

Climate Change and Global Wine Quality

Gregory V. JONES

Geography Department - Southern Oregon University

gjones@sou.edu

Michael WHITE

Dpt of Aquatic, Watershed, and Earth Resources - Utah State University

mikew@cc.usu.edu

Owen COOPER

CIRES - University of Colorado

ocooper@al.noaa.gov

Abstract

Understanding climate change and the potential impacts on natural and human-based systems has become increasingly important as changing levels of greenhouse gases and alterations in earth surface characteristics bring about planetary energy, temperature, and hydrologic changes. For temperature, the observed warming trends have been found to be asymmetric with respect to seasonal and diurnal cycles with greatest warming occurring during the winter and spring and at night. These observed trends and potential changes in temperatures exert strong influences on virtually every form of agriculture where production viability may be altered due to changes in winter hardening, frost occurrence, growing season lengths, and heat accumulation for ripening potential.

The importance of understanding climate change impacts on agriculture is never more evident than with viticulture where many years of experience has resulted in the finest wines being made from grapes grown in geographically distinct regions. However, grapevines are generally grown in regions and under conditions that are considered marginal for agricultural production ultimately putting it at a greater potential risk from climatic variations and change. Given that high quality wines are generally associated optimum climatic conditions in any given vintage, these questions arise: what is the direction and magnitude of climatic changes in the world's top wine regions, what effects has climate change had on wine quality in the past, and what effects may climate change bring in the future?

Here we report results of our analysis for 27 of the world's top wine producing regions as: 1) observed changes in growing season temperatures from 1950-1999; 2) the variation and trends in vintage quality; 3) the relationship between observed climate and vintage ratings; and 4) future climate scenarios from a 50 year output (2000-2049) of a climate model. Overall, the results indicate that the majority of the regions have experienced growing season warming that is related to better overall vintages with lower year-to-year variation. Future climate change scenarios in these same regions indicate an average warming of 2°C in the next 50 years with regions becoming more (more equitable climate) or less viable (too hot to produce quality grapes) as high quality wine producers.