Supporting Streamflow Forecasting In the Western United States Using the GEOLEM Library

Ken Rojas[1], Roland Viger[2], Jim Marron[3], Tom Pagano[3], Olaf David[4], Frank Geter[1]
[1] USDA-NRCS-ITC Fort Collins, CO
[2] USGS Denver, CO
[3] USDA-NRCS-NWCC Portland, OR
[4] USDA-ARS-GPSR Fort Collins, CO

The USDA-NRCS National Water and Climate Center (NWCC) has been producing streamflow forecasts for watersheds in the western United States for many years using traditional stochastic methods. Forecasting procedures will be enhanced in part by using the Geospatial Object Library for Environmental Modeling (GEOLEM) to improve the integration of the geographic information systems (GIS) and environmental simulation models. In this case, GEOLEM aids in the delineation and parameterization of watershed features whose behavior is to be simulated by the environmental model. This library implements a middleware solution (i) for the definition, storage, and manipulation of geographic metadata about geographic information, and (ii) for the transformation of information from the form of one "context" into another based on metadata specification (e.g. from the spatial data formats of GIS into the parameter organization of an environmental model). The overall purpose of this system is to eliminate the need for GIS-specific knowledge to be embedded in an environmental model and avoid encoding model-specific knowledge within the proprietary and constantly evolving environment of commercial GIS. GEOLEM will provide support for 1) watershed delineation from USGS DEM data for watershed identification; 2) methods for mapping driving data into a geospatial context; 3) standardizing the access and retrieval of driving data; 4) provide a basic API for geospatial visualization for the host modeling system. Initially the NWCC will use the USGS model Precipitation and Runoff Model System (PRMS) coupled with various driving data sources from multiple data providers within the USDA-ARS Object Modeling System (OMS). Components from GEOLEM will be utilized throughout the simulation process from the pre-model process of watershed identification to the post-model process of visualization of geospatial information.