IDEAS-Watersheds: Accelerating watershed science through a community-driven software ecosystem

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Project Abstract:

Through its Science Focus Area (SFA) projects the Subsurface and Biogeochemical Research (SBR) program is tightly integrating observations, experiments, and modeling to advance a systems-level understanding of how watersheds function, and to translate that understanding into advanced science-based models of watershed systems. To enhance and broaden the impact of the existing SFAs, the IDEAS-Watersheds project strives to increase watershed modeling capacity by increasing software development productivity - a key aspect of overall scientific productivity - through an agile approach to creating a sustainable, reliable, software ecosystem with interoperable components.

In this poster we highlight the unique structure of the IDEAS-Watersheds project, which is organized around six Research Activities. There are three Partnership Activities, each undertaken jointly with one of SBR's interdisciplinary watershed focused SFA projects using concrete use cases to advance our watershed modeling capability. These projects include the Watershed Function SFA (LBNL - poster by S. Molins), the Critical Interfaces SFA (ORNL - poster by E. Coon), and the River Corridor SFA (PNNL - poster by X. Chen). A Continental United States (CONUS) Activity is advancing a basin-to-continental scale simulation platform (poster by L. Condon). A Reaction Network Activity partnering with SBR's fine-scale SFAs (ANL, LLNL, SLAC) focused on fundamental biogeochemical processes brings those advances into geochemistry reaction modeling tools. Finally, a Shared Infrastructure Activity coordinates the development of common workflow tools and software interfaces to support interoperability (see Workflows poster by S. Molins). To further leverage this structure to accelerate the development of watershed modeling capacity, we adopt a co-funding model with shared deliverables and joint funding of early career researchers. This approach creates a pool of IDEAS-SFA liaisons with most of their time focused on these shared deliverables, and hence, enables a variety of inter- SFA activities, such as our monthly training webinars in software development, and inter-SFA web-meetings exploring synergistic collaborations.