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Understanding crop model response types in a global gridded crop model ensemble

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Global Gridded Crop Models (GGCMs) are increasingly applied for assessing climate change impacts, adaptation, environmental impacts of agricultural production and in combination with integrated assessment or economic modeling for projecting future land-use change. Even though global gridded crop models are often based on detailed field-scale models or have implemented similar modeling principles in other ecosystem models, global-scale models are subject to substantial uncertainties from both model structure and parametrization as well as from calibration and input data quality.
AgMIP's Global Gridded Crop Model Intercomparison (GGCMI) has thus set out to intercompare GGCMs in order to evaluate model performance, describe model uncertainties, identify inconsistencies within the ensemble and (ideally) underlying reasons, and to ultimately improve models and modeling capacities. In phase 2 of the GGCMI activities, 12 modeling groups followed a modeling protocol that asked for up to 1404 31-year global simulations at 0.5 arc-degree spatial resolution to assess models' sensitivities to changes in carbon dioxide (C; 4 different levels) temperature (T; 7 different offset levels), water supply (W; 9 levels), nitrogen (N; 3 levels) and adaptation (A; 1 non-adapted and 1 adapted setting) in the so-called CTWN-A experiment.
We here describe the data archive and present analyses of model response types using impact response surfaces along the C, T, W, N, and A dimension, respectively and collectively. We explore spatial patterns of dominant drivers, that is, regions in which changes in e.g. temperature have greater effects on crop yields than changes in water supply or vice versa. The vast amount of simulation data allows for a plentitude of analyses and we invite collaborators to jointly explore their research questions with the help of GGCMI data.