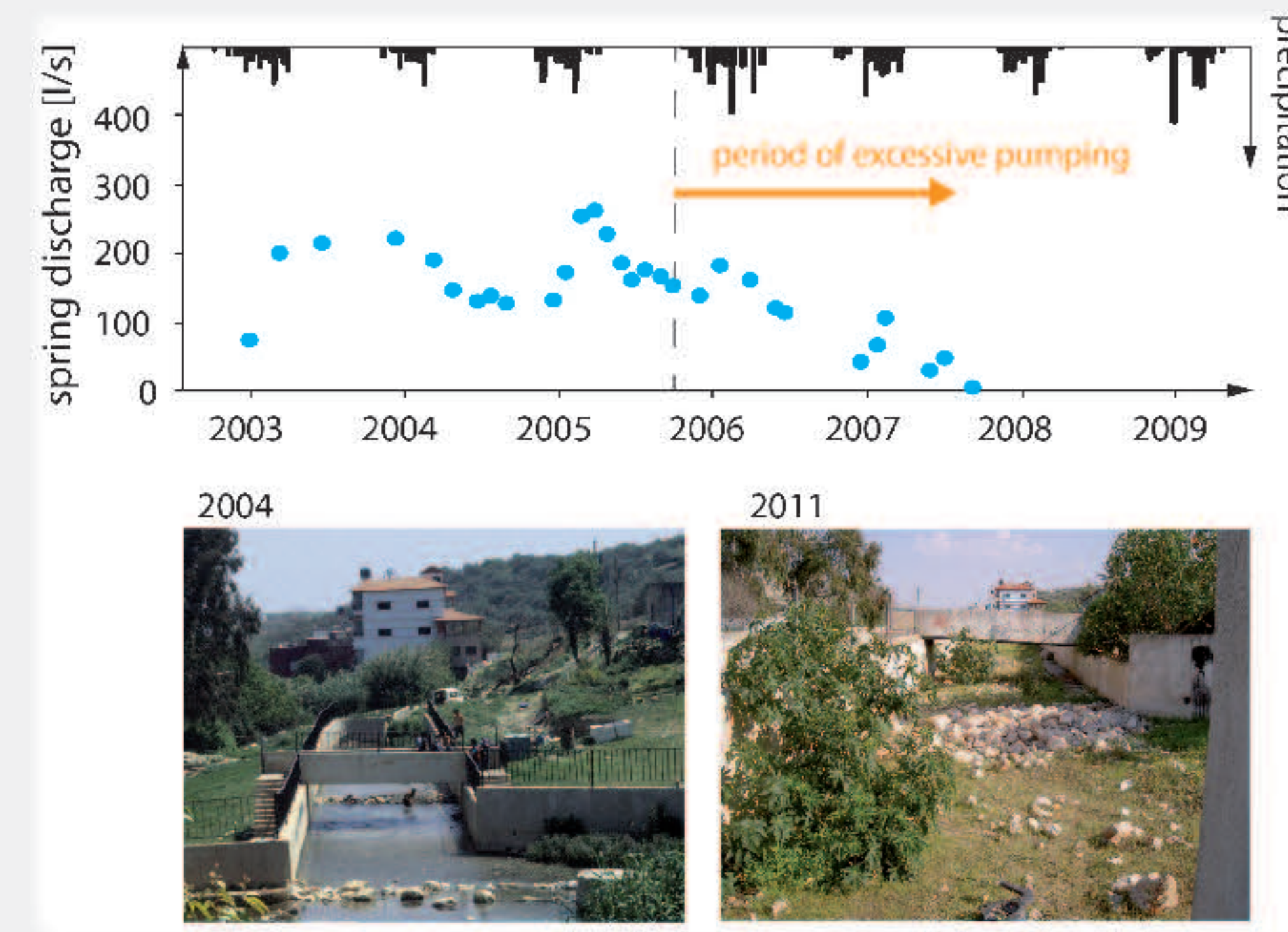


A database to assess impacts of land use and climate change at Europe's karst regions

Simon Brenner¹, Vera Marx¹, Andreas Hartmann^{1,2}

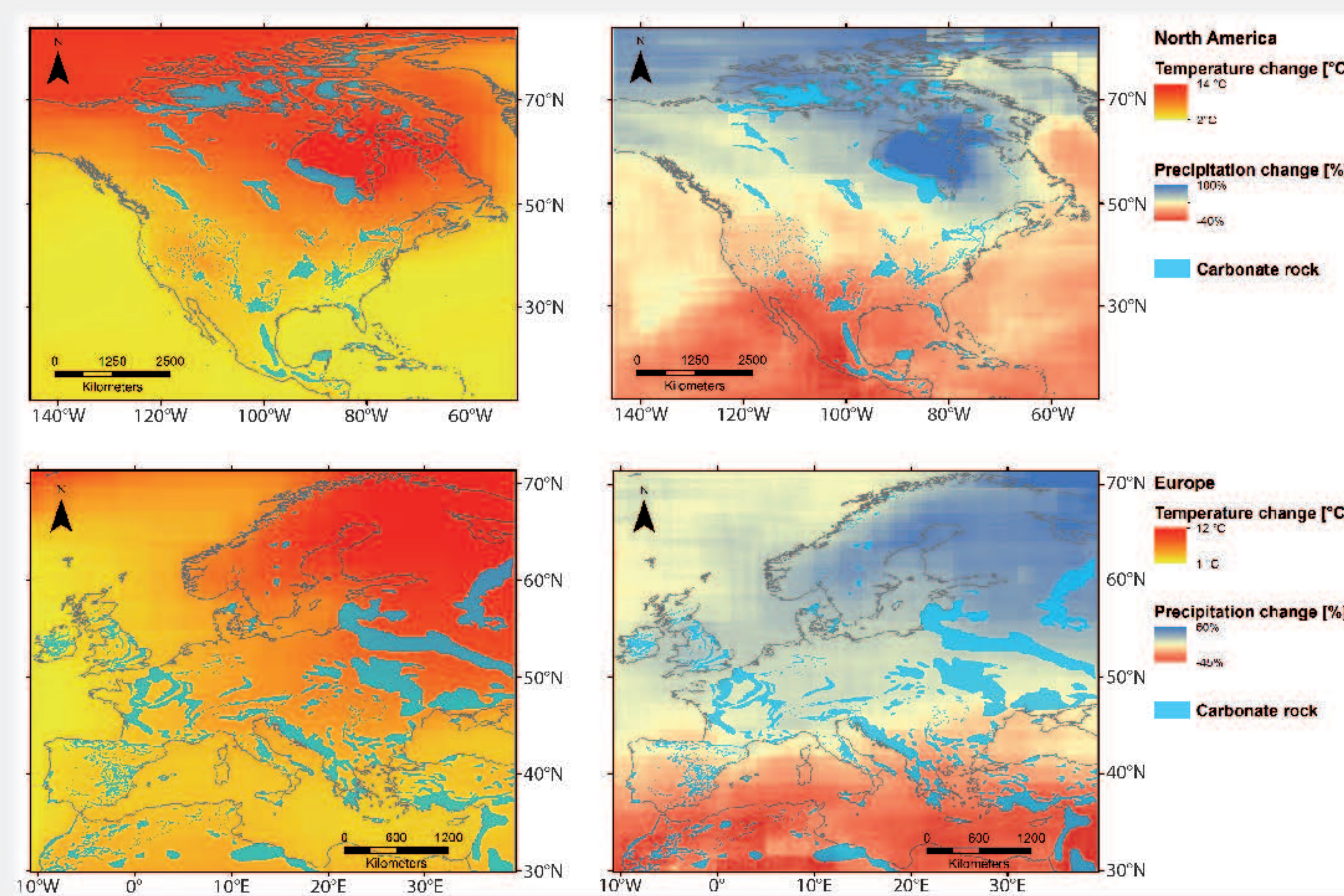
MOTIVATION

Around 11% of the earth's ice free land surface is composed of carbonate rock. Its high storage and infiltration capacities make it a preferred domain for groundwater abstractions. Lately, stress on groundwater resources increased significantly in terms of quantity, due to excessive irrigated agriculture, and in terms of quality, due to pollution by fertilizers. In the future, such problems will get even worse because of the increasing imbalances between freshwater supply, water consumption and population growth.



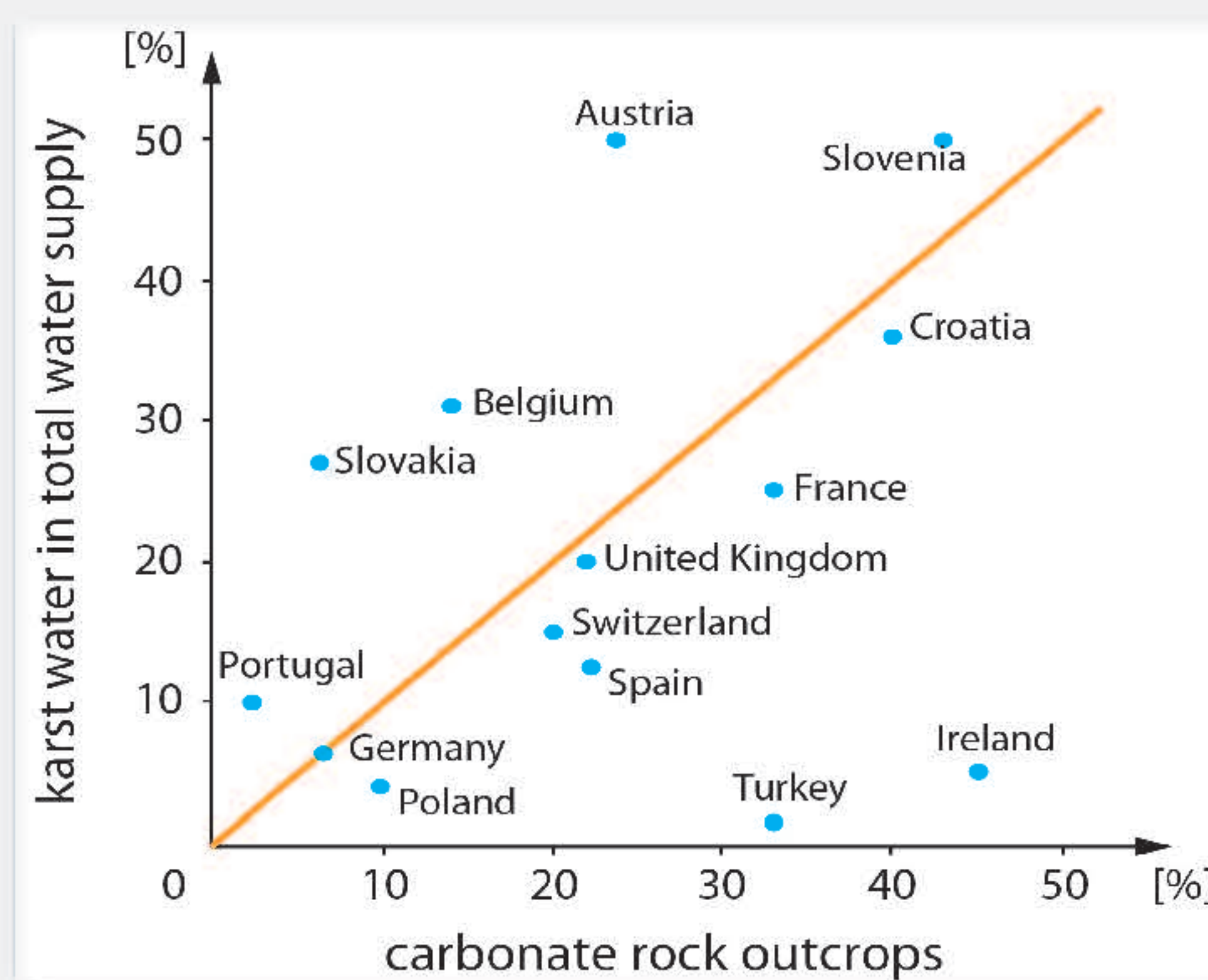
EXAMPLES

Projections of general circulation models suggest that an increase of temperature and a strong decrease in precipitation in most karst regions can be expected. How these changes will affect local or regional water availability in karst regions is still difficult to assess.



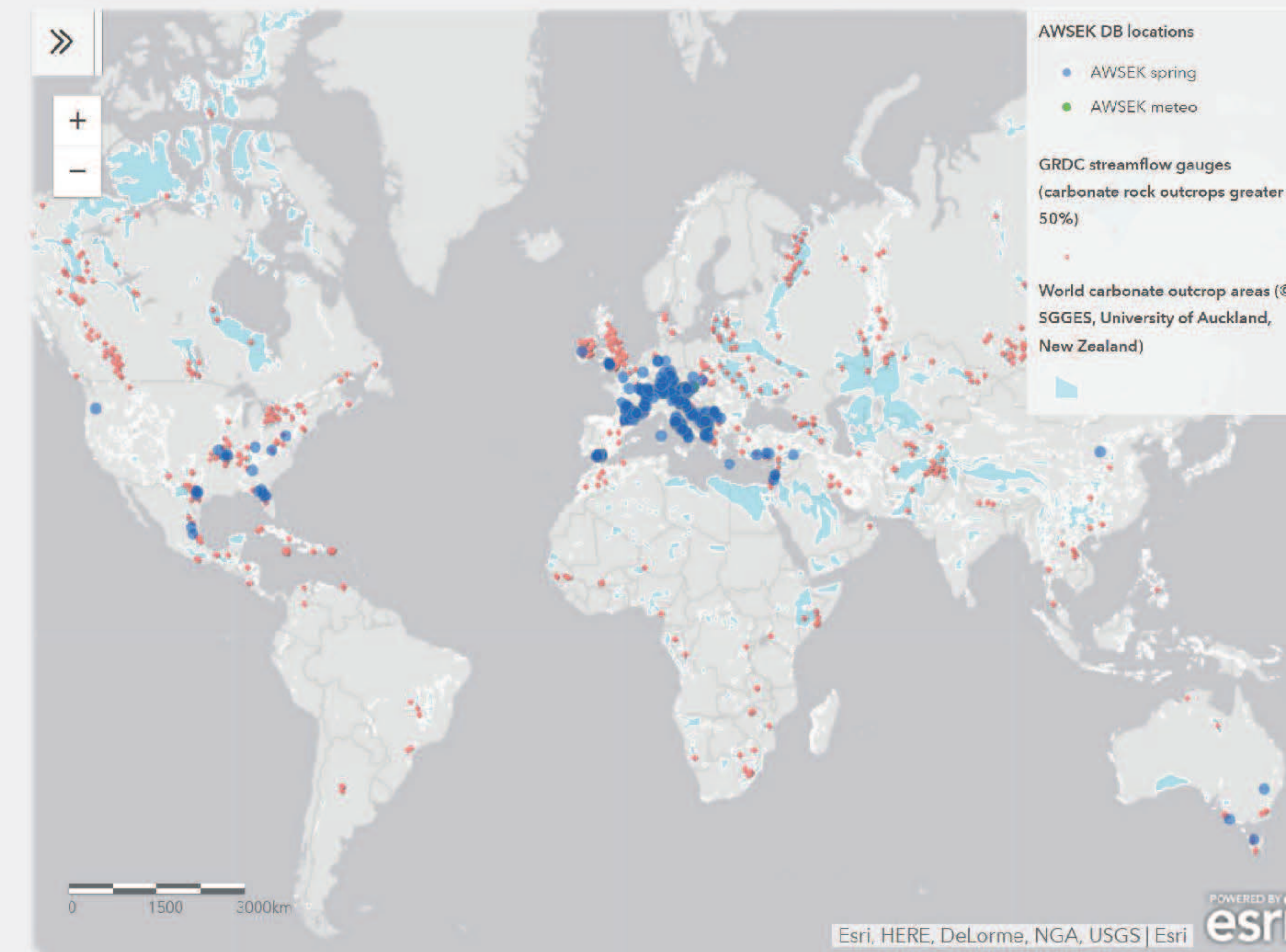
DIRECTIONS

Karst aquifers are important contributors of freshwater to national water supplies. Especially in Mediterranean and dry regions with strong rainfall seasonalities karst aquifers are a common source of fresh water. Considering the future pressure on karst water resources water suppliers and water management need regional predictions of future karst water availability and quality. **But an apparent lack of information to parameterise and evaluate regional scale models still prohibits model applications larger than single aquifer systems.**



A MAP FULL OF METADATA

The aim of this project is to review the apparent lack of data. In 2015 and 2016 a catalog and a map with metadata of all data related to karst hydrology has been established and published online. In addition to the location of the data, meta information about its type (e.g. discharge, water quality, etc.) are provided, and the name and contact information of the research group possessing the data. **Therefore, the metadata map will facilitate data acquisition for regional studies and future scientific collaborations.**



www.subsurface-heterogeneity.com --> Projects --> Karst data base

Villanueva del Rosario	
Identificator	ES-0016
Name	Villanueva del Rosario
Location type	AWSEK spring
Research Group	Department of Geology, Centre of Hydrogeology of the University of Malaga (CEHUMA), 29071 Malaga, Spain
Elevation (m a.s.l)	770
Latitude	36.98
Longitude	-4.35
Recharge Area (square km)	13.85
Mean Annual Discharge (cubic m per s)	0.26
Mean Annual Precipitation (mm)	760
Mean Annual Temperature (°C)	14
Mean Annual Recharge (mm)	
Mean Annual PET (mm)	
Vegetation	scant vegetation of the Mediterranean type

Please contact Simon Brenner if you would like to be listed in the map.
simon.brenner@hydrology.uni-freiburg.de

A FULL DATABASE

A future goal building up on the meta database could be a full data base used by the entire karst community. An example for such a database is provided below using AQUARIUS - Time Series which is a database software to archive large sets of water data of karst systems (used by USGS and others).

Locations in AQUARIUS

Location Identifier	Location Name	Location Type	Folder
ES-0015	Yedra	AWSEK spring	Alta Cadena
ES-0026	Villanueva del Rosario meteo	AWSEK meteo	Alta Cadena
ES-0016	Villanueva del Rosario	AWSEK spring	Alta Cadena
ES-0006	Verde	AWSEK spring	Yunque-Nieves
ES-0014	Torremolinos	AWSEK spring	Sierra de Mijas
ES-0028	Rosario la Vina	AWSEK meteo	Alta Cadena
ES-0017	Pita	AWSEK spring	Alta Cadena
ES-0004	Pileta	AWSEK meteo	Sierra de Libar
ES-0018	Parraso	AWSEK spring	Sierra de Mijas
ES-0013	Ojen	AWSEK spring	Sierra de Mijas
ES-0012	Marbella	AWSEK spring	Sierra de Mijas
ES-0010	Llanos de Pozuelo	AWSEK meteo	Sierra de Libar
ES-0008	Jorox	AWSEK spring	Yunque-Nieves
ES-0003	Jimera de Libar (Spring S-3)	AWSEK spring	Sierra de Libar
ES-0011	Istan	AWSEK spring	Sierra de Mijas
ES-0007	Grande	AWSEK spring	Yunque-Nieves
ES-0005	Genal	AWSEK spring	Yunque-Nieves
ES-0020	Fuencanta	AWSEK spring	Sierra Blanca
ES-0019	El Burgo	AWSEK spring	Sierra Blanca
ES-0001	Cueva del Gato (Spring S-1)	AWSEK spring	Sierra de Libar
ES-0025	Cortijo de Jobo	AWSEK meteo	Alta Cadena
ES-0027	Colmenar, Casapalma	AWSEK meteo	Alta Cadena
ES-0009	Charco del Moro (Spring S-4)	AWSEK spring	Sierra de Libar

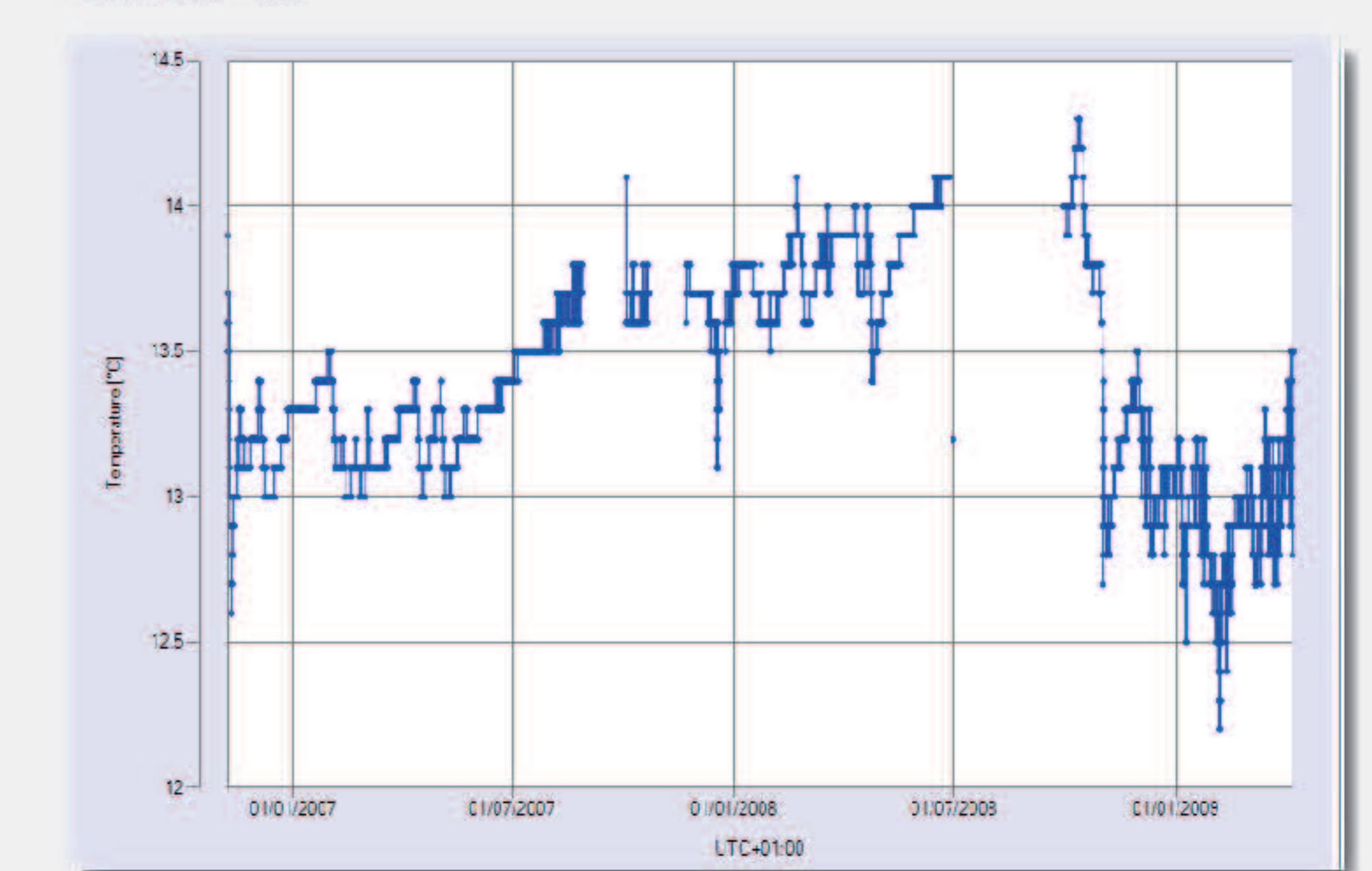
Location attributes

ES-0016 - Villanueva del Rosario	
Identifier:	ES-0016
Name:	Villanueva del Rosario
Type:	AWSEK spring
Source:	AQUARIUS Location
Description:	Position accuracy: high
Position:	Geo Datum: WGS 84
Latitude:	36.98493
Elevation:	770
Longitude:	-4.354944
Time Zone:	CET (UTC+01:00)

Additional attributes:

Geology	Mean Annual Recharge
Landuse	Mean Annual PET
Recharge Area	Vegetation
Mean Annual Discharge	Catchment Area
Mean Annual Precipitation	Koepfen-Geiger
Mean Annual Temperature	Research Group

Charts



Data sets can be queried and selected based on locations' attributes (e.g. catchment area > 500 km²). They can then be exported directly to tables or charts for further processing.

Data sets

Data Set Id	Description	First Measurement	Last Measurement
# Discharge.Continuous.Measurements@ES-0016		03/03/1977 00:00	01/06/2010 00:00
# Discharge.PHO@ES-0016		08/11/2006 00:00	25/03/2009 00:00
# Discharge.Single.Measurements@ES-0016		15/01/1904 00:00	19/05/2010 00:00
# Temperature.Monitored@ES-0016		07/11/2006 14:55	08/04/2009 08:41
# Water Cond.Monitored@ES-0016		07/11/2006 14:55	08/04/2009 08:41

SYNTHESIS

To answer many of the relevant questions for future karst water supply more comparative and regional studies are necessary. **This is only possible if we make most of the available data by sharing it with our research community.**