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## Climate change impacts on viticulture in Italy

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In Italy the wine industry is an economic asset representing the 8% of the annual turnover of the Food & Beverage sector, according to Unicredit Industry Book 2019. Viticulture is strongly influenced by weather and climate, and winegrowers in Europe have already experienced the impact of climate change in terms of more frequent drought periods, warmer and longer growing seasons and an increased frequency of weather extremes. These changes impact on both yield production and wine quality.

Our study aims to understand the impact of climate change on wine production, to estimate the risks associated with climate factors and to suggest appropriate adaptation measurement. The weather variables that most influence grape growth are: temperature, precipitation and evapotranspiration. Starting for these variables we calculate a range of bioclimatic indices, selected following the International Organisation of Vine and Wine Guidelines (OIV), and correlate these with wine productivity data. According to the values of different indices it is possible to determine the more suitable areas for wine production, where we expect higher productivity, although the climate is not the only factor influencing yield.

Using the convection-permitting models (CPMs – 2.2 horizontal resolution) we investigate how the bioclimatic indices changed in the last 20 years, and the impact of this change on grapes productivity. We look at possible climate trends and at the variation in the frequency distribution of extreme weather events. The CPMs are likely the best available option for this kind of impact studies since they allow a better representation of surface and orography field, explicitly resolve deep convection and show an improved representation of extremes events. In our study, we compare CPMs with regional climate models (RCMs – 12 km horizontal resolution) to evaluate the possible added value of high resolution models for impact studies. To compare models' output to observation the same analysis it carried out using E-OBS dataset.

Through our impact study, we aim to provide a tool that winegrower and stakeholders involved in the wine business can use to make their activities more sustainable and more resilient to climate change.