

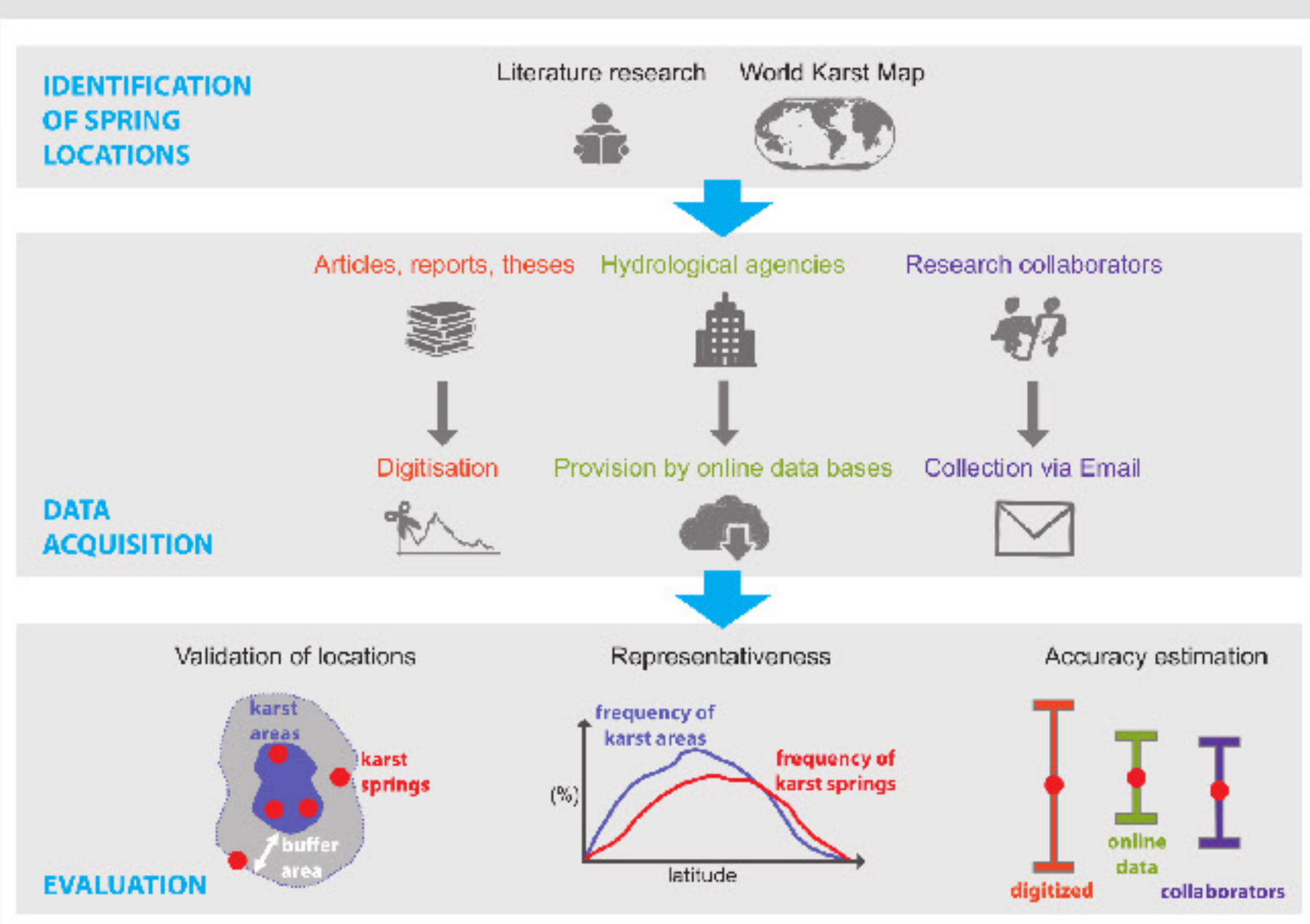
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Motivation

About 10% of the world's population gets drinking water from karst groundwater. Karst aquifers are highly vulnerable with complexities of slow and fast flowing groundwater. Many large-scale hydrological models and studies applied discharge datasets obtained from global databases such as GRDC and MOPEX that do not explicitly consider karst areas, and this may lead to unrealistic results in karst regions. Comparative knowledge about the hydrodynamic behaviour of karst systems is very limited as well.

Large number of time series of spring discharges are required to

initiate a comparative study of karst systems. With World Karst Spring (WoKaS) hydrograph database, we provide easy access to a large-sample of good quality karst spring discharge observation for wide range of applications.



Workflow for WoKaS database development

Data acquisition

Countries with carbonate rock outcrops were identified from the World Karst Aquifer Map (WOKAM). Spring discharge observations were collected from three sources:

Publications: Spring discharge hydrographs were extracted from articles, reports and thesis with webPlotDigitizer.

Research partners and collaborators: Data obtained from karst research community through data calls at conferences, emails and social media

Hydrological agencies: Automatic download routine code extracts (<https://github.com/KarstHub/WoKaS>) karst spring discharge time series from national hydrological databases' webpages directly. Manual data request in countries without online database

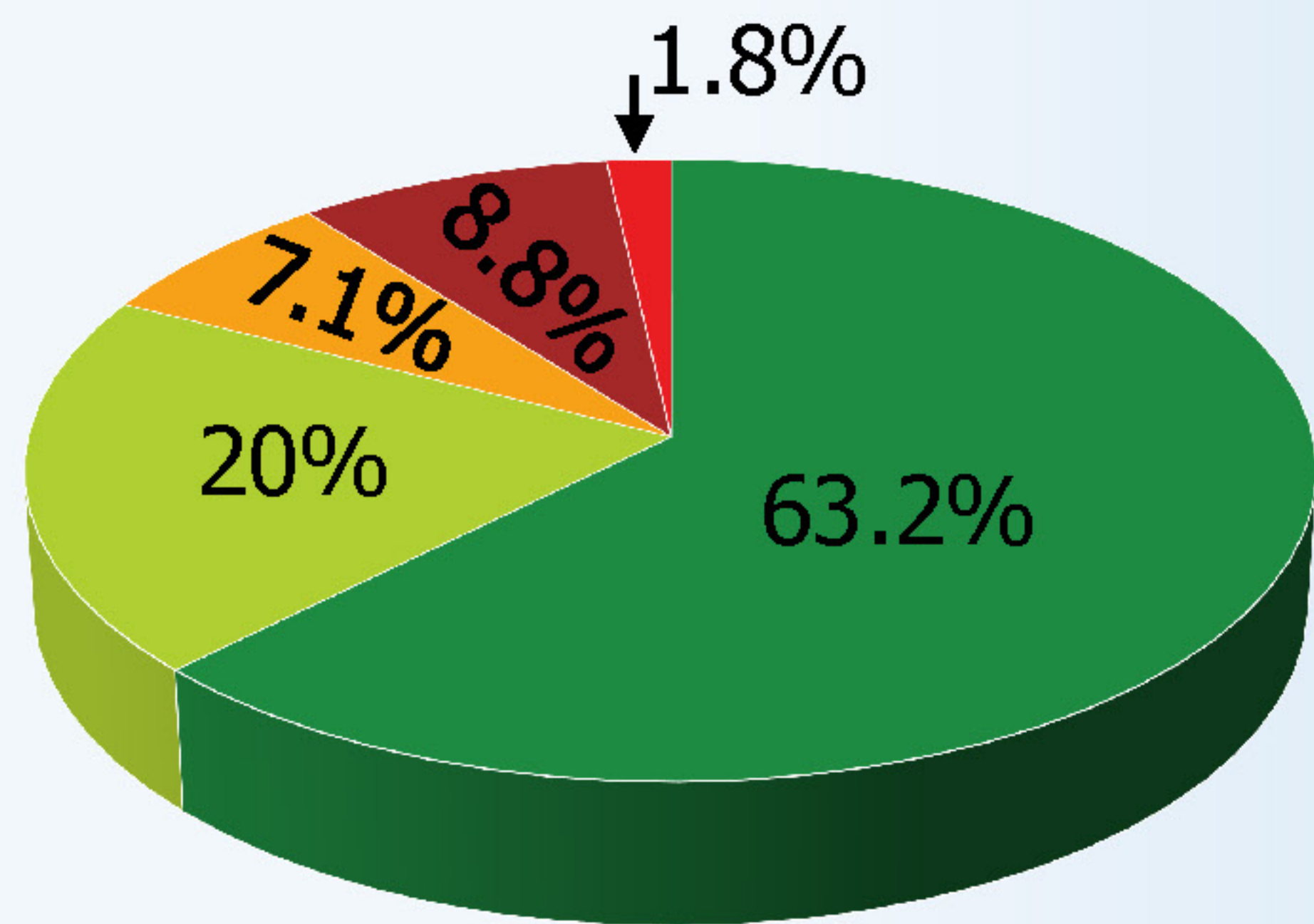
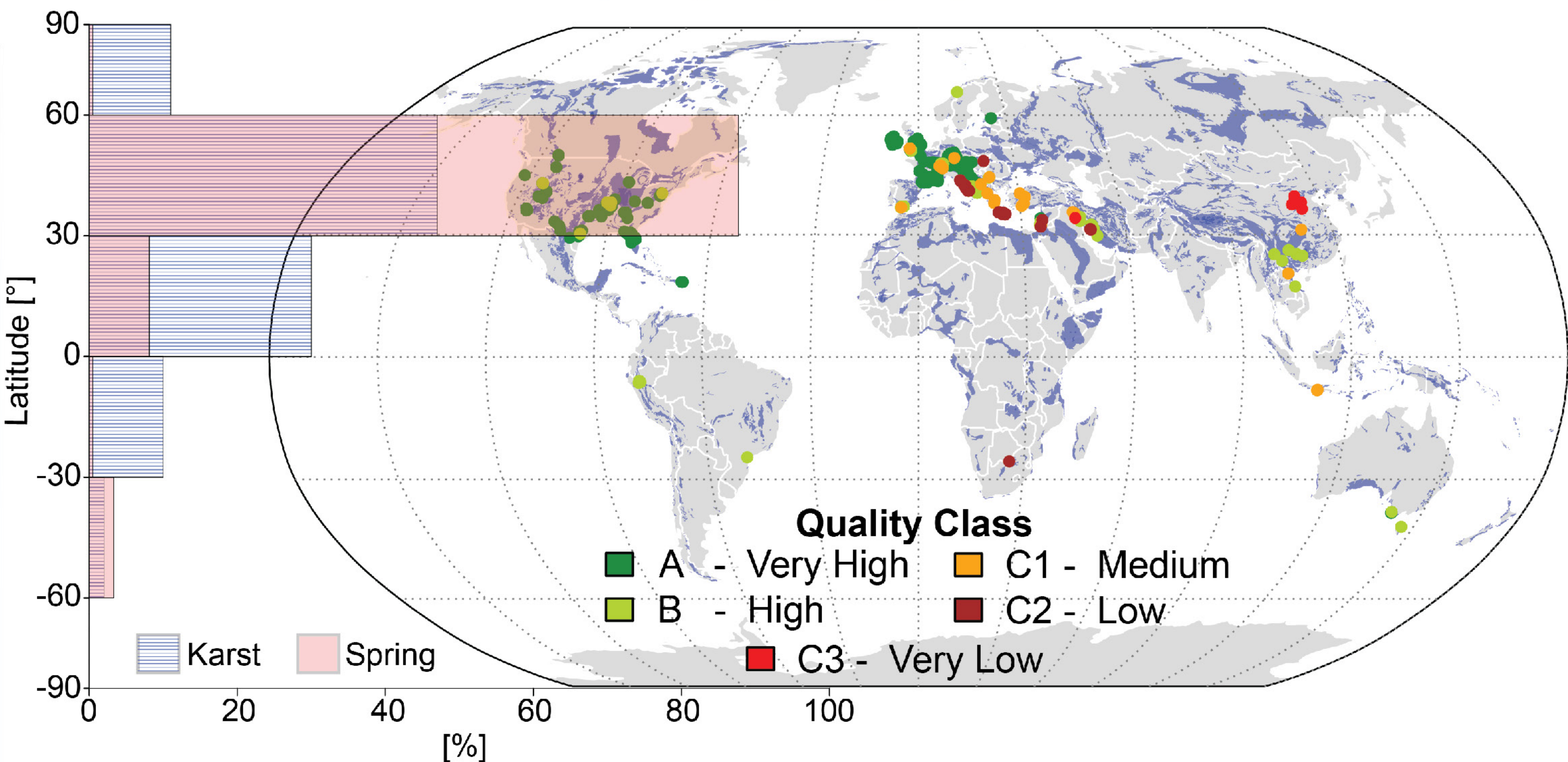
Technical validation

Collected datasets were evaluated by (i) determining the accuracy of the identified spring locations with respect to carbonate rock outcrop of WOKAM, (ii) determining the spatial representativeness of collected datasets for karst areas, and (iii) assigning quality flags

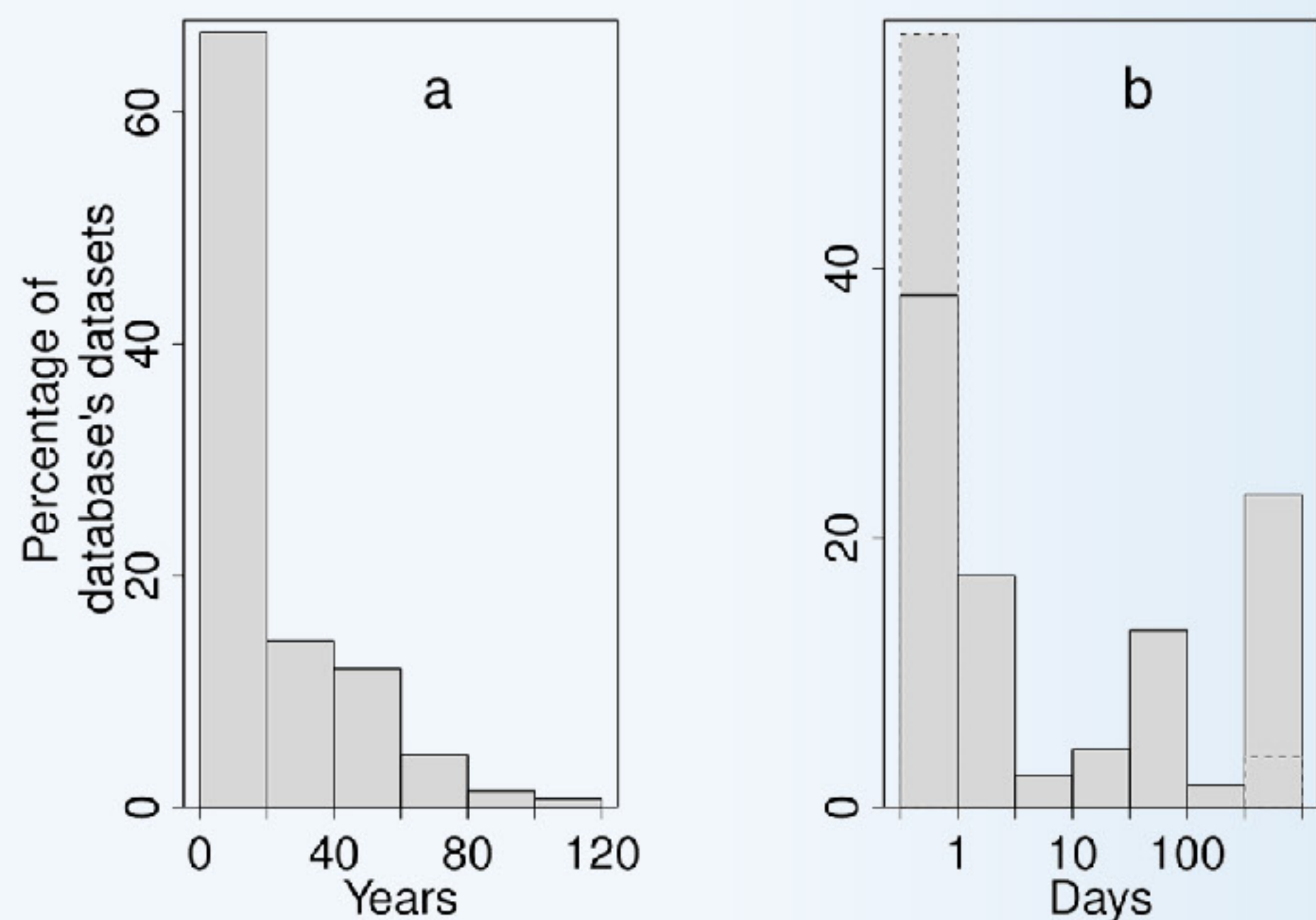
Data records

WoKaS database includes over 400 karst spring discharge observations from over 30 countries across the globe. The datasets are freely available at <https://doi.org/10.6084/m9.figshare.9638939>. Over 60% of the datasets have up to 20 years discharge observations. Approximately 40% or 60% of the datasets are available at daily or sub-daily temporal resolution depending on the CC-BY license fulfilment.

World Karst Spring hydrograph database



Distribution of WoKaS datasets by quality classes



Properties of WoKaS datasets

Outlook

The stationary WoKaS database (Olarinoye, T. *et al.* WoKaS database for research and management of the world's fastest-flowing groundwater: *2nd review Scientific Data*) will be upgraded through integration with web application platform for visualisation, further data uploads, fast download and instant statistical analysis.

Data usage

The "very high" and "high" quality datasets are appropriate for all hydrological analyses including model evaluation, calibration and statistical analyses. C1 datasets are suitable for trend analysis, event-based process understanding and water balance estimation. C2 and C3 quality class data are most suitable for analysis requiring less accuracy, such as computing annual averages or monthly spring discharge variations.