

**Topic:** Addressing uncertainty and risk in climate change impact studies

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## Probabilistic assessment of adaptation options from an ensemble of crop models: a case study in the Mediterranean.

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Uncertainty about future climate change impacts increases the complexity of addressing adaptation and evaluating risks at regional level. In modelling studies, such uncertainty may arise from climate projections, field data and crop models. Approaches are required for effectively quantifying climate impacts and the effect of adaptation options, managing inherent uncertainties and communicating the results. The latter will especially benefit from adding user-friendly visualizations.

In this study, a probabilistic framework for evaluating the effect of feasible adaptation strategies for winter wheat in northern Spain was applied with an ensemble of crop models. First, adaptations response surfaces (ARSs) were created. These are bi-dimensional surfaces in which the effect of an adaptation option (e.g. changes in crop yield compared to the unadapted situation) is plotted against two explanatory variables (e.g. changes in temperature and precipitation). Based on these ARSs the most effective adaptations considered here were mainly based on wheat without vernalization requirements, current and shorter cycle duration and early sowing date. Other combinations of sowing dates and cycle duration were only promising and selected when a single supplementary irrigation was applied. Then, the likelihood of staying below a critical yield threshold with different adaptation measures was calculated using ARSs and probabilistic projections of climate change. The latter are joint probabilities of changes in the same explanatory variables used for drawing the ARSs. Therefore, for these options ARSs were constructed and probabilistic climate projections superimposed. Consequent probability of effectively adapting were discussed for several options.