106-4 Using a Large Ensemble of Crop Models to Simulate the Climate Sensitivity of Wheat Yields Across a European Transect.

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We studied the sensitivity of a 26-member ensemble of process-based wheat models to perturbations in baseline temperature and precipitation along a transect in Europe to construct impact response surfaces (IRSs) of simulated wheat yields.

Resultant IRSs show the simulated yield response to systematic changes to the 1981-2010 baseline in temperature (ranging from -2 to +9°C) and precipitation (-50 to +50%). IRSs were calculated for spring and winter wheat cultivated at four contrasting sites: in southwestern Finland, Germany (winter wheat in the west; spring wheat in the east) and north-eastern Spain. Simplified assumptions were made on CO_2 level, management and soils with the aim to distinguish differences in model response attributable to climate.

Results show that simulated absolute yield levels vary considerably between models under baseline and perturbed conditions. Across the ensemble, there is general agreement among models that the dominant sensitivity changes along the transect. Wheat yields are more sensitive to temperature changes at the Finnish site, sensitive to a combination of temperature and precipitation at the German sites, and more sensitive to precipitation at the Spanish site. Yields benefit from cooling at the Spanish and German sites, while temperatures are close to optimal for the baseline in Finland. Reasons for these site-specific patterns of response can partly be attributed to differences in baseline climate, local cultivars and management practices. Standardized anomalies of simulated yield series match observed regional yield anomalies more closely for spring wheat in Germany than at other sites, mainly due to better resolved observations.

The IRS approach appears suitable for illustrating model behaviour under changing climate, as well as for comparing results from multi-model ensemble simulations.

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