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Assessment of the effects of rainfall variability on the hydrological regime of a small rural catchment in Northwest Spain: preliminary results

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Knowledge of streamflow regime is required to evaluate water supply and to assess the vulnerability of aquatic habitat. This paper presents preliminary results from analysis of hydrological variability of a 16 km2 catchment near A Coruña city, northwest Spain, with particular focus on the effects of rainfall variability, by using the daily streamflow data for the period of October 2004 to September 2009. The analysis is based on the examination of statistical parameters, flow duration characteristics, baseflow separation and investigation of the relationship between measured streamflow and rainfall. The results show that daily, monthly and annual streamflow is highly variable in this catchment. The hydrology of the Corbeira catchment is governed by the natural climatic characteristics of a temperate humid area. At seasonal scale about 65% of the water flows in winter (33%) and spring (32%) months, although with significant differences between years. This seasonality essentially relates to distribution and characteristics of rainfall episodes. However, a good relationship between flow values and monthly rainfall was not observed, probably due to the influence of soil moisture state in the hydrologic response of this catchment. The baseflow contribution to the total streamflow is quite high with values of the baseflow index higher than 0.69, which is consistent with the characteristics of the study area, such as geology (dominated by schist), soils (Umbrisoles and Cambisols), vegetation cover (more than 65% corresponds to forest areas) and rainfall characteristics (heavy, long duration and low intensity). This indicates that the baseflow contributions are mainly responsible for keeping the stream. The flow duration analysis also reveals that the flow regime is dominated by baseflow, recording high flow peaks during a limited period of the year. Flow duration curves have sharp decline from 0.01 to 0.30, indicating that the Corbeira catchment experience rapid flow decrease after the wet season. The study concludes that the major cause of streamflow variability in this catchment is related to rainfall distribution.