



## **Regional analysis of monthly runoff using regime curves**

A. Viglione, P. Claps and F. Laio

DITIC, Politecnico di Torino, Torino, Italy

The evaluation of monthly runoff in ungauged basins is necessary for water resources assessment and management, and can be achieved through regional analysis. A trivial approach toward this evaluation is to carry out a different statistical (regional) analysis for each of the twelve months. A major problem with this approach is that it can produce a different multi-regression model for each considered month, possibly involving a large number of geomorphic and climatic basin attributes. Moreover, this approach does not preserve the month to month correlation. The alternative proposed here involves the following steps: (i) deseasonalise the monthly runoff data by dividing them by their corresponding monthly averages; (ii) use a two-parameter distribution to represent the inter-annual variability; (iii) reproduce the series of the monthly averages (the regime curve) using a Fourier series, whose parameters are regionalized by multi-regression analysis; (iv) treat the series of the monthly variances in a similar manner. This procedure involves a limited number of regression models, built for the Fourier curve parameters, and requires a reasonable number of catchment descriptors. An application to a large alpine region in northern Italy demonstrates the robustness of the proposed procedure.