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Guest Editorial

Recent developments of statistical tools for hydrological application

The statistical approach to the analysis of hydrological processes has a long history and continues to be an intense research topic. Statistical tools have proved very helpful and useful in numerous applications and case studies. The necessity of statistical descriptions of hydrological processes may reflect the enormous complexity of the hydrological systems. A couple of decades ago, the impressive increase of computer power triggered an aspiration that this complexity would be dealt with by very detailed deterministic representations of the hydrological systems. Such representations were expected to eliminate or radically reduce uncertainty. However, the efforts toward this direction were not as successful as expected and an important lesson learned is that uncertainty is a structural element of natural systems. This makes a purely deterministic description ineffective and underlines the usefulness of probabilistic, statistical and stochastic methods.

It is then natural that the number of available tools, approaches and procedures in several statistical fields are recently increasing faster than before. The correct application of new and old updated methods is fundamental for hydrological applications. With the aim to synthesize the enormous number of information and resources in literature (and not only) recently a new working group, named "Statistics in Hydrology – STAHY", was launched by the International Association of Hydrological Sciences. Many researchers are already working together with the purpose to share knowledge on statistical hydrology organizing several initiatives.

The first event sponsored by STAHY was a workshop held during the IAHS – IHP Symposium "The role of hydrology in water resource management", Capri, October 2008.

From the 35 interesting submitted manuscripts we selected 13 papers. The topics mainly analyzed by the authors are:

- extreme value distribution,
- model selection criteria,
- stochastic modeling,
- multivariate analysis and copula function,
- generalised Likelihood Uncertainty Estimation (GLUE),
- nonstationary time series analysis.

The studies in the 13 papers cover a wide spectrum on rainfall and runoff simulation, prediction and regional analysis, droughts, seawater intrusion and infiltration.

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