



A Pilot Cyberinfrastructure for Hydrology Cyberlearning

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The geoscience educational agenda in hydrology involves teaching the description, explanation, and prediction of the occurrence, distribution and movement of water in nature. Hydrology is conventionally taught on a chalkboard using the fundamental physical laws of mass, momentum and energy. However, the connections between theoretical concepts are easier to understand when the cause-effect relationships are demonstrated through visual experimentation with models and real-world data. The last decade has produced a revolution in the availability of observational data, hydrological models, and the geoinformatic software necessary to process complex datasets. These advances can bring into the classroom the exploratory modeling and data analysis methods that were once available only to specialists.

Unfortunately, several practical problems have prevented the widespread adoption of the latest data analysis and modeling tools for hydrology education by teachers and researchers. These include steep technology learning curves (specialized curricula written by experts are needed for software training), rapid technology turnover (curricula must be updated very frequently, making it difficult for educators to keep current), and the lack of an organized community cyberinfrastructure for the dissemination and publication of the latest tools and curricula (causing duplication of effort by educators, and limiting the adoption of technology).

Our objective is to dramatically increase the incorporation of exploratory data analysis and modeling tools within the hydrology and geoscience education classroom, beginning in the University, and moving toward primary and secondary education applications. We are developing a cyberinfrastructure to support open community development and dissemination of a data-driven curriculum for hydrology and the geosciences. A modular pilot curriculum is being developed to teach data access, analysis, and modeling and visualization using case studies for watersheds and aquifers in Arizona and Indiana, USA. These modules are designed to be easily adapted to other contexts, and easily updated and replaced by community members as new technology dictates new methods. This pilot curriculum emphasizes the same learning outcomes and concepts being advanced by the MOCHA community for modular hydrology curriculum.