, « Climate Change in the Western United States Grape Growing Regions », art. cit.

in frost frequency that is most significant in the dormant period and spring, earlier last spring frosts, later first fall frosts, and longer frost-free periods[22]. Temporal changes for the Napa Valley since 1930 show that heat accumulation is over 350 units higher (degree-days in °C units) and has been the result of significant warming at night where the minimum temperatures have climbed 3.0°C while daytime temperatures have not changed significantly. Precipitation amounts and timing are highly variable in the western U.S., being more tied to larger scale climate variability mechanisms such as El Niño or the Pacific Decadal Oscillation than structural trends[23]. A focused study for Napa and Sonoma California, found that higher yields and quality over the last 50 years were influenced by asymmetric warming (at night and in the spring) where a reduction in frost occurrence, advanced initiation of growth in the spring, and longer growing seasons were the most influential[24]. In addition, recent analyses of wintertime extreme freeze events for two important growing regions in North America – eastern Washington and the Niagara Peninsula of Canada – reveal that although there has been some warming in moderate minimum temperature levels (days with temperatures less than 0°C), extreme low temperatures (-5°C or less) have not changed in frequency over the last 75 years[25]. Furthermore, from the limited data available across the U.S., observed changes in grapevine phenology document changes on the order of 2-5 days earlier per decade over the last 25-35 years depending on variety and region[26] and are strongly correlated to warmer springs and summers.

Recent research for Europe has shown similar results as those found in North America detailed above[27]. An examination of climate and phenology trends over the last 30-50 years for eleven locations across a range a climate types in Europe (cool to warm) and for 16 varieties shows that warming has occurred across most seasons, but is strongest in the spring and summer. Growing seasons over the

22 G.V. Jones, « Climate Change in the Western United States Grape Growing Regions », art. cit.

23 G.V. Jones, G.B. Goodrich and J. Miller, « Influences of Climate Variability on the U.S. West Coast Wine Regions and Wine Quality in the Napa Valley », art. cit.

24 R.R. Nemani, M.A. White, D.R. Cayan *et al.*, « Asymmetric Climatic Warming Improves California Vintages », art. cit.

25 G.V. Jones, « Structure and Trends in Wintertime Extreme Minimum Temperatures in Eastern Washington and the Niagara Region of Canada », art. cit.

26 D.W. Wolfe, M.D. Schwartz, A.N. Lakso *et al.*, « Climate Change and Shifts in Spring Phenology of Three Horticultural Woody Perennials in Northeastern USA », *International Journal of Biometeorology*, 49(5), 2005, p. 303-309 ; G.V. Jones, « Structure and Trends in Wintertime Extreme Minimum Temperatures in Eastern Washington and the Niagara Region of Canada », *Winter*, 2007.

27 G.V. Jones, E. Duchene, D. Tomasi *et al.*, « Changes in European Winegrape Phenology and Relationships with Climate », art. cit.

studied locations have warmed by 1.7°C on average with most of the warming coming at night. Heat accumulation has increased as well with degree days rising by 250-300 units (°C units) while precipitation frequency and amounts have not changed significantly. Specifically for Spain, Jones *et al.*[28] find growing seasons that have warmed on average by 0.8-1.2°C for the Galicia and Valladolid regions with the warming being much more significant at night (minimum temperatures increasing 1.1-2.1°C) than during the day (not significant). Heat accumulation, either measured by the Huglin Index or Winkler Index (see below), has increased inland but has not changed significantly in the more coastal region of Galicia. Furthermore, grapevine phenological timing in Europe has showed strong relationships with the observed warming with trends ranging 6-25 days earlier over numerous varieties and locations[29]. Changes are greatest for véraison and harvest dates which typically show a stronger, integrated effect of a warmer growing season. Interval lengths between the main phenological events have also declined with bud break to bloom, véraison, or harvest dates shortening by 14, 15, and 17 days, respectively. Averaged over all locations and varieties, grapevine phenology shows a 3-6 day response per 1°C of warming over the last 30-50 years.

MODEL PROJECTIONS OF WINE REGION CLIMATES

Projections of future climates are produced through models based upon knowledge of how the climate system works and used to examine how the environment, in this case viticulture and wine production, are likely to respond to these changes. These climate models are complex 3-D, mathematical representations of our Earth/Atmosphere system that represent spatial and temporal analyses of the laws of energy, mass, moisture, and momentum transfer in the atmosphere and between the atmosphere and the surface of the Earth. Additionally, climate models are based upon IPCC emissions scenarios (IPCC, 2001[30]) which reflect estimates of how humans will emit CO_2 in the future. The many models in use today, combined with the fact that they are modeling a non-linear system and using different emission scenarios, result in a range of potential changes in temperature and precipitation for the planet (IPCC, 2001). Work over the last three decades using model projections show that the observed warming trends in wine regions worldwide are predicted

28 G.V. Jones, E. Duchene, D. Tomasi *et al.*, « Changes in European Winegrape Phenology and Relationships with Climate », art. cit.

29 *Ibid.*

30 IPCC (2001) : J.T. Houghton *et al.*, *Climate Change 2001: The Scientific Basis*, *op. cit.*

to continue. From one of the early analyses of the impacts climate change on viticulture, it was suggested that growing seasons in Europe should lengthen and that wine quality in Champagne and Bordeaux should increase[31]. These results have largely been proven correct. Furthermore, spatial modeling research has also indicated potential shifts and/or expansions in the geography of viticulture regions with parts of southern Europe predicted to become too hot to produce high quality wines and northern regions becoming more stable in terms of consistent ripening climates and/or viable once again[32]. Examining specific varieties (Sangiovese and Cabernet Sauvignon), Bindi *et al.*[33] found that climate change in Italy should lead to shorter growth intervals but increases in yield variability. Other studies of the impacts of climate change on grape growing and wine production reveal the importance of changes in the geographical distribution of viable grape growing areas due to changes in temperature and precipitation, greater pest and disease pressure due to milder winters, changes in sea level potentially altering the coastal zone influences on viticultural climates, and the effect that increases in CO_2 might have on grape quality and the texture of oak wood which is used for making wine barrels[34].

At the broadest scale of global suitability for viticulture, it has long been considered that viticulture zones are found between either the mean annual 10-20°C isotherms[35] or the growing season 12-22°C isotherms[36], however

31 J.M. Lough, T.M.L., J.P. Wigley and Palutikof, « Climate and Climate Impact Scenarios for Europe in a Warmer World », *J. Clim. Appl. Meteorol.*, 22, 1983, p. 1673-1684.

32 G.J. Kenny and P.A. Harrison, « The Effects of Climate Variability and Change on Grape Suitability in Europe », *Journal of Wine Research*, 3, 1992, p. 163-183 ; R.E. Butterfield, M.J. Gawith, P.A. Harrison *et al.*, « Modelling Climate Change Impacts on Wheat, Potato and Grapevine in Great Britain », dans *Climate Change, Climate Variability and Agriculture in Europe: An Integrated Assessment*, Oxford, University of Oxford, Environmental Change Institute, 2000.

33 M. Bindi, L. Fibbi, B. Gozzini *et al.*, « Modeling the Impact of Future Climate Scenarios on Yield and Variability of Grapevine », *Clim. Res.*, 7, 1996, p. 213-224.

34 A.B. Tate, « Global Warming's Impact on Wine », *J. Wine Res.*, 12, 2001, p. 95-109 ; B. Renner, « The Shape of Things to Come », *Wine and Spirit*, December 1989, p. 55-57 ; H.R. Schultz,« Climate Change and Viticulture: a European Perspective on Climatology, Carbon Dioxide, and UV-B Effects », *Aust. J. Grape and Wine Res.*, 6, 2000, p. 2-12 ; K.L. McInnes, P.H. Whetton, L. Webb and K.J. Hennessy, « Climate Change Projections for Australian Viticultural Regions », art. cit.

35 H.J. de Blij, « Geography of Viticulture: Rationale and Resource », *J. Geog.*, 82, 1983, p. 112-121 ; H. Johnson, *The World Atlas of Wine*, *op. cit*.

36 J. Gladstones, « Climate and Australian Viticulture », dans *Viticulture 1-Resources*, dir. P.R. Dry and B.G. Coombe, Adelaide, Winetitles, 2005 ; G.V. Jones, « Climate and Terroir: Impacts of Climate Variability and Change on Wine », art. cit.

Jones found that the growing season criteria is more valid as the 12-22°C isotherms more completely encompasses the world's viticulture regions (not shown). To examine the global latitudinal bounds of viticulture suitability due to climate, Jones[37] used output from the Community Climate System Model (CCSM) on a 1.4°x1.4° latitude/longitude resolution and B1 (moderate), A1B (mid-range), and A2 (high) emission scenarios to depict the 12-22°C isotherms shifts for three time periods 1999, 2049, and 2099. Changes from the 1999 base period show both shifts in the amount of area suitable for viticulture and a general latitudinal shift poleward (**fig. 3**). By 2049, the 12°C and 22°C isotherms shift 150-300 km poleward in both hemispheres depending on the emission scenario (see fig 3 for the mid-range A1B scenario). By 2099, the isotherms shift an additional 125-250 km poleward. The shifts are marginally greater on the poleward fringe compared to those on the equatorial fringe in both hemispheres. However, the relative area of land mass that falls within the isotherms across the continents expands in the Northern Hemisphere while contracting in the Southern Hemisphere due to land mass differences (**fig. 3**). Similar shifting is seen by 2099 for all scenarios (not shown).

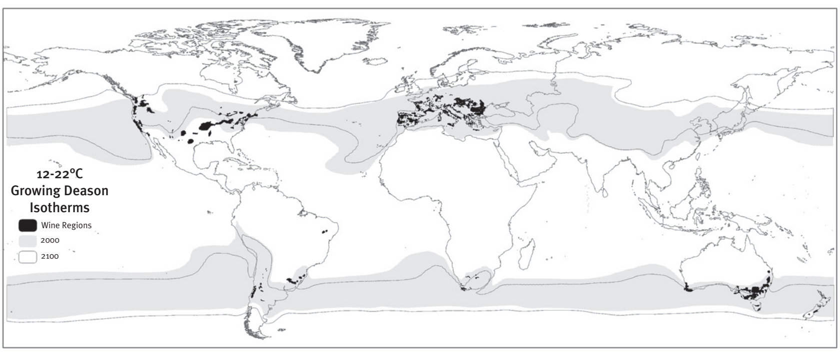

Fig. 3. Map of growing season average temperatures (Northern Hemisphere Apr-Oct, Southern Hemisphere Oct-Apr) derived from observations and model runs from the Community Climate System Model (CCSM). Future projections are driven by the A1B emission scenario (moderate future consumption)

37 G.V. Jones, « Spatial Changes in Global Viticulture Zones », *Winter*, 2007.

Using Hadley Centre climate model (HadCM3) output and an A2 emission scenario[38] to 2049 for 27 of the world's top wine producing regions, Jones *et al.*[39] compared the average climates of two periods, 1950-1999 and 2000-2049. The results suggest that mean growing season temperatures will warm by an average 1.3ºC over the wine regions studied with Burgundy (Beaujolais), Rhine Valley, Barolo, and Bordeaux differences ranging from 0.9-1.4ºC (fig. 4). Also, the projected changes are greater for the Northern Hemisphere (1.3ºC) than the Southern Hemisphere (0.9ºC). Examining the *rate of change* projected for the 2000-2049 period only reveals significant changes in each wine region with trends ranging from 0.2ºC to 0.6ºC per decade. Overall trends during the 2000-2049 period average 2ºC across all regions with the smallest warming in South Africa (0.9ºC/50 years) and greatest warming in Portugal (2.9ºC/50 years). For the Burgundy (Beaujolais), Rhine Valley, Barolo, and Bordeaux regions, decadal trends are modeled at 0.3-0.5ºC while the overall trends are predicted to be 1.5-2.4ºC (**fig. 4**). In addition, Jones *et al.*[40] showed that many of the wine regions may be at or near their optimum growing season temperature for high quality wine production and further increases, as predicted by the differences between the means of the 1950-1999 and 2000-2049 periods, will place some regions outside their theoretical optimum growing season climate. The magnitude of these mean growing season changes indicate potential shifts in climate maturity types for many regions at or near a given threshold of ripening potential for varieties currently grown in that region. Referring back to Figure 1, where Bordeaux's growing season climate of the last 50 years averaged 16.5ºC and add to it the overall trend in projected warming in Bordeaux of 2.3ºC by 2049. An 18.8ºC average growing season would place Bordeaux at the upper end of the optimum ripening climates for many of the red varieties grown there today and outside the ideal climates for the main white varieties grown. Still more evidence of these impacts come from Napa, where a 17.5ºC historical average is projected to warm by 2.2ºC to 19.7ºC by 2049. This would place Napa at the upper end of optimal ripening climates for nearly all of the most common varieties (**fig. 1**). Finally, the results also show warming during the dormant periods which could influence hardening potential for latent buds, but observations and models indicate continued or increased seasonal variability which could spell problems in freeze or frost prone regions.

38 V.D. Pope, M.L. Gallani, P.R. Rowntree and R.A. Stratton, « The Impact of New Physical Parameterizations in the Hadley Centre Climate Model – HadAM3 », *Clim. Dyn.*, 16, 2000, p. 123-146.

39 G.V. Jones, M.A. White, O.R. Cooper and K. Storchmann, « Climate Change and Global Wine Quality », art. cit.

40 *Ibid.*

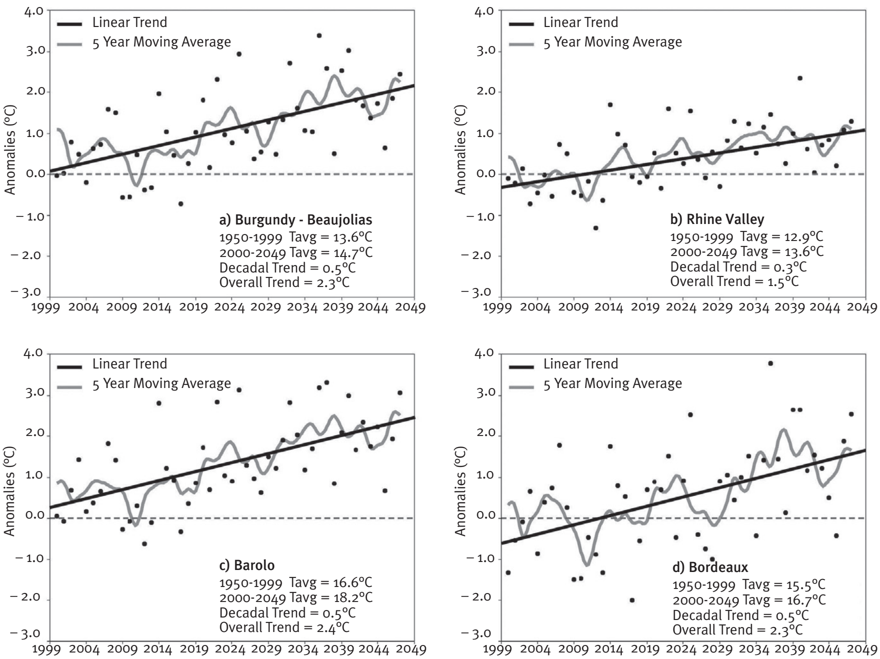

Fig. 4. Modeled growing season average temperature anomalies for a) the Beaujolais region of Burgundy, b) the Rhine Valley, c) Barolo, and d) Bordeaux as analyzed by Jones *et al.* (v. « Climate Change and Global Wine Quality »). The modeled temperature data are from the HadCM3 climate model on a monthly time scale extracted from a 2.5° x 3.75° grid centered over the wine producing regions for 2000-2049. The anomalies are referenced to the 1950-1999 base period from the HadCM3 model. Trend values are given as an average decadal change and the total change over the 50-year period

For the United States as a whole, White *et al.*[41] used a high-resolution (25 km) regional climate model forced by an IPCC A2 greenhouse gas emission scenario and estimated that potential premium winegrape production area in the conterminous United States could decline by up to 81 % by the late 21st-century. The research found that increases in heat accumulation will likely shift wine production to warmer climate varieties and/or lower-quality wines. Additionally the models show that while frost constraints will be reduced, increases in the frequency of extreme hot days (>35°C) in the growing season are projected to completely eliminate winegrape production in many areas of the

41 M.A. White, N.S. Diffenbaugh, G.V. Jones *et al.*, « Extreme Heat Reduces and Shifts United States Premium Wine Production in the 21st-Century », art. cit.

United States. Furthermore, grape and wine production will likely be restricted to a narrow West Coast region and the Northwest and Northeast, areas where excess moisture is already problematic[42].

From a more regional analysis, Jones examined suitability for viticulture in the western U.S., which has long been based on a standard heat summation formulation originally proposed by Amerine and Winkler[43]. Winkler regions are defined by growing degree-days using a base of 10°C over the growing season of April-October. The resulting five regions show broad suitability for viticulture across cool to hot climates and the varieties that grow best in those regions. Using recent historical data at a 1 km resolution[44] depicts that the cooler region I is found higher in elevation, more coastal, and more northerly (e.g., the Willamette Valley) while the warmest region V areas are mostly confined to the central valley and further south in California (e.g., the San Joaquin Valley; Figure 5). Averaged over the 1980-2003 time period, 34 % of the western U.S. falls into regions I-V with 59 % being too cold (< 1111°C units) and 7 % too hot (>2778°C units). Separated into individual regions finds that region I encompasses 34.2 %, region II 20.8 %, region III 11.1 %, region IV 8.7 %, and region V 25.2 %. Therefore the western U.S. is predominately at the margins of suitability with 59.4 % in the coolest and hottest regions (regions I and V, respectively). Using projections for increases in average growing season temperatures from the Community Climate System Model (CCSM) of 1.0-3.0°C for 2049 results in a range of increases in growing degree-days of 15-30 % (fig. 5). At a +1.0°C warming (roughly a 15 % increase in growing degree days) by 2049, the area of the western U.S. in regions I-V increases 5 % from 34 % to 39 % and at +3.0°C warming (roughly a 30 % increase in growing degree days), increases by 9 % to 43 %. Overall the changes show a reduction in the areas that are too cold from 59 % to 41 % while the areas that are too hot increase from 7 % to 16 % in the greater warming scenario. Similarly, by individual region there are shifts to predominately more land in region I (34.2 % to 40.6 %), smaller changes to region II (20.8 % to 23.4 %), region III (11.1 % to 14.2 %), and region IV (8.7 % to 10.1 %), and a reduction of region V area from 25.2 % to 11.6 %. Spatially the shifting of regions occurs toward the coast, especially in California, and upwards in elevation (most notably in the Sierra Nevada Mountains). Other regions show large scale shifting from one Winkler region

42 *Ibid*.

43 M.A. Amerine and A.J. Winkler, « Composition and Quality of Musts and Wines of California Grapes », art. cit.

44 P.E. Thornton, S.W. Running and M.A. White, « Generating Surfaces of Daily Meteorology Variables Over Large Regions of Complex Terrain », art. cit.

to another (e.g., Willamette Valley shifting from predominately region I to region II).

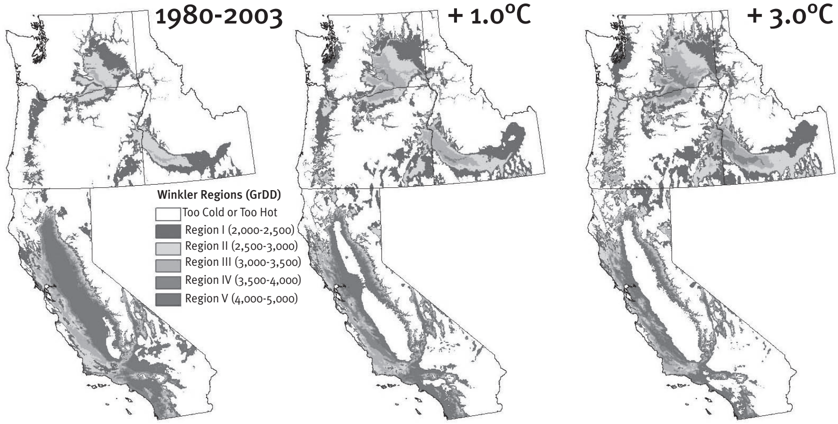

Fig. 5 – Winkler Regions for the western U.S. based on Daymet (v. Thornton *et al.*, « Generating Surfaces of Daily Meteorology Variables Over Large Regions of Complex Terrain ») daily 1 km resolution daily temperature data (growing degree-days, base 10°C over Apr-Oct). The left panel is the average over the 1980-2003 time period. The middle panel is a projection of a +1.0°C increase over 1980-2003 (low range of projected climate change by 2049). The right panel is a projection of a+3.0°C increase over 1980-2003 (high range of projected climate change by 2049)

In another regional analysis for the west coast of the U.S., Lobell *et al.*[45] examined the impacts of climate change on yields of perennial crops in California. The research combined the output from numerous climate models (testing climate uncertainty) with multiple statistical crops models (testing crop response uncertainty) for almonds, walnuts, avocados, winegrapes, and table grapes. The results show a range of warming across climate models of ~1.0-3.0°C for 2050 and 2.0-6.0°C for 2100 and a range of changes in precipitation from -40 to +40 % for both 2050 and 2100. Winegrapes showed the smallest yield declines compared to the other crops, but showed substantial spatial shifts in suitability to more coastal and northern counties. The authors also note that yield trends have low attribution to climate trends and are more due to changes in technology (mostly) and an increase in CO_2 (likely).

45 D.B. Lobell, C.B. Field, K.N. Cahill and C. Bonfils, « Impacts of Future Climate Change on California Perennial Crop Yields: Model Projections with Climate and Crop Uncertainties », art. cit.

Other regional work in both Europe[46], Australia[47], and South Africa[48] has examined climate change through different modeling approaches but has come up with similar results. Kenny and Harrison[49] did some of the early spatial modeling of future climate change impacts on viticulture in Europe and indicated potential shifts and/or expansions in the geography of viticulture regions with parts of southern Europe predicted to become too hot to produce high quality wines and northern regions becoming viable once again. Examining changes in the Huglin Index of suitability for viticulture in Europe[50], Stock[51] shows increases of 100-600 units that result in broad latitudinal shifts with new areas on the northern fringes becoming viable, changes in varietal suitability in existing regions, and southern regions becoming so hot that overall suitability is challenged. Specifically in Spain, Rodriguez *et al.*[52] examine different emission *scenarios* to place lower and upper bounds on temperature and precipitation changes and find trends of 0.4-0.7°C per decade with summer warming greater than in the winter. Overall the changes result in warming by 2100 of between 5-7°C inland and 3-5°C along the coast. Concomitant with these temperature projections, Rodriguez *et al.*[53] show much drier springs and summers and lower annual rainfall which is less homogeneous across Spain than is temperature. Furthermore, to examine grapevine responses to climate change, Lebon[54] used model output to show that the start of Syrah ripening (véraison) in Southern France would shift from the second week of August today to the third week of July with a 2°C warming and to the first week of July with a 4°C warming. Additionally the research found

46 G.J. Kenny and P.A. Harrison, « The Effects of Climate Variability and Change on Grape Suitability in Europe », art. cit. ; R.E. Butterfield, M.J. Gawith, P.A. Harrison *et al.*, « Modelling Climate Change Impacts on Wheat, Potato and Grapevine in Great Britain », art. cit. ; M. Stock, « Klimaveränderungen fordern die Winzer – Bereitschaft zur Anpassung ist erforderlich », art. cit.

47 K.L. McInnes, P.H. Whetton, L. Webb and K.J. Hennessy, « Climate Change Projections for Australian Viticultural Regions », art. cit. ; L.B. Webb, P.H. Whetton and E.W.R. Barlow, « Impact on Australian Viticulture from Greenhouse Induced Temperature Change », art. cit.

48 T.R. Carter, M.L. Parry, J.H. Porter, « Climatic Change and Future Agroclimatic Potential in Europe », art. cit.

49 G.J. Kenny and P.A. Harrison, « The Effects of Climate Variability and Change on Grape Suitability in Europe », art. cit.

50 P. Huglin, « Nouveau mode d'évaluation des possibilités héliothermiques d'un milieu viticole », *CR. Acad. Agr. France*, p. 1117-1126.

51 M. Stock, « Klimaveränderungen fordern die Winzer – Bereitschaft zur Anpassung ist erforderlich », art. cit.

52 J.M. Rodriguez *et al.*, « Main Conclusions from the Preliminary Assessment of the Impacts in Spain due to the Effects of Climate Change », dans *Project ECCE*, Madrid/Toledo, Ministry of the Environment and the University of Castilla-La Mancha, 2005.

53 *Ibid.*

54 E. Lebon, « Changements climatiques : quelles conséquences pour la viticulture », *CR 6e Rencontres Rhodaniennes*, Orange, Institut Rhodanien, 2002, p. 31-36.

that significant warming during maturation and especially at night would disrupt flavor and color development and ultimately the wine's typicity[55].

In Australia, Webb *et al.*[56] analyzed climate change scenarios for viticulture showing that temperatures by 2070 are projected to warm in Australia by 1.0-6.0°C increasing the number of hot days and decreasing frost risk, while precipitation changes are more variable but result in greater growing season stress on irrigation. The changes projected for Australia has tied future temperature regimes to reduced wine quality with southerly and coastal shifts in production regions being the most likely alternative to maintaining viability. In South Africa, regional projections of rising temperatures and decreased precipitation are projected to put additional pressure on both the phenological development of the vines and on the necessary water resources for irrigation and production[57]. The research implies that the practice of winemaking in South Africa is likely to become riskier and more expensive with the most likely effects being shifts in management practices to accommodate an increasingly limited water supply. The author notes that the situation will likely exacerbate other economic issues such as increases in the price of wine, a reduction in the number of wine growers, and need for implementation of expensive and yet unknown adaptive strategies[58]. Together these studies, and those detailed previously, indicate that the challenges facing the wine industry include more rapid phenological development, changes in suitable locations for some varieties, a reduction in the optimum harvest window for high quality wines, and greater management of already scarce water resources.

OVERVIEW AND IMPLICATIONS

It is clear from recorded history and proxy records that the climates of the Earth have varied and changed on both long and short timescales[59]. These variations have driven viability in many agricultural systems including viticulture and wine production where in general, and even more specifically for individual

55 *Ibid.*

56 L.B. Webb, P.H. Whetton and E.W.R. Barlow, « Impact on Australian Viticulture from Greenhouse Induced Temperature Change », art. cit.

57 S. Carter, « The Projected Influence of Climate Change on the South African Wine Industry », *Interim Report IR-06-043*, Laxenburg (Austria), International Institute for Applied Systems Analysis, 2006.

58 S. Carter, « The Projected Influence of Climate Change on the South African Wine Industry », art. cit.

59 E. Le Roy Ladurie, *Times of Feast, Times of Famine: A History of Climate Since the Year 1000*, *op. cit.* ; C. Pfister, « Variations in the Spring-Summer Climate of Central Europe from the High Middle Ages to 1850 », art. cit.

varieties, there are narrow climatic optimums that provide limited geographical zones of suitability. The observed warming over the last 50 years appears to have been largely beneficial for viticulture in many regions through longer and warmer growing seasons with less risk of frost. However, the trends have been shown to more influential on the poleward fringes by providing more consistent ripening climates for existing varieties, making warmer climate varieties more viable or opening up once forgotten regions again. On the other extreme, already hot regions have experienced warmer and generally drier conditions that have produced challenges in ripening balanced fruit. Concomitant with the warming trends have come better technology, better plant material, and better vineyard management and these adaptations have allowed growers to meet some of these challenges. However, the projections for future climate change will likely be more rapid and to a greater magnitude than our ability to adapt without increased understanding of the impacts and advances in plant breeding and genetics[60].

Overall climate change is one of the most studied and debated scientific issues of our day. While it is clear from historical evidence that changing climates are a part of the Earth's natural adjustments to both internal and external forces, more and more evidence is pointing to increasing human impacts on our climate. From processes such as desertification, deforestation, and urbanization where the global energy balance is disrupted, to changes in atmospheric composition, which enhances the greenhouse effect beyond its natural equilibrium, our role in climate change is increasing. From the latest Intergovernmental Panel on Climate Change "Summary for Policymakers" (IPCC, 2007[61]), the following statements express our current state of knowledge:

> Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.
>
> Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic

60 L.F. Bisson, A.L. Waterhouse, S.E. Ebeler *et al.*, « The Present and Future of the International Wine Industry », *Nature*, 418, 2002, p. 696-699 ; M.A. Vivier and I.S. Pretorius, « Genetically Tailored Grapevines for the Wine Industry », *Trends in Biotechnology*, 20(11), 2002, p. 472-478.

61 IPCC (2007) : R. Alley *et al.*, *Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Contribution of the Working Group I to the Fourth Assessment of the Intergovernmental Panel on Climate Change*, Cambridge, Cambridge University Press, 2007, <www.ipcc.ch/>.

> greenhouse gas concentrations. Discernible human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes and wind patterns.
>
> Anthropogenic warming and sea level rise would continue for centuries due to the timescales associated with climate processes and feedbacks, even if greenhouse gas concentrations were to be stabilized.

Given this knowledge, society's role should now shift from one of uncertainties, blame, or attribution, to one of mitigation and adaptation. While the wine industry has some leeway to mitigate fossil fuel use and sequester carbon through more efficient processes both in the vineyard and winery, the bulk of the response will likely be through adaptation. Because we know that winegrapes can only be grown across a fairly narrow range of climates for optimum quality and production, it all depends on where a region is today in terms of climate and the magnitude and rate of the future warming. Observations show and models predict that one of the most important issues for the wine industry will be whether or not achieving optimum varietal ripeness and wine balance will occur in the warmer environment or will we be forced to change varieties or shift regions to achieve the same wine styles. Referring back to Figure 1, note that varietal suitability has a window of only 2-3°C and that the projections of temperature changes for wine regions around the world range from 1-7°C. Changes of these magnitudes have the potential to bring about large shifts in suitability.

While most of the discussion has been focused on temperature-related impacts, other potential issues affecting grape and wine quality include changes in vine growth due to a higher CO_2 concentration in the atmosphere, added moisture stresses in water-limited regions, and changes in the presence or intensity of pests and vine diseases. Even with our current state of knowledge, much uncertainty still exists in the exact spatial and temporal nature of changes in climate, therefore the wine industry will need to be proactive in assessing the impacts, be ready to implement appropriate adaptation strategies, be willing to alter varieties and management practices or controls, or mitigate wine quality differences by developing new technologies. However, probably the greatest adaptation challenge will be how we respond culturally to changes in regional identities due to variety changes or wine style changes.

While the *exact* spatial changes in the magnitude and rate of climate in the future are speculative at this point, what is absolutely clear from historical observations and modeling is that the climates of the future, both over the short term and over the long term, will be different than those today. Can we remain steadfast in our approaches to growing winegrapes or any crop for that matter, likely not. It will be those sectors of agriculture that are the most aware, that experiment with both methods and technology– in plant breeding and genetics, in the field, and in processing –that will have the greatest latitude of adaptation.

ACKNOWLEDGEMENTS

This article represents an overview from the work of many individuals and the author would like to recognize each of them for their valuable work and knowledge provided. Some of the referenced work of the author is in process (i.e., in submission, under review, or being processed for publication) and will be available soon. The Jones *et al.*[62] research data was provided by the Climate Impacts LINK Project (DEFRA Contract EPG 1/1/124) on behalf of the Hadley Centre and U.K. Meteorological Office for supplying the HADCM3 data.

62 G.V. Jones, M.A. White, O.R. Cooper and K. Storchmann, « Climate Change and Global Wine Quality », art. cit.

POSTFACE

Denis Maraval

Il n'est pas très facile de succéder à la crème des historiens réunis par Francine-Dominique Liechtenhan pour rendre hommage à Emmanuel Le Roy Ladurie. Une postface de ma part peut sembler incongrue, puisqu'un éditeur a plutôt vocation à rester dans l'ombre qu'à se faire valoir lui-même. J'ai donc été tenté d'abord de décliner l'offre de conclure ce volume et d'esquiver un pari en plus : tenir compte de trois générations de chercheurs. Comment ne pas faire de jaloux ?

Comme Dominique insistait et comme j'éprouve pour Emmanuel Le Roy Ladurie une affection qui ne nuit en rien à l'admiration, j'ai fini par accepter, à la condition que je n'aurais à produire qu'un témoignage qui pourrait apporter un peu de lumière sur l'homme et son « fonctionnement » : il est vrai que le métier d'éditeur n'est pas, là-dessus, le plus mauvais poste d'observation…

Je vais donc égrener quelques souvenirs et anecdotes qui me paraissent exemplaires.

Comme tout étudiant d'histoire, j'avais lu une partie des *Paysans de Languedoc* où j'avais observé que l'érudition n'était pas nécessairement aride et qu'elle pouvait donner à penser voire à rêver… *L'Histoire du climat depuis l'an mil* avait été l'un des deux ou trois livres qui m'avaient montré à quel point « l'histoire batailles » et « l'histoire politique » pouvaient paraître pauvres comparées aux voies inédites que pouvait ouvrir la « nouvelle histoire ». Plus tard, alors que j'étais un jeune éditeur, j'avais été émerveillé (et très envieux) du fabuleux succès de *Montaillou* : il m'avait enseigné une chose, que l'excellence de l'historien et de son travail ne s'opposaient pas au succès, bien au contraire. Je n'ai, depuis lors, jamais changé d'avis, car cette maxime s'est pour moi constamment vérifiée durant les 25 années où j'ai dirigé les collections chez Fayard.

Lorsque je suis entré dans cette maison en 1985, une belle surprise m'attendait : Claude Durand avait signé un contrat avec… Emmanuel Le Roy Ladurie pour ses projets sur les Platter. Les livres ne sont pas venus tout de suite, BN (pas encore BnF) oblige, mais ils ont été écrits jour après jour, et j'ai fini par publier une quinzaine d'ouvrages de l'illustre historien, pour certains sur des sujets tout à fait inattendus. Cela fait de Fayard l'éditeur principal de l'un nos plus féconds auteurs : trois volumes relatifs aux Platter, quatre sur le climat, le grand travail sur Saint-Simon et la Cour, le volume *Ouverture, société et pouvoir* [...] dans l'histoire, la suite des écrits de Pierre Prion, etc., etc. Ce traitement de faveur qu'il nous a réservé, nous ne l'avons pas obtenu en le couvrant d'or au moyen d'à-valoirs élevés – ce qui pourtant aurait été justifié ces livres se vendent très bien ici comme à l'étranger – mais juste parce que nous avons noué au fil des années un très fort lien de confiance et d'amitié. Emmanuel est en effet, sur le plan des relations humaines aussi, un homme de la longue durée ; il ne se laisse pas apprivoiser facilement, car il est très attaché à sa liberté. Il faut avoir avec lui un commerce au long cours, lui consacrer du temps et ne jamais lui prêter une oreille distraite, car il y a toujours quelque chose à saisir derrière des propos en apparence sinueux et décousus ou encore portant sur des sujets à très long terme. Il faut aussi savoir que c'est un esprit universel et insatisfait. Pour notre plus grand bonheur, il n'estime jamais une recherche ou une enquête closes ; ses dossiers restent ouverts en permanence. Une anecdote : le comportement obscurantiste des grands médias lors de la tempête de décembre 1999, qui n'avaient pas même pensé à interroger un historien pour savoir si cet événement avait ou non des précédents, m'a conduit à interroger Emmanuel là-dessus et m'apercevoir qu'il continuait à nourrir un dossier « Climat » depuis les années 1960. Notre conversation m'a montré que le sujet le passionnait toujours et qu'il serait partant pour une nouvelle aventure éditoriale sur l'histoire du climat. Résultat dix ans plus tard : quatre livres et bientôt cinq qui ont entièrement fondé une discipline aujourd'hui indispensable aux sciences dites dures et propre à éclairer les débats sur le réchauffement.

Emmanuel est aussi l'opposé de l'historien spécialisé rigoureusement dans une époque, dans un espace et dans une approche et/ou dans une méthode. Tantôt, il estime que c'est le politique qui prime (*L'État royal*), le religieux et le social (*Montaillou*) qui l'emportent, ou encore le système des représentations qui comptent le plus (*Saint-Simon ou le Système de la Cour*). De la même façon, il refuse l'enfermement chronologique, ce qui donne les magnifiques résultats que vous connaissez tous. C'est le corollaire de l'ouverture permanente des dossiers. Cette générosité intellectuelle, cette ouverture aux travaux des autres, cette curiosité toujours en éveil ont fait vivre un éditeur généraliste comme moi dans un climat d'ouverture enthousiasmant. Qui m'a fait connaître l'existence du livre de René Weiss sur les derniers cathares de Montaillou ? Nul autre qu'Emmanuel. Qui insiste pour que la contribution de tel ou tel collaborateur spécialisé soit bien mise en valeur sur la couverture des livres, au risque d'agacer l'éditeur qui préfère toujours mettre en avant exclusivement le nom d'un auteur célèbre ? Encore Emmanuel !

Une telle capacité à partager et à dialoguer, chez un homme capable de se mettre à l'allemand à 60 ans pour comprendre la très difficile langue de la famille Platter, de s'emparer de sujets où il y a parfois plus de coups à prendre que de lauriers à recueillir de la part des collègues, tout cela montre bien que nous avons affaire à un historien hors du commun d'une culture et d'une curiosité universelles. Là est le secret : Emmanuel Le Roy Ladurie donne et partage parce qu'il possède beaucoup.

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DEUXIÈME PARTIE

AUTOUR DES PLATTER

TROISIÈME PARTIE

NOBLESSE ET SOCIÉTÉ

Collection Roland Mousnier

Le 19 juillet 2009, Emmanuel Le Roy Ladurie fêta son quatre-vingtième anniversaire dans l'intimité familiale. Pour ses amis, collègues et élèves, auxquels s'associa une jeune génération de chercheurs inspirés de l'œuvre de ce grand historien, un colloque et un ouvrage en son hommage s'imposaient.

Les contributions consacrées à son œuvre présentent des bilans et des ouvertures vers de nouvelles recherches, la thématique s'échelonnant du Moyen Âge à l'époque contemporaine. Une large place est accordée à l'histoire du climat, à la démographie et à l'anthropométrie.

La deuxième partie de ces hommages est consacrée au *Siècle des Platter*. Les journaux de cette fratrie se prêtent à l'histoire comparée, leurs récits offrant d'impressionnants tableaux de l'Europe du XVIe siècle. Le système de cour occupe une importante partie de cet ouvrage, une attention particulière étant portée aux femmes dans la hiérarchie princière, au cérémonial et aux apparences. Le contrecoup révolutionnaire s'articule logiquement avec une analyse dépréciative du système de cour.

Ce recueil se clôt sur des réflexions sur les retombées de l'œuvre d'Emmanuel Le Roy Ladurie à l'étranger, où sa pluridisciplinarité influença des générations d'historiens, ceci dans les pays les plus lointains.

Couverture : Lucas Van Valckenborch (*ca* 1535-1597), *Paysage de printemps (mai)*, huile sur toile, 1587, Vienne, Kunsthistorisches Museum © La Collection/Imagno

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