



## **Influence of climate variability on wine and olive oil productions in Portugal**

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Understanding climate change and potential impacts on natural systems is becoming increasingly important as growing levels of greenhouse gases and changes in earth surface features convey temperature and precipitation changes. Over Portugal, the observed warming trends have been found to be asymmetric with respect to seasonal and diurnal cycles, with greatest warming occurring for the minimum temperature and during winter and spring (Miranda et al, 2002). These observed trends and potential changes in temperature exert strong influences on agriculture systems, affecting production viability through changes in winter hardening, frost occurrence, growing season lengths and heat accumulation for ripening potential. Previous studies have shown that a high North Atlantic Oscillation (NAO) index significantly reduces the precipitation and water resources over Iberia (Trigo et al., 2004), being associated with low yield wheat crop in Portugal (Gouveia and Trigo, 2006). Also climatic changes over coastal California associated with increases in SST and water vapour over Pacific Ocean may have benefited the premium wine industry, as seen in higher quality wines and larger grape yields (Nemani, 2001).

Viticulture and oliviculture, two vital Mediterranean crops, reveal to be of great significance for understanding climate change impacts on agriculture, as grapevines and olive fruits are generally grown in geographically distinct regions under marginal conditions, for agricultural production. Since these productions are exposed to a greater potential risk for climatic variations and change, high quality wines and olive oils are generally associated to optimum climatic conditions.

In this work we report results of our analysis for olive oil and wine producing regions in Portugal, showing the relationship between production values and observed climate variability, using North Atlantic Oscillation (NAO) Index. Besides the NAO pattern we have also applied an EOF analysis to the 500 hPa geopotential height, surface temperature and precipitation fields over Euro Atlantic region and related the corresponding PCs with time series of wine and olive production anomalies.

Our results clearly show that, depending on the Portuguese production region, there is a significant correlation between production values and monthly NAO index values for late winter and early spring. The strength and signal of this connection depends also on the relationship between temperature and precipitation with NAO for each production region. The results reveal also a strong negative correlation between NAO index and both olive and wine productions, in spring, namely in the Trás-os-Montes region, in the Northeast of Portugal. This correlation is even stronger when the analysis is performed only for the finest olive oils productions.

Finally we believe that this analysis allows developing and implementing a tool that contributes to improve yield forecasts through the use of seasonal climate forecasts.

Célia Gouveia and Ricardo M. Trigo. "Influence of climate variability on wheat production in Portugal". GeoENV2006- 6th International Conference on Geostatistics for Environmental Applications, Rhodes, Outubro 25-27, 2006

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