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The characteristic trends of karst springs discharges in relation to climate change (examples from the Classical Karst, SE Slovenia)

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Changes in the large-scale hydrological cycle induced by global warming are among the biggest actual concerns. The observed records and climate simulations are consistent in projecting changing precipitation and temperature patterns worldwide. Particularly the incidence of changed precipitation amount, intensity and variability may increase changes in hydrological regimes, and could have implications on water quantity and quality in many areas. This may affect freshwater dependant ecosystems and several socio-economic activities. Groundwater resources availability, stability of access and utilisation may further provoke difficulties for many services, such as drinking water supply, agriculture, industry, hydropower, etc.
Karst aquifers are due to their specific nature (i.e. rapid infiltration rates and underground water flow, highly controlled by conduits) highly dependent on respective hydrological conditions. The goal of this study was to better understand how and to what extent impacts of the climate change may affect karst groundwater resources and to quantify the role of karst aquifers in flood attenuation and baseflow maintenance. The characteristic linear trends of mean, minimal and maximal annual discharge values of nine selected karst springs in SE Slovenia have been assessed and compared with the linear trends of annual precipitation amount and air temperature covering a 52-year period (1961 – 2013). The data have also been evaluated in respect to the individual spring's catchment characteristics (e.g. storage capacity). Obtained results and analysis reveal the impacts of climate (environmental) change on karst groundwater and call for urgent adherence of standards for karst water sources protection, monitoring and rational use in the relevant management strategies.