The first global database of karst spring discharge observations

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Karst aquifers provide drinking water to a large fraction of the world population. For sustainable management of this valuable water resource, adequate knowledge and understanding have to be provided. While public hydrological databases have permitted significant advances in the management of water resources in non-karstic areas, public databases for karst regions are still not available. With this presentation, we present the first effort to provide a global and publicly available database for karst discharge observations, which represent groundwater flux to surface water. Extensive literature search was performed to identify locations of karst springs around the globe. For these locations, discharge observations were gathered from four main sources: (1) national meteorological, hydrological and hydrogeological databases; (2) water bodies and agencies; (3) project partners and collaborators; and (4) digitized from published articles, theses and reports. An automatic procedure to download the most recent data from all national databases was developed. To prepare the combined dataset of all four sources, we applied homogenization procedures, by which datasets from the various sources were converted to same format and unit. For validation, all the spring locations from different sources were compared with the location of karst areas derived from the World Karst Map project (WoKaM, https://www.whymap.org) to confirm they are genuinely fed by karst systems. We provide information about the accuracy of the different datasets using a classification scheme that distinguishes (1) original datasets from research partners, collaborators and water boards, (2) datasets from national databases and (3) digitized datasets. For the latter, accuracy depends on several factors such as quality of plot on paper, length of time series, number of variables on plot, computer screen size, etc. Therefore, the digitized datasets were sub-classified accordingly. With this procedure, we collected over 300 karst spring discharge time series. Although most of our data points are located in the data-rich mid-latitudes, the data set also covers locations at higher latitudes in (semi-)arid areas and the (sub-)tropics. Our database will facilitate much easier access to karst data and we hope that it will greatly contribute to sustainably manage karst water resources in the future.