Going to space: Implementation of spatial input data processing in real-time flood forecasting in the Czech Republic

T. Vlasak (1), J. Krejci (2), and J. Danhelka (3)

(1) Czech Hydrometeorological Institute, Regional forecasting office, Ceske Budejovice, Czech Republic (vlasak@chmi.cz),
(2) AquaLogic, Dolni Jircany, Czech Republic (j.krejci@aqualogic.cz), (3) Czech Hydrometeorological Institute, Central
forecasting office, Praha, Czech Republic (danhelka@chmi.cz)

Real-time forecasting systems were developed and used in the Czech Republic since late 90's. AquaLog forecasting system is used for forecasting in the Czech part of the Elbe river basin. AquaLog uses SAC-SMA for rainfall-runoff modeling and SNOW17 for modeling of snow cover accumulation and melting. There are about 150 forecasting profiles (computed sub-basins). Data input pre-processing module AquaBase for data quality check and correction. Previous version of AquaBase and AquaLog (ver.5) operated in the scale of basins using time-series of observed precipitation and temperature to compute MAP and MAT based on Thiessen polygons method for basins of typical size of 200-500 km2 (basins were internally divided into 2-4 computation units based on elevation to simulate more precisely the snow cover).
New version of AquaBase (ver.6) process data into regular 1 km grid offering to choose between several interpolating techniques:
- Inverse distance weighted (IDW) with optional value of power parameter, number of stations and diameter in km to be taken into account
- IDW quadrant (IDWq) using only the nearest station from every quadrant of space (optional power parameter and diameter applicable)
- IDW and temperature gradient (for temperature only) correcting the interpolated value according to optional vertical temperature gradient and elevation difference among used stations (optional power parameter and diameter applicable)
- Krigging with optional parameters
- Co-krigging with optional parameters
- Use of radar-raingauge dynamically combined field product
AquaBase ver.6 enables editing of precipitation and temperature field by implementing pseudo-gauges anywhere in the space and editing its values.
AquaLog computation unit were changed to small sub-basins of typical size of 10 to 15 km2 and specific unit hydrographs were derived for every sub-basin. MAP and MAT based on grid analysis in AquaBase environment input every particular sub-basin.
Long time runoff simulation proved a better performance of AquaBase&AquaLog ver.6 in comparison to ver.5 as average Nash-Sutcliffe increased from 0.63 (STD=0.22) to 0.70 (0.14). Beneficial was that increase took place in low performance basins especially.