Abstract

Investigation about the mechanisms of transformation of precipitation to runoff in mountainous environments has always represented an intriguing issue for hydrologists. Numerous studies attempt to quantify the effects of snow accumulation and melt on the response of a basin. In these studies the type of approach depends on the spatial (point-scale or basin-scale) and temporal (long term or short term) scales of interest and on the way (stochastic or deterministic) inputs and parameters are described. These methods, however, often suffer from the complexity of the processes in mountain environments, that seldom is captured by the traditional monitoring systems. Moreover these methods, given their high demand in terms of data and parameter specification, are often inadequate to be transposed to ungauged locations.

The contribution of the present study follows the guidelines of the PUB initiative (i.e., Prediction in Ungauged Basins). Two avenues of research are followed, both aimed at defining parsimonious techniques to describe flow formation in snow-driven regions, but at different time scales. On the one hand the effect of temperature on discharge variations is investigated by means of contingency criteria applied to daily time series of precipitation and runoff. On the other hand the role of elevation on the flood formation in mountainous environments is interpreted by means of a simple contributing-area model. Very good results are obtained especially by this second activity, revealing the ability of the modelling scheme to relate the basins susceptibility to flood events and their elevation characteristics. Thanks to its simplicity the model is also suitable to study the effects of temperature increase on flood risk in mountainous regions.