Geophysical Research Abstracts
Vol. 15, EGU2013-2067-1, 2013
EGU General Assembly 2013

Uncertainties in climate change projections for viticulture in Portugal

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The assessment of climate change impacts on viticulture is often carried out using regional climate model (RCM) outputs. These studies rely on either multi-model ensembles or on single-model approaches. The RCM-ensembles account for uncertainties inherent to the different models. In this study, using a 16-RCM ensemble under the IPCC A1B scenario, the climate change signal (future minus recent-past, 2041-2070 – 1961-2000) of 4 bioclimatic indices (Huglin Index - HI, Dryness Index - DI, Hydrothermal Index – HyI and CompI – Composite Index) over mainland Portugal is analysed. A normalized interquartile range (NIQR) of the 16-member ensemble for each bioclimatic index is assessed in order to quantify the ensemble uncertainty. The results show significant increases in the HI index over most of Portugal, with higher values in Alentejo, Trás-os-Montes and Douro/Porto wine regions, also depicting very low uncertainty. Conversely, the decreases in the DI pattern throughout the country show large uncertainties, except in Minho (northwestern Portugal), where precipitation reaches the highest amounts in Portugal. The HyI shows significant decreases in northwestern Portugal, with relatively low uncertainty all across the country. The CompI depicts significant decreases over Alentejo and increases over Minho, though decreases over Alentejo reveal high uncertainty, while increases over Minho show low uncertainty. The assessment of the uncertainty in climate change projections is of great relevance for the wine industry. Quantifying this uncertainty is crucial, since different models may lead to quite different outcomes and may thereby be as crucial as climate change itself to the winemaking sector. This work is supported by European Union Funds (FEDER/COMPETE - Operational Competitiveness Programme) and by national funds (FCT - Portuguese Foundation for Science and Technology) under the project FCOMP-01-0124-FEDER-022692.