



An automatic system for on-line flash flood forecasting

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The research group at Russian State Hydrometeorological University continues developing hydrologic software, called SLS+, which might be useful for background flash flood forecasting in poorly gauged regions.

Now the SLS+ software has a user-friendly web interface for on-line background flash flood forecasting in training and operational (real time or near real time) modes, and allows issuing stream flow forecasts based on precipitation and evaporation data obtained either from archives, or from field sensors, respectively. The system currently includes two hydrological models, the Sacramento Soil Moisture Accounting model (USA) and Multi-Layer Conceptual Model (Russia). These models can be calibrated either manually, or automatically based on four calibration algorithms:

Shuffled Complex Evolution algorithm (SCE), which is quite useful if (1) a number of calibrated parameters does not exceed 6–7 and boundaries of the parameter space are well defined and (2) the parameter space is not too wide;

Basic Stepwise Line Search (SLS) algorithm, which is efficient and computationally “inexpensive”, if an initial point for pattern optimization is well defined;

SLS-2L algorithm (where 2L is an abbreviation for “two loops” or “two cycles”), which is used in regions with scarce soil data and allows first to predetermine the soil hydraulic parameters, and then use these parameters for the refined model parameterization;

SLS-E algorithm (where E stands for “Ensemble generation”), which implies the generation of ensembles of one or several forcing processes (for instance, effective precipitation and evaporation) and model calibration for each of those ensembles. This method is primarily designed for models with undistracted parameters at a relatively low density of ground-based meteorological observation network.

Currently the trial version of the system is available for testing upon request.