Prototyping a Python wrapper for the Structure for Unifying Multiple Modeling Alternatives (SUMMA) hydrologic modeling framework

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Prototyping a Python wrapper for the Structure for Unifying Multiple Modeling Alternatives (SUMMA) hydrologic modeling framework

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Abstract: The Structure for Unifying Multiple Modeling Alternatives (SUMMA) is a hydrologic modeling framework that allows hydrologists to systematically test alternative model conceptualizations. The objective of this project is to create a Python library for wrapping the SUMMA modeling framework called pySUMMA. Using this library, hydrologists can create Python scripts that document the alternative model conceptualizations tested within different experiments. To this end, pySUMMA provides an object-oriented means for updating SUMMA model configurations, executing SUMMA model runs, and visualizing SUMMA model outputs. This work is part of the HydroShare web-based hydrologic information system operated by the Consortium of Universities for the Advancement of Hydrologic Science Inc. (CUAHSI) that seeks to make hydrologic data and models discoverable and shareable online. Creating pySUMMA is a first step toward the longer-term goal of creating an interactive SUMMA-based modeling system by combining HydroShare.org, JupyterHub, and High Performance Computing (HPC) resources. In the current version of HydroShare, different data and model resources can be uploaded, shared, and published. This current development will result in a tighter integration between the SUMMA modeling process and HydroShare.org with the goal of making hydrologic models more open, reusable, and reproducible. Ultimately, SUMMA serves as a use case for modeling in HydroShare that advances a general approach for leveraging JupyterHub and HPC that can be repeated for other modeling systems.

Keywords: Integrated environmental modelling, Modeling interfaces, Community Modeling, Jupyter Notebooks