



Climate and the Spatial-Temporal Distribution of Winter Wheat Yields: Evidence from the U.S. PNW

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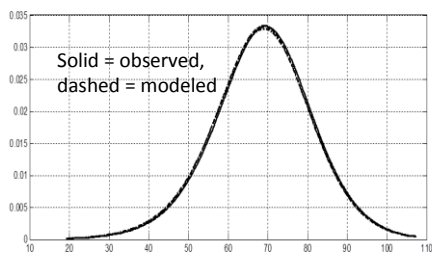


Fig. 1 Validation of the MBM in PNW

We use data from the REACCH region and the PNW to model the spatial-temporal distribution of winter wheat yields using new statistical methods developed by Antle (2010), which we call the “moment-based model” (MBM). These methods are combined with techniques to approximate and visualize yield distributions (Antle, Mu and Abatzoglou 2014) and could provide an alternative to the use of process-based models like CropSys. We use these methods to simulate (1) the effects of historical and extreme droughts; and (2) the effects of alternative projected climates.

As shown in the graph below, research suggests that crop yields are the result of complex interacting processes, including soils, climate, genetics, management, etc., and the distribution of yields over space and time will depend on these factors. **Fig. 1** shows the validation of the MBM in PNW suggesting that the model fits the observed data quite well. **Fig. 2** presents simulated yield distributions for historical and extreme droughts using MBM, indicating extreme drought could reshape the yield distributions more significantly for non-irrigated land than for irrigated land and there are changes in skewness. **Fig. 3** finds that yield distributions shift right slightly under future climates but vary across future climates and emission scenarios.

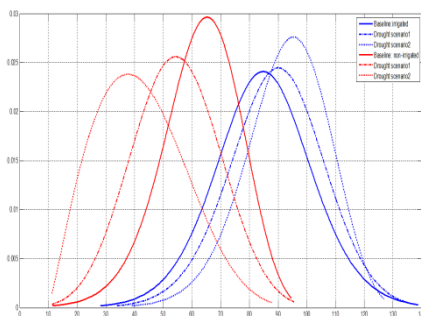


Fig. 2 Yield distributions for historical (scenario 1) and extreme (scenario 2) droughts simulated with MBM

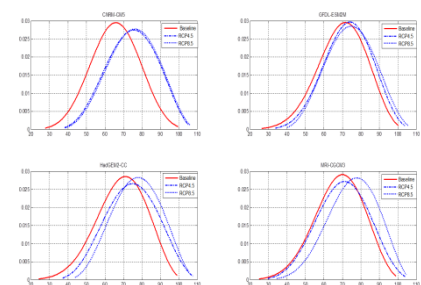
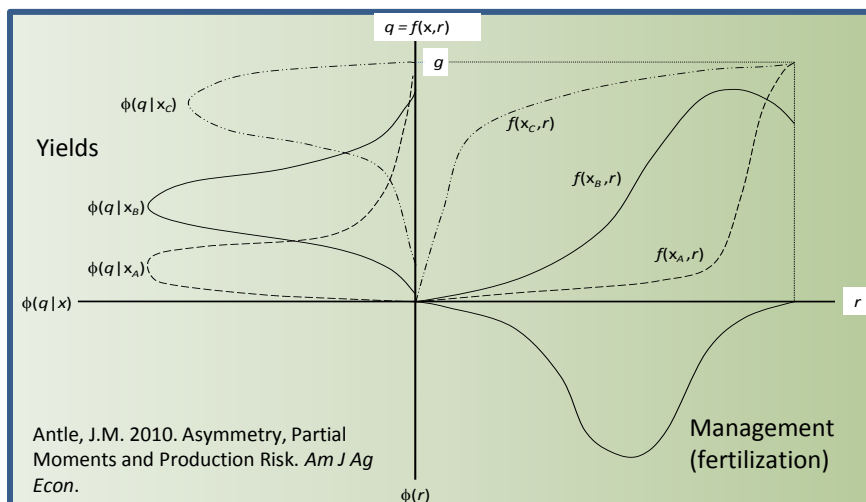


Fig. 3 Rainfed yield distributions in REACCH for projected future climates (4 GCMs) at mid-century



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