

Assessing Climate Change Impacts on Crops and Livestock in Greece with Regional Climate Modeling: Model Setup, Evaluation and Future Projections

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Climate change significantly affects primary production by imposing various types of stress on crops and livestock, increasing food safety and scarcity risks. The purpose of this work is to produce regional climate simulations for Greece, which aim to provide the necessary parameters required to calculate crop and livestock stress indices and their changes until the middle of the century, and thus provide guidance for mitigation and adaptation policies with regards to cultivation and animal husbandry. For that purpose, the Weather Research and Forecasting (WRF) model was employed to dynamically downscale global climate projections from the Coupled Model Intercomparison Project 6 (CMIP6), producing high resolution climate simulations (10 km) for Greece, under the most recent scenario framework for greenhouse gases emissions, the Shared Socio-economic Pathways (SSP). A reference simulation, covering the decade 2005-2014, has been produced as representative of the present climate and also as a basis for the evaluation of model performance. The future climate conditions have been examined by simulating the decade 2046-2055 under two different SSP Scenarios: SSP2-4.5, a middle-of-the-road scenario and SSP5-8.5, a high-end scenario which assumes little to no mitigation measures. In order to reduce biases related to the large scale forcing from individual global models, a bias-corrected global dataset, based on 18 models from CMIP6, has been used as initial-boundary conditions input for WRF. Finally, the ERA5-Land reanalysis dataset (~9 km resolution) was employed as reference for the performance evaluation of the WRF model. The model setup and preliminary results for model evaluation, crop water stress and livestock thermal stress in Greece are presented and discussed.

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