Karst aquifers recharge and its relation with flood formation in the Vipava/Vipacco basin

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In karst basins a strong mutual interaction between streamflow and groundwater is often observed and can affect flood formation and runoff propagation. Aiming at characterising the runoff regime of the transnational Vipava/Vipacco karst basin ($650\,\mathrm{km}^2$, Eastern Alps, SLO/I), which is a case study of the FP7 KULTURisk research project, the natural groundwater recharge was investigated. The Vipava/Vipacco river is a left tributary of the Soča/Isonzo river, and its main course is $50\,\mathrm{km}$ long. A large amount of data, provided by the Alto Adriatico Water Authority and by the Slovenian Environment Agency was collected, including time series from 7 stream gauges, 10 groundwater level measurement station and 9 rain gauges. Data covers a time period lasting since 1948 until 2011. Groundwater level data are available at a daily scale, and runoff and precipitation time–series are available both at daily and, for some stations, at hourly scale. An indirect approach, based on the stochastic univariate and multivariate correlation between groundwater levels, precipitation and hydrometric time series was adopted. It allowed to evaluate the characteristics of the groundwater recharge, due both to infiltration and to percolation from the stream channel, and its effect on the baseflow. As the hydrological response of a karst aquifer to an intense precipitation is strongly characterised by its initial conditions, a more detailed analysis was conducted for the most relevant flood events since 1998, in order to study the groundwater feedback to a severe water input in areas close to the stream channel. Considering flood events, it also allowed to neglect the evapotranspiration, and to estimate the basin infiltration. This section of the study is preliminar to model the basin in view of predicting flood events.