

Interbasin groundwater flows in karstic and non-karstic catchments: impacts on annual water balance and flood processes

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To better understand the spatial variability of catchments hydrological response to flood events, regionalisation of hydrological indicators obtained from annual water balance can be performed. However, many natural catchments are non-conservative, essentially due to interbasin groundwater flows (IGF), which does not allow applying water balances with traditional terms only (i.e. precipitations P , streamflow Q and evapotranspiration E). The aim of this paper is to perform annual water balances including IGF on conservative and non-conservative catchments of medium size (100-500 km²), subject to karst processes influence. To this end, we propose an innovative adaptation of the L'vovich annual water balance, accounting for IGF and including hydrograph separation, coupled to a geomorphological analysis. Water balances are performed at the elementary catchment scale (i.e. headwater catchment, or intermediate catchment delimited by two gauging stations). Our approach is applied to 120 elementary catchments for which daily rainfall and runoff data have been gathered. Those catchments belong to 12 French hydrographic basins, located in partially or totally karstified regions (Cévennes, Jura, Normandy) subject to variable IGF depending on the extend of karst units. First, our results show that IGFs can represent a significant part of the annual water balance, and that accounting for this component brings real improvements to catchment processes understanding. Second, we show that depending on study sites, some correlations exist between hydrological and geomorphological parameters, which provide interesting perspectives in terms of regionalisation, in particular regarding ungauged basins. These results represent a promising framework to better understand the gains and losses on stormflow and baseflow components in catchments prone to important IGF.

