



## **Climate change implications on viticultural suitability of Portuguese wine denominations of origin**

Monica Santos (1), André Fonseca (1), Helder Fraga (1), Gregory V. Jones (2), and João Andrade Santos (1)

(1) UTAD, CITAB, School of Sciences and Technology, Physics Dep., Vila Real, Portugal (jsantos@utad.pt), (2) Center for Wine Education, Linfield College, McMinnville, Oregon, 97128, United States

In this study, a high-resolution bioclimatic zoning over 50 protected Denominations of Origin (DOs)/sub-regions in mainland Portugal is performed based on Dryness (DI) and Huglin indices (HI). A principal component analysis (PCA) was applied to the time mean spatial patterns of the two selected bioclimatic indices, for the baseline period (1981–2015) and only over the planted vineyard cover areas in each region, isolating a new optimized combined index. The analysis is based on a very high-resolution dataset for a baseline period (1981–2015). Climate change projections are also carried out for two scenarios (RCP4.5 and RCP8.5) and using a 5-member ensemble over the future periods of 2041–2070 and 2071–2100. The results for the present conditions highlight the spatial variability of Portuguese DO/sub-regions. This study also shows that for the future periods, and regardless of the scenario, the wine sector in Portugal will likely see important bioclimatic changes across most DOs. In the future, warmer and drier conditions are expected across the country where areas classified as humid will be substantially reduced or even disappear in the most severe scenario (RCP8.5). Increases in the growing-season mean temperatures in all the Portuguese winemaking DO/sub-regions, accompanied by increasing severe dryness, are projected in future climates, mainly in south-eastern Portugal and along the upper Douro Valley (Douro Superior) in north-eastern Portugal. These DO/sub-regions are projected to become much drier than currently so that irrigation or the introduction of new varieties are likely adaptation measures to warrant the viability and sustainability of regional viticulture in future periods. This research highlights the differences between DO/sub-regions, allowing for a better understanding of the nature of climate change across various regions of the country. Acknowledgments: This study was supported by the Clim4Vitis project – “Climate change impact mitigation for European viticulture: knowledge transfer for an integrated approach”, funded by European Union’s Horizon 2020 research and innovation programme, under grant agreement n° 810176.