MINT: An intelligent interfact for understanding the impacts of climate change on hydrological, agricultural, and economic system

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Motivation: Understanding the impacts of climate change on natural and human systems poses major challenges as it requires the integration of models and data across various disciplines, including hydrology, agriculture, ecosystem modeling, and econometrics.

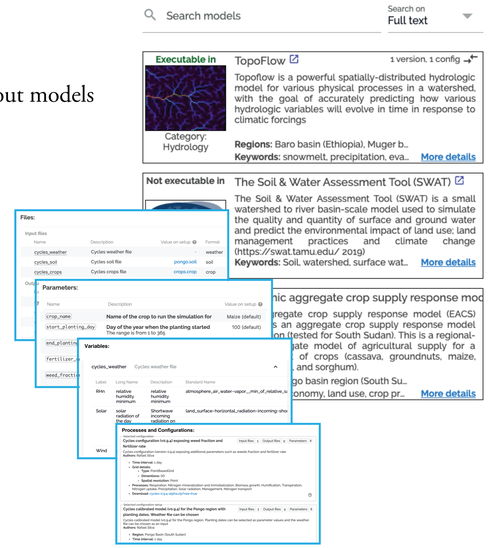
Proposed approach: The Model INTegration (MINT) framework utilizes semantic representation to describe datasets and models to support modelers in data search and transformations, model selection and set up, ultimately combining them into scientific workflows for execution and visualization of the results. MINT is designed both for modelers and analysts, who ultimately propose a range of solutions to the decision makers.

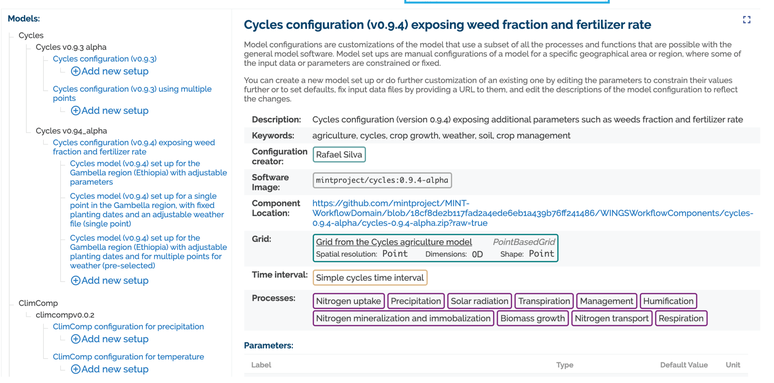
1 Identify and prepare relevant models

Model Catalog

Representing knowledge about models

1. Data formats
2. Model variables
3. Constraints
4. Adjustable parameters
5. Interventions
6. Execution of ensembles
7. Data preparation
8. Post-processing
9. Calibration
10. Sensitivity analysis



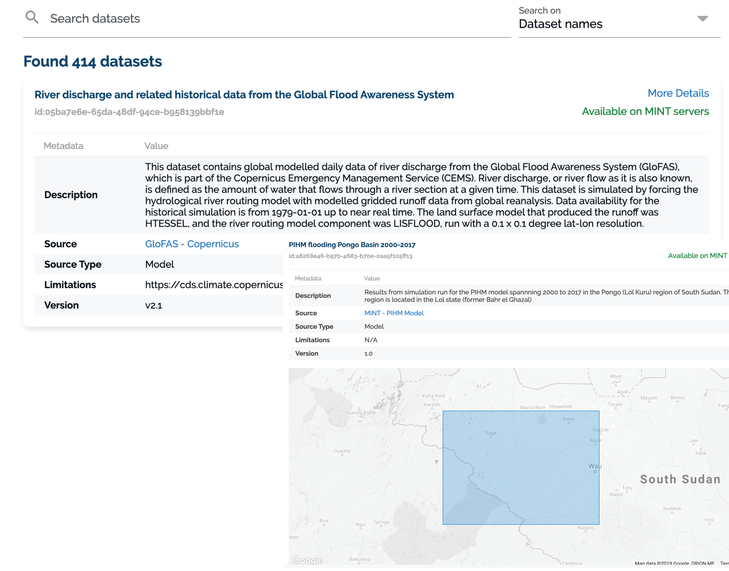


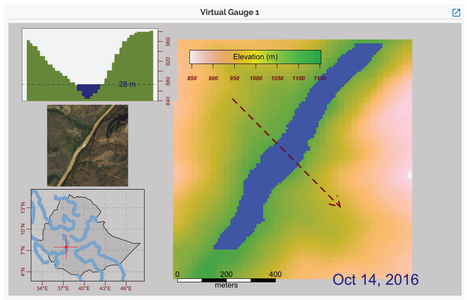
Model configurations are possible directly via the interface. They represent customizations of the model that use a subset of all the processes and functions that are possible with the general model software.

2 Browse and prepare datasets

Data Catalog

The MINT data catalog allows to learn about the different datasets available on the platform.

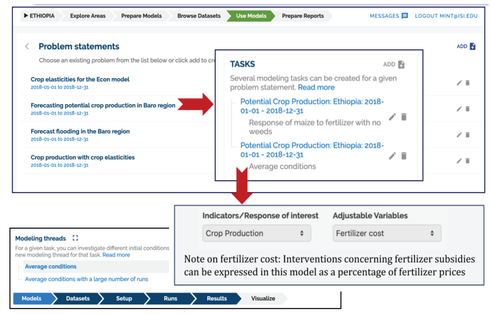




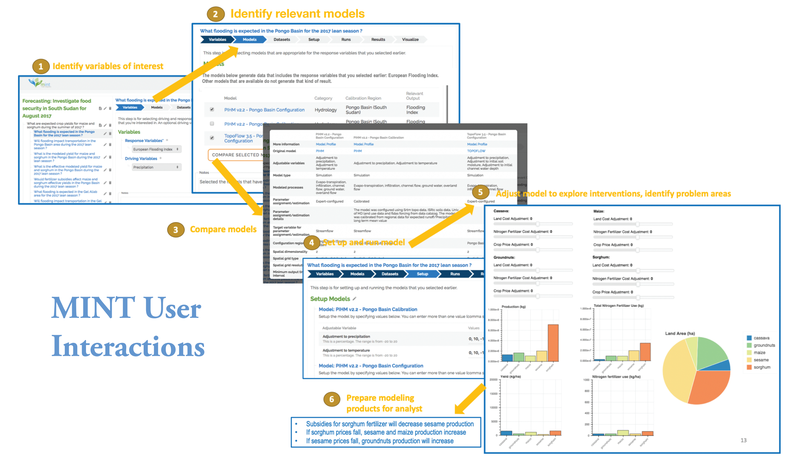
Theory-Guided Data Science

We use physics-guided neural networks (Karpatne et al, 2017) to generate physically consistent models of river width and depth.

3 Run models



Knowledge-driven problem framing: Indicators and adjustable variables



MINT User Interactions

http://mint-project.info

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