Global and national yield anomalies for wheat, maize and millet based on LPJmL

We use LPJmL, a well-established dynamic global vegetation, hydrology and crop-growth model, to simulate wheat, maize and millet yield anomalies for 2018 based on climate, soil conditions and management regimes. Observed weather data are fed into the model until April 30, 2018; afterwards, to simulate the uncertainty of operational forecasts, weather data is sourced from the portion May 01-Dec 31 from the previous years (1984-2017). The crop model runs on a global grid with 0.5° size in latitude and longitude.  
  
We provide yield anomalies as deviation from the mean of 2013-2017 as simulated by LPJmL. The data is available on a global grid and as nationally aggregated anomalies. Apart from a default simulation, assuming the same management in 2018 as for the previous years, we provide alternative intervention scenarios that assume different irrigation levels, more nitrogen input, or both. In total, there are 3 (crops) \* 12 (scenarios) = 36 hypothetical back-casting simulations. Each of these scenarios is calculated for each of the 34 different 2018 climate realizations.

* Model ID: yield\_anomalies\_lpjml
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* Model Category: Agriculture

# Outputs

**yield level:**

* Description: Percent increase or decrease in yield from baseline
* Units: percent

# Parameters

**crop:**

* Description: Choose the crop of interest from one of [millet, maize, wheat].
* Type: ChoiceParameter
* Choices: millet, maize, wheat
* Default: None

**irrigation:**

* Description: Choose the irrigation level. It should be one of [LIM, NO, POT]. NO: no irrigation anywhere. Crops are rain-fed only. This can be considered as a "what-if irrigation failed scenario". LIM: irrigation is applied on crop-specific areas equipped for irrigation. Irrigation water withdrawal is limited to water available in surface water bodies. As a result, it is possible that irrigation demand cannot be fulfilled completely in some grid cells if demand is higher than supply. POT: uses the same irrigated areas as LIM\_IRRIGATION, but allows for withdrawals to exceed water available in surface water bodies. As a result, irrigated crops should not experience water stress.
* Type: ChoiceParameter
* Choices: NO, LIM, POT
* Default: None

**nitrogen:**

* Description: Choose the nitrogen level. It should be one of [LIM, LIM\_p25, LIM\_p50, UNLIM]. LIM: country- and crop-type-specific amounts of N fertilizer to crops. The dataset is from GGCMI (the Global Gridded Crop Model Inter-comparison within AgMIP) and describes fertilizer application levels around the year 2000. LIM\_p25: same as LIM, but with 25% more fertilizer in all cells where N>0. That is, cells without fertilization around 2000 in our data set do also not receive fertilizer in this scenario. LIM\_p50: similar to \_p25, but with 50% more N. UNLIM: extremely high N rates in all cells such that there should be no N limitation of crop growth. There are no negative effects of too much nitrogen on plant growth in our model (but there will be increased leaching and outgassing).
* Type: ChoiceParameter
* Choices: LIM, LIM\_p25, LIM\_p50, UNLIM
* Default: None

**area:**

* Description: Either global (global pixel tif file) or merged (a txt file aggregated to the country level).
* Type: ChoiceParameter
* Choices: global, merged
* Default: None

**statistic:**

* Description: Only provide if area=global. Select the statistical aggregation over possible future climate realizations which can be any of ["mean", "std", "pctl,5", "pctl,95"] for the mean, standard deviation, 5th percentile or 95th percentile. These four measures reflect the uncertainty of the climate forecasts starting in May 2018.
* Type: ChoiceParameter
* Choices: mean, std, pctl,5, pctl,95
* Default: None