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General Large-Area Model for annual crops (GLAM)

The General Large-Area Model for annual crops (GLAM) is a tool used for research purposes for assessing the impacts of climate variability and change on annual crops. It has been designed for use with regional and global climate model output and remotely sensed data.

GLAM is a regional-scale crop model that was developed to operate on the grid of global and regional climate models. Hence GLAM is process-based, but is less complex than field scale models. It parameterises the impact of weather and climate on crops; it does not explicitly simulate biotic stresses but implicitly includes their impact using a yield gap parameter.

GLAM simulates the impact of climate variability and change on crops by using daily weather information to determine the growth and development of the crop, from sowing to harvest. By simulating different varietal properties, the model can be used in developing and assessing genotypic adaptation strategies.

The model can be used as part of studies that need to turn gridded weather data into crop productivity outcomes. Our setup is particularly well-suited to producing tens of thousands of simulations in order to quantify uncertainty and obtain robust results.

Inputs

The model requires daily time series of rainfall and solar radiation, and either: i. maximum and minimum temperatures or ii. humidity and mean temperature. If daily data are not available then, with the exception of rainfall, data may be interpolated. Soil hydrological properties can also be used, though these are not required. The planting window is set as an external input. The model also needs crop yield data for calibration.

Outputs

Crop yield, biomass, leaf area index, water balance (transpiration, runoff, evaporation, drainage) and many other outputs can be analysed at seasonal and daily timesteps.

Crops and regions

GLAM has been used across the globe; principal regional foci at Leeds include India, Africa and China. The model was originally designed for groundnut (peanut) in India and has since been extended for spring and winter wheat, sorghum, soybean, millet, potato and maize. It can be run for any region for which there is crop yield data. Re-running existing crop/region combinations is quicker than applying the model to new regions.

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Category

Software

Learn more

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