An EU-wide citizen science network to monitor hydrological conditions in intermittent rivers and ephemeral streams

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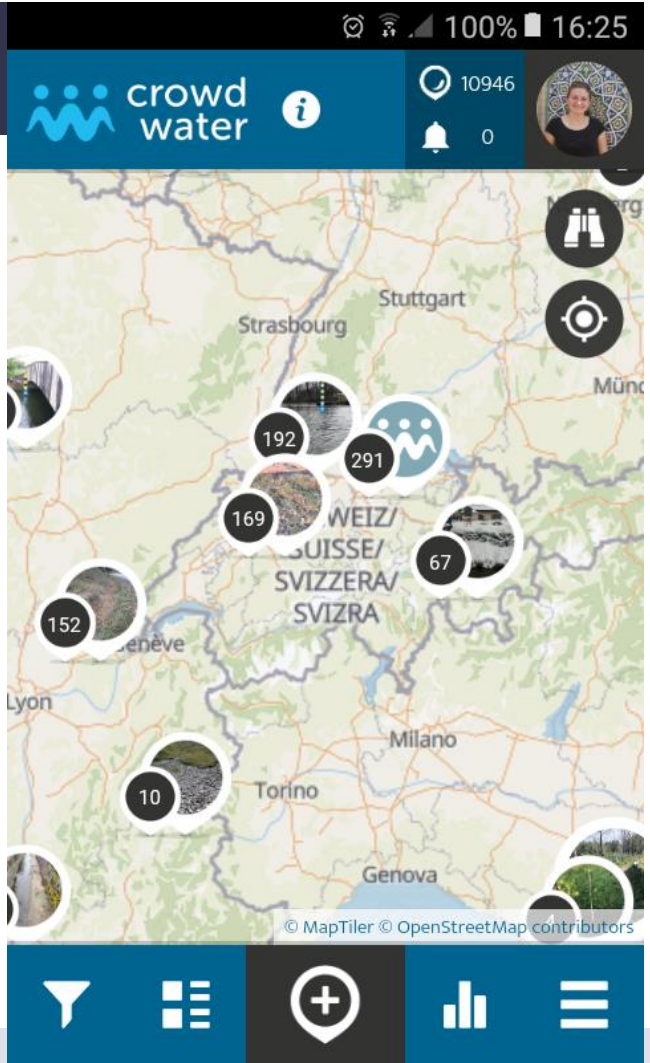
Rationale

- Intermittent rivers and ephemeral streams are very common but are rarely gauged.
- Citizen science and crowdsourcing provide a way to obtain data at many different locations.
- This requires easy methods to describe the state of intermittent rivers and ephemeral streams

- Here we describe the SMIRES-CrowdWater initiative, which started in April 2019

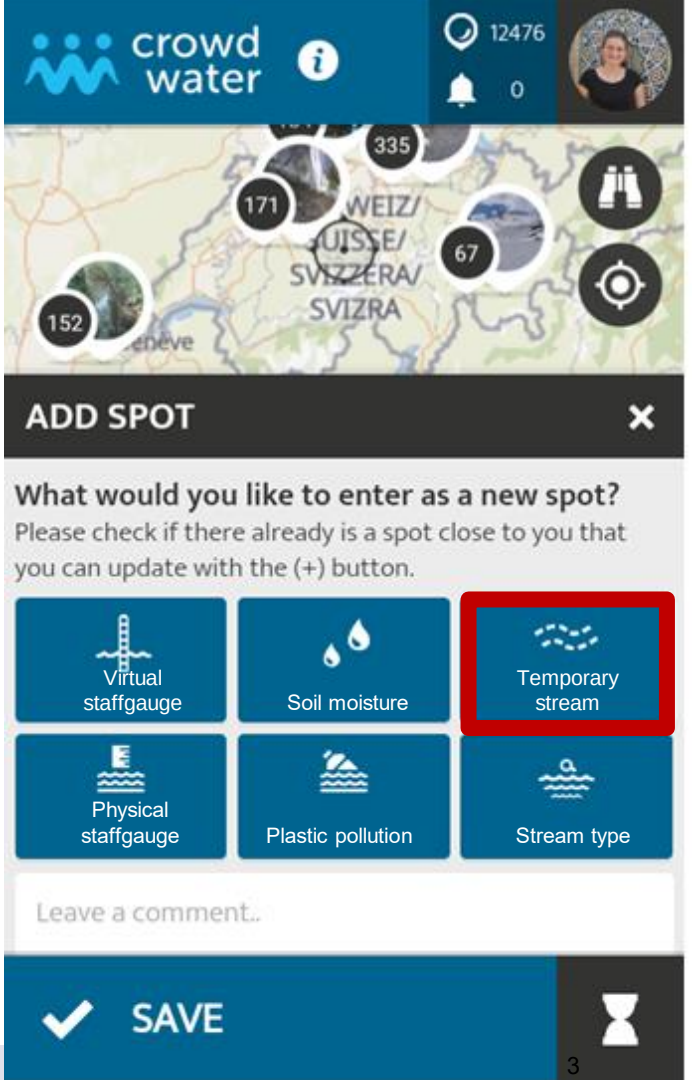


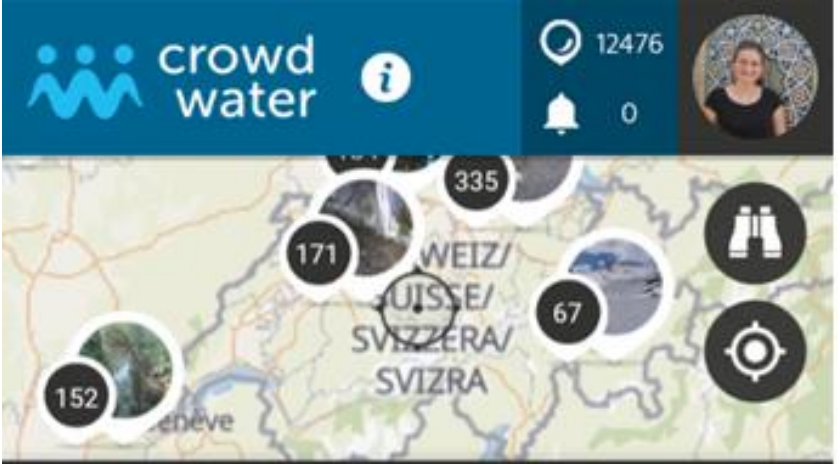
The CrowdWater app

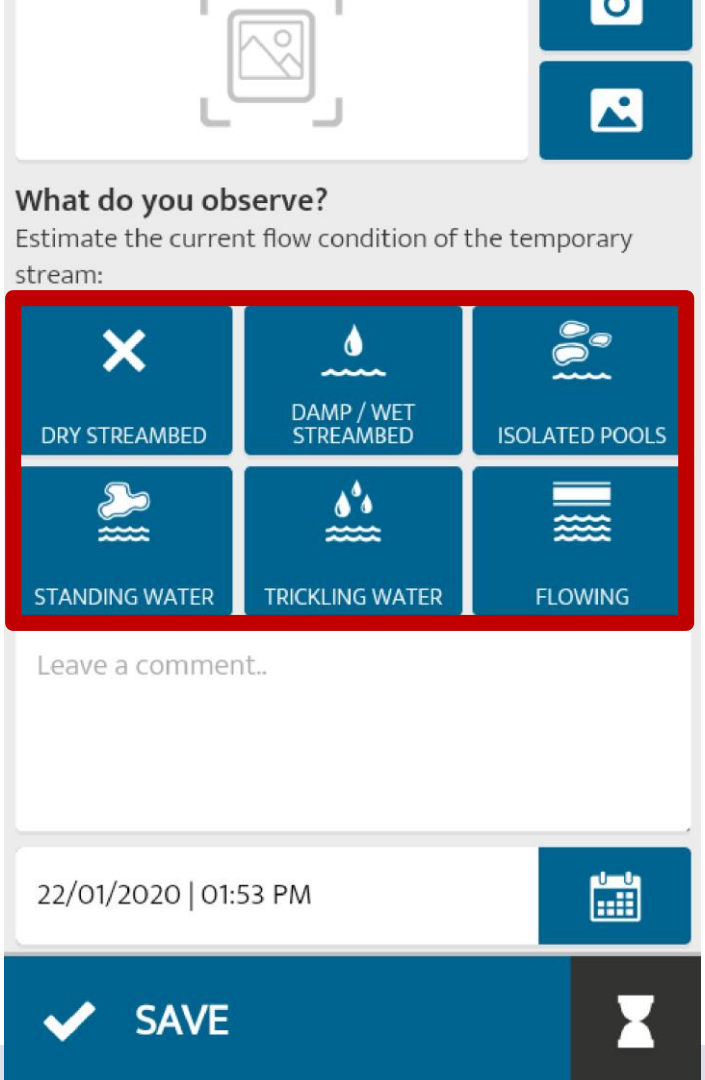
- Free – for android and iOS
- In different languages

- Different types of data
  - Water level class
  - Soil moisture
  - **Temporary streams**
  - Plastic pollution
  - New:
    - Water level
    - Description of streams

- www.CrowdWater.ch



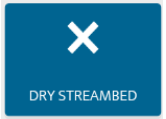




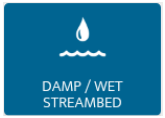
The app

6 categories to report the state of a temporary stream

Intermittent stream categories



Dry streambed: no visible water and the streambed is dry



Wet streambed: no visible water, but the streambed is wet (for at least 2 cm depth below the surface)

Isolated pools: separated pools of water that are not visibly flowing are present on the streambed

Standing water: water but no visible flow

Trickling water: very small flow, but clearly visible flowing water

Flowing water: a continuous pathway of water that is flowing

Some statistics (28.04.2020)

- **All app categories**
  - Since April 2017
  - 12’530 observations
    - 2’857 locations
      - 173 ≥ 10 observations
    - 602 participants
      - 109 ≥ 10 observations

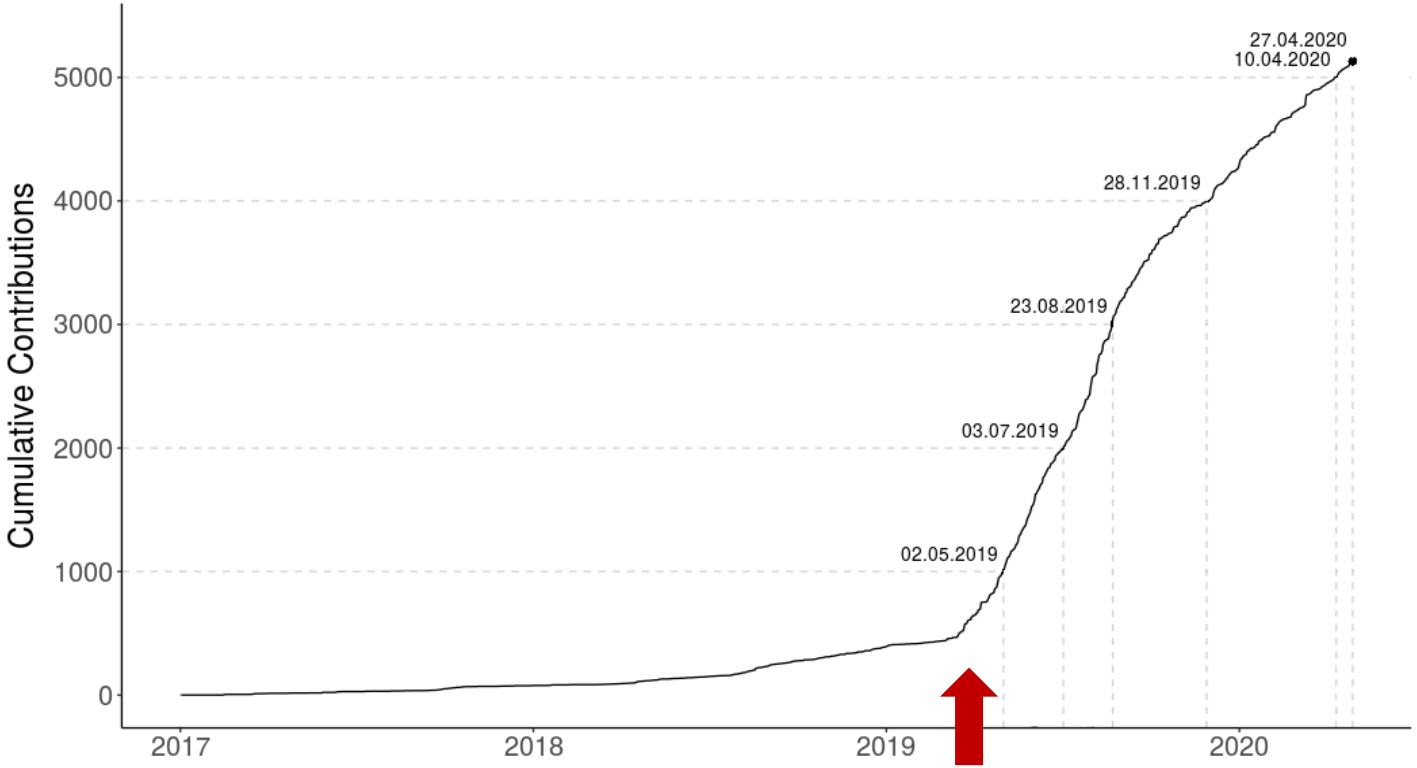
- Data are freely available

Some statistics (28.04.2020)

- **Temporary stream category**
  - Since April 2017
  - 5’137 observations
    - 1’541 locations
      - 85 ≥ 10 observations
    - 164 participants
      - 51 ≥ 10 observations

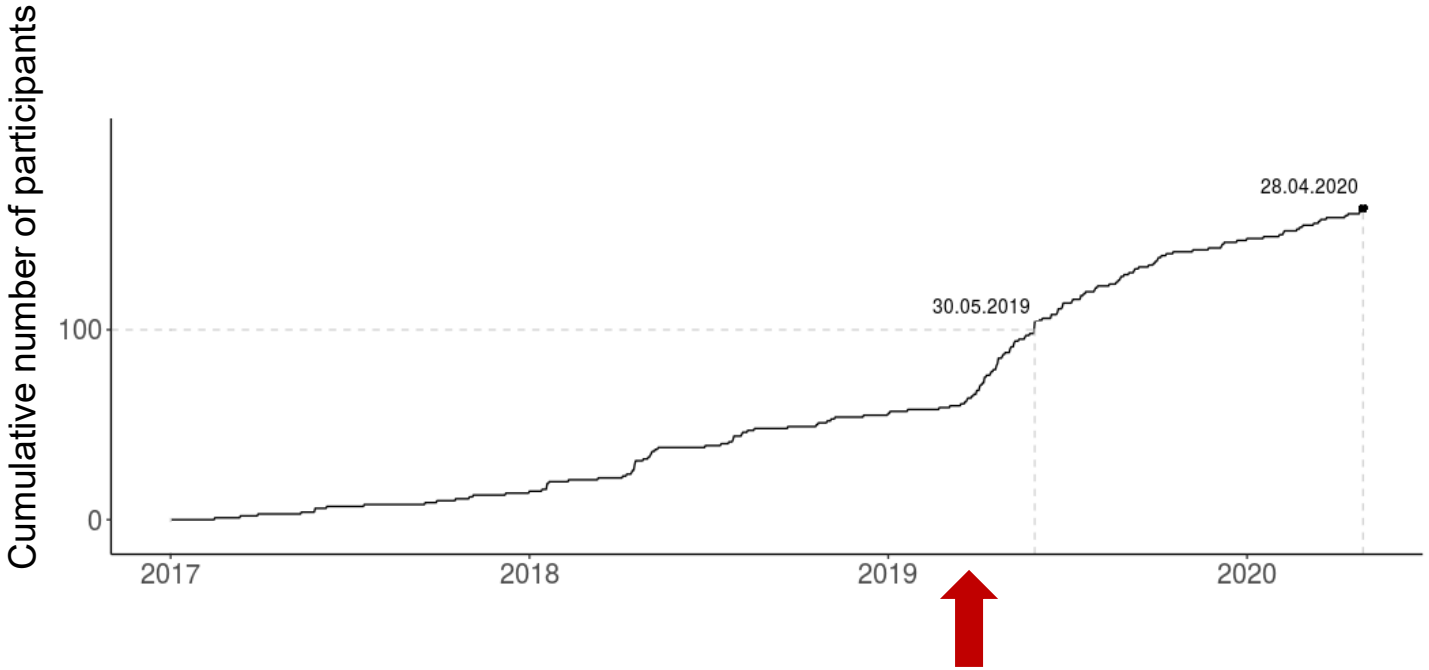
- Data are freely available

Number of contributions for the temporary stream category



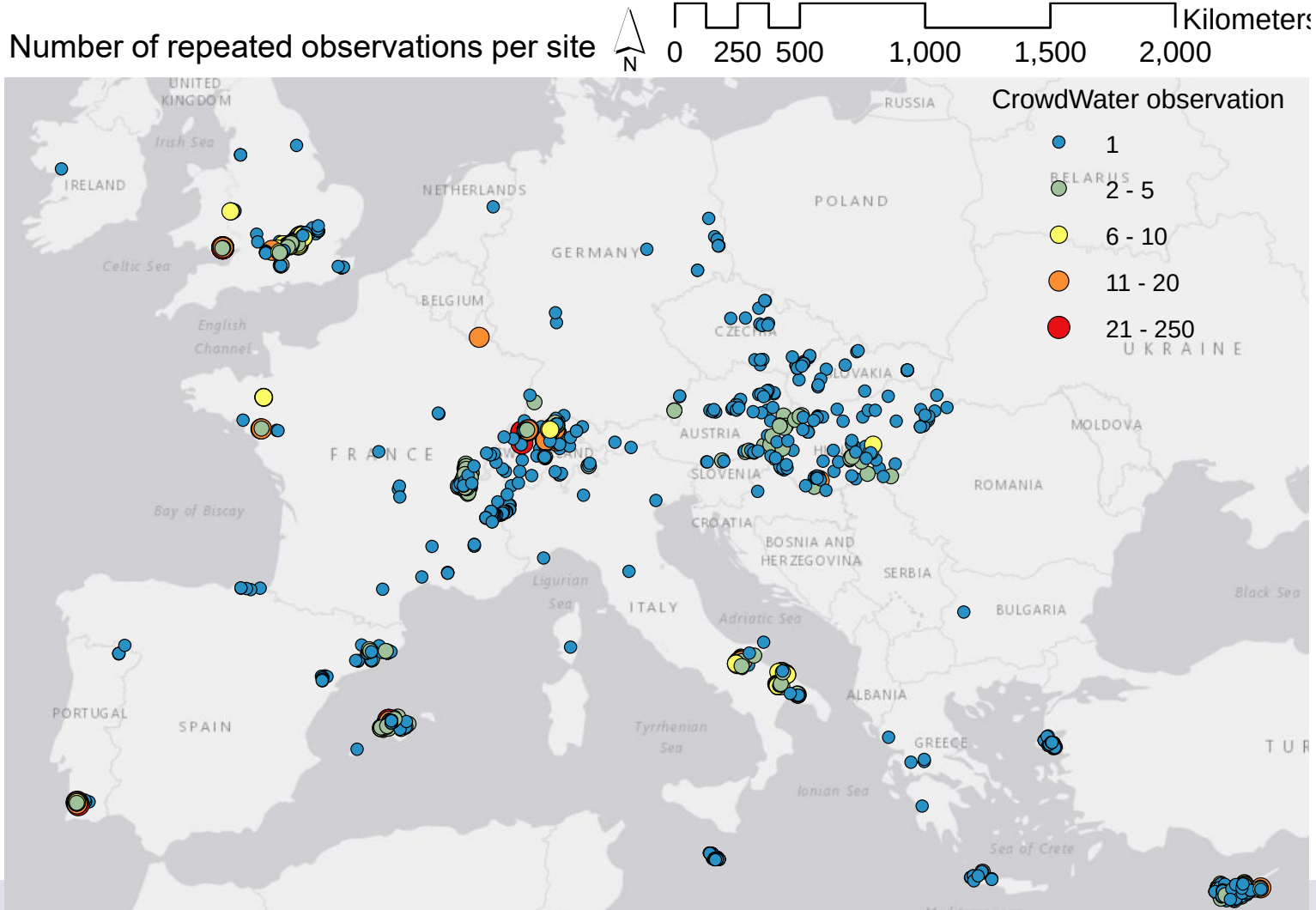
The Smires – CrowdWater initiative started in April 2019 and resulted in a large increase in the number of intermittent stream observations

Number of participants for the temporary stream category

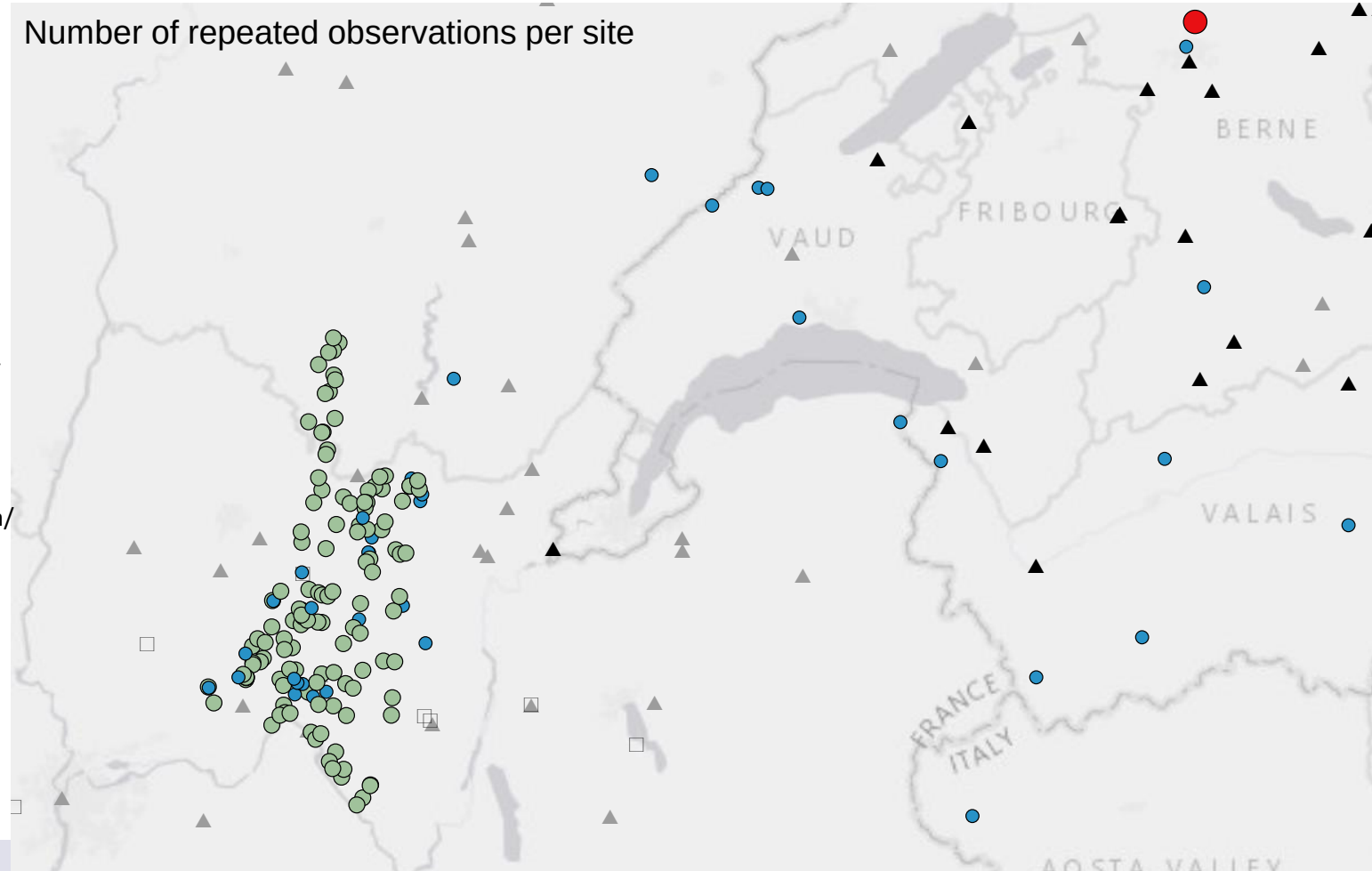


The Smires – CrowdWater initiative started in April 2019 and resulted in an increase in the number of participants who record the state of temporary streams

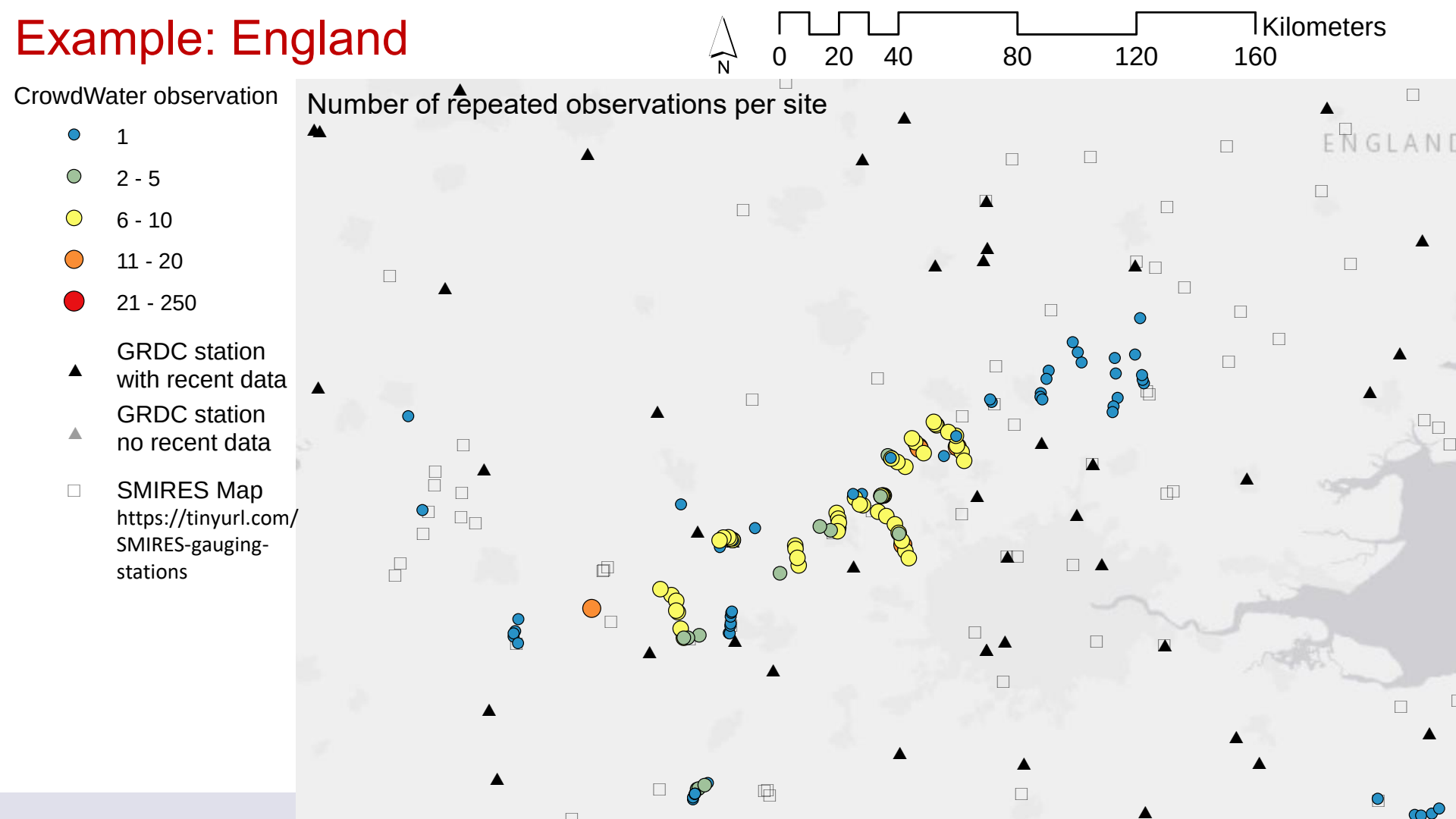
Putting intermittent streams on the map



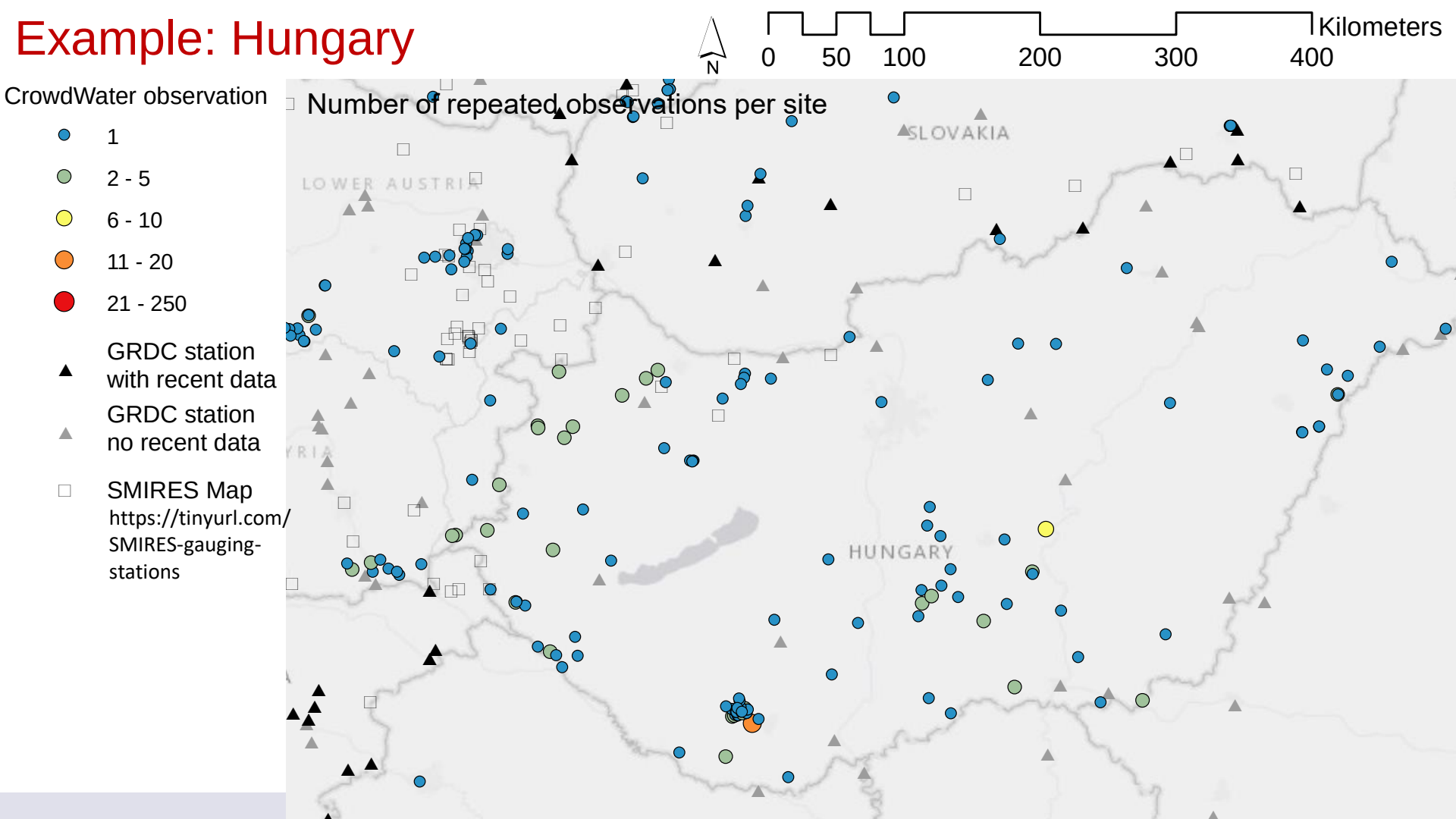
Example: French Alps



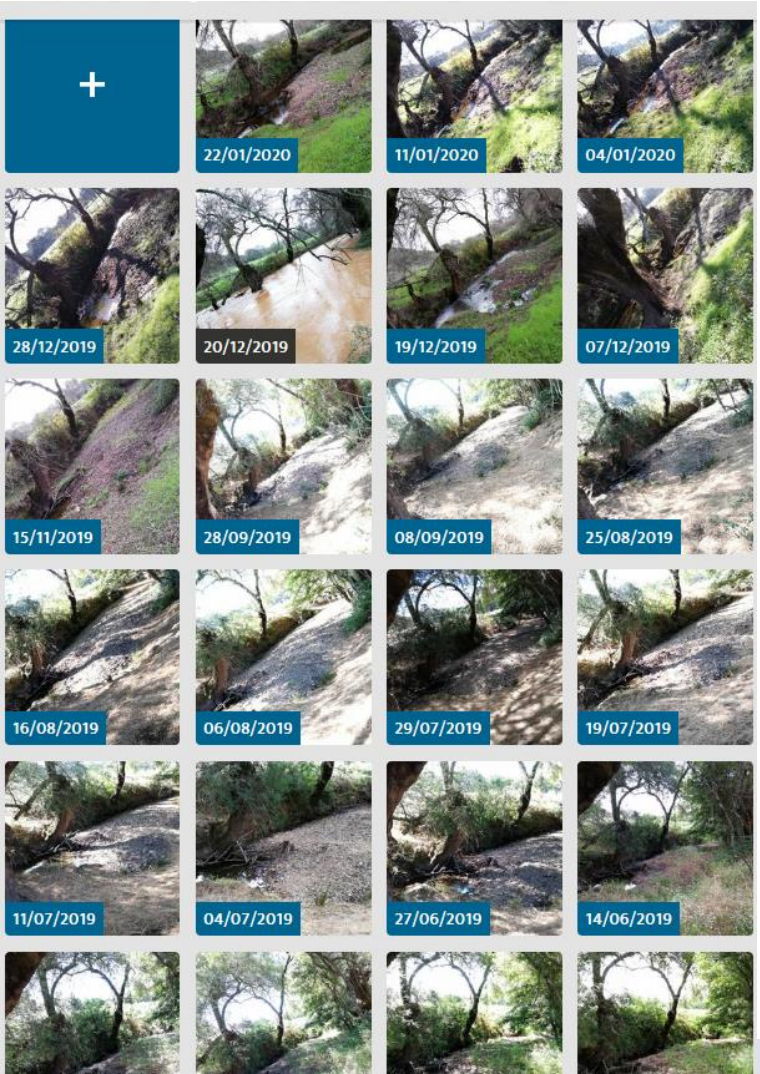
Example: England

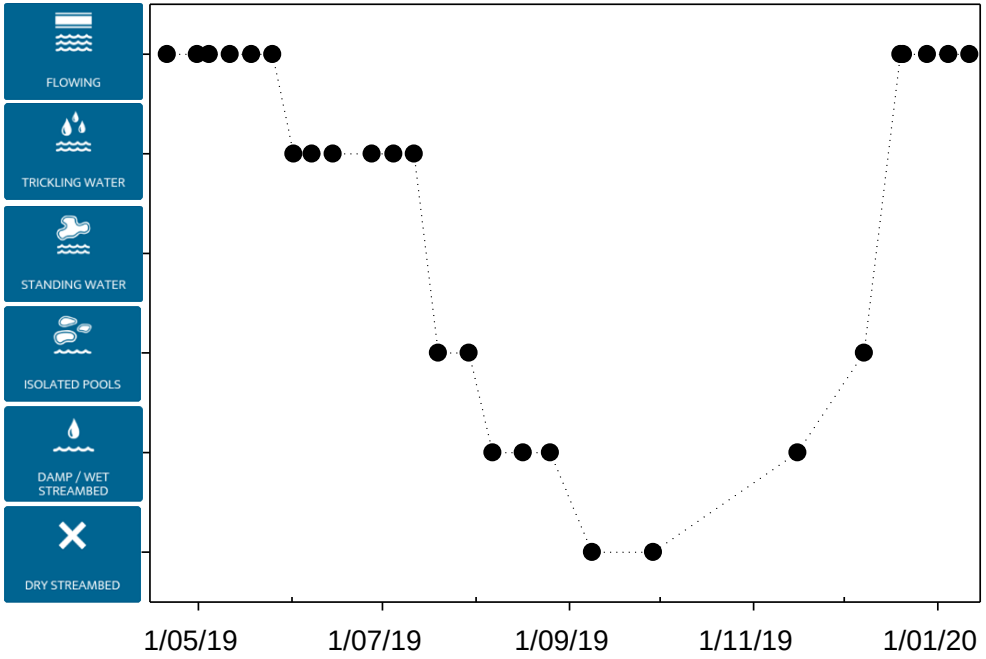


Example: Hungary



Example:
temporal variation Portugal





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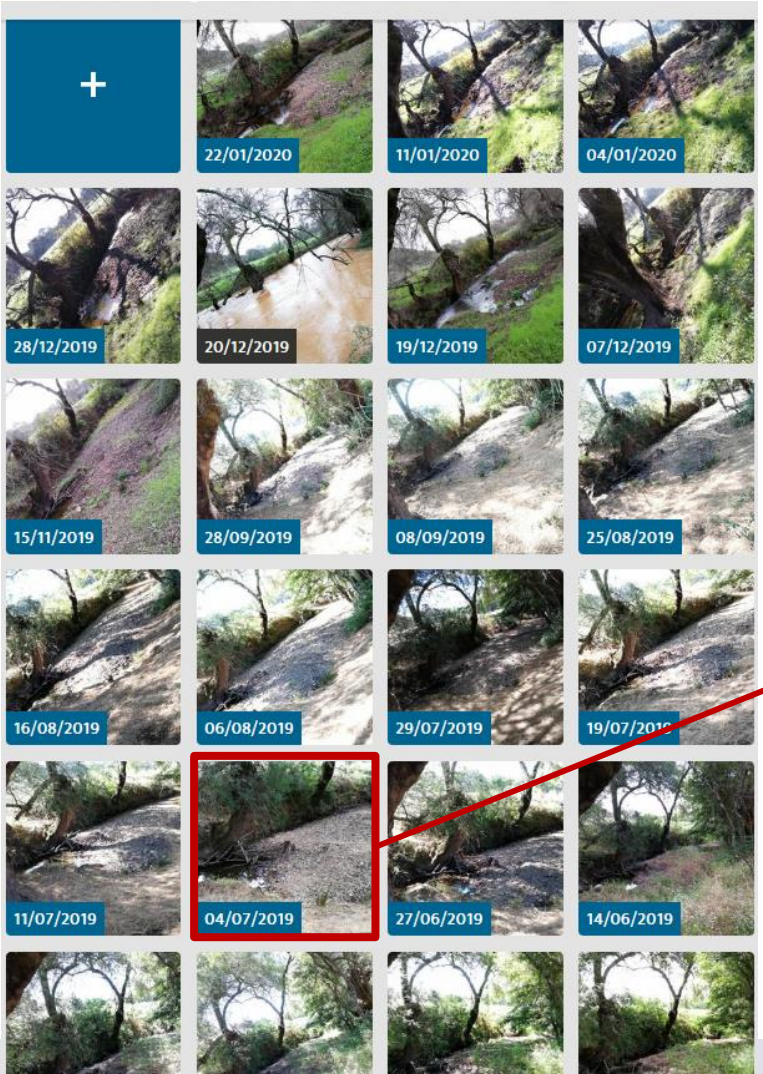

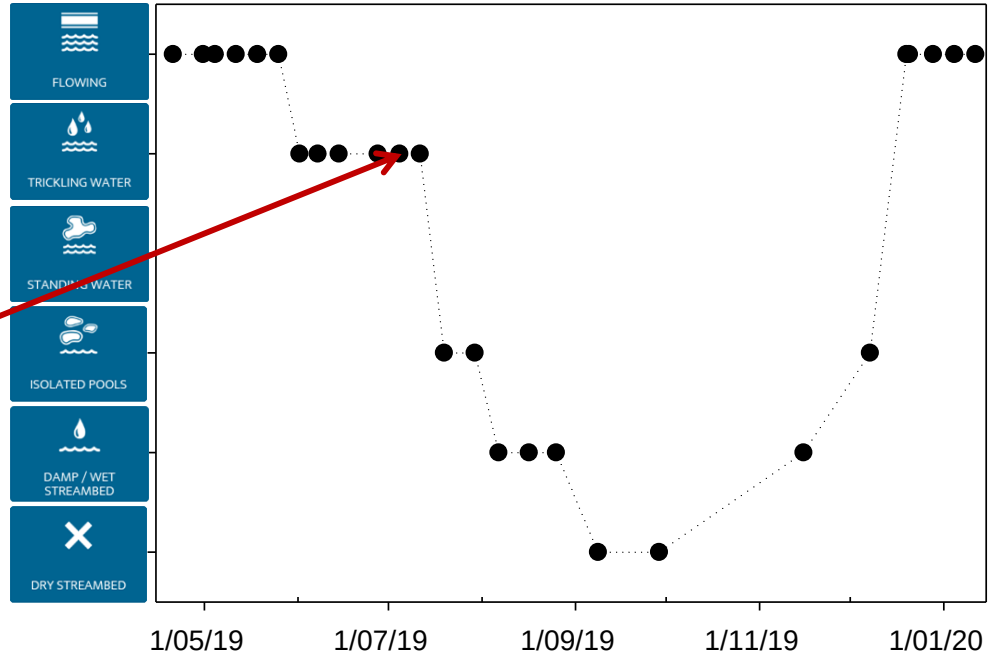

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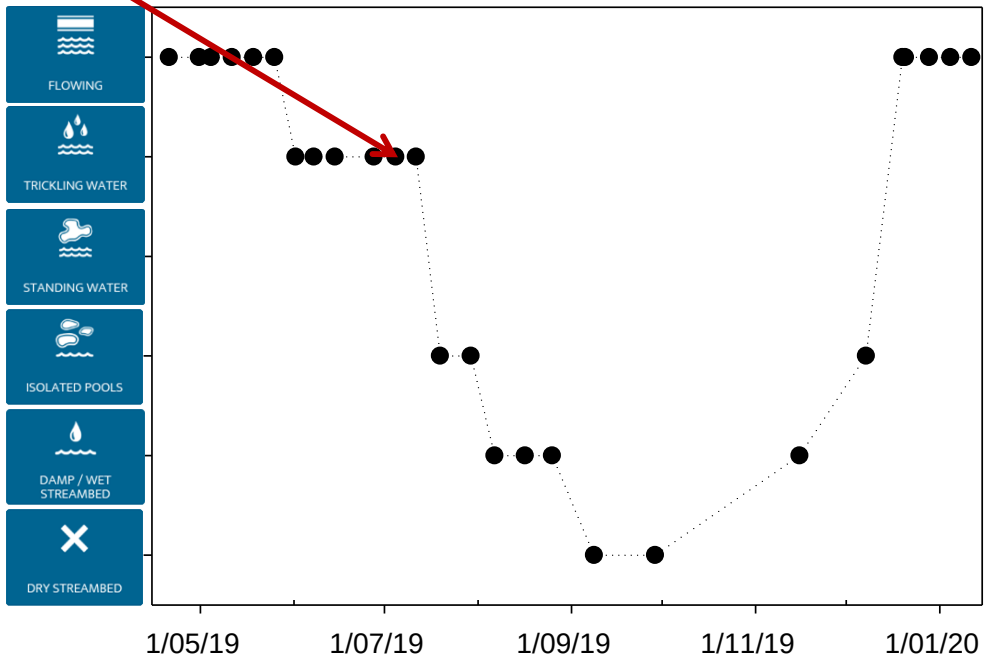

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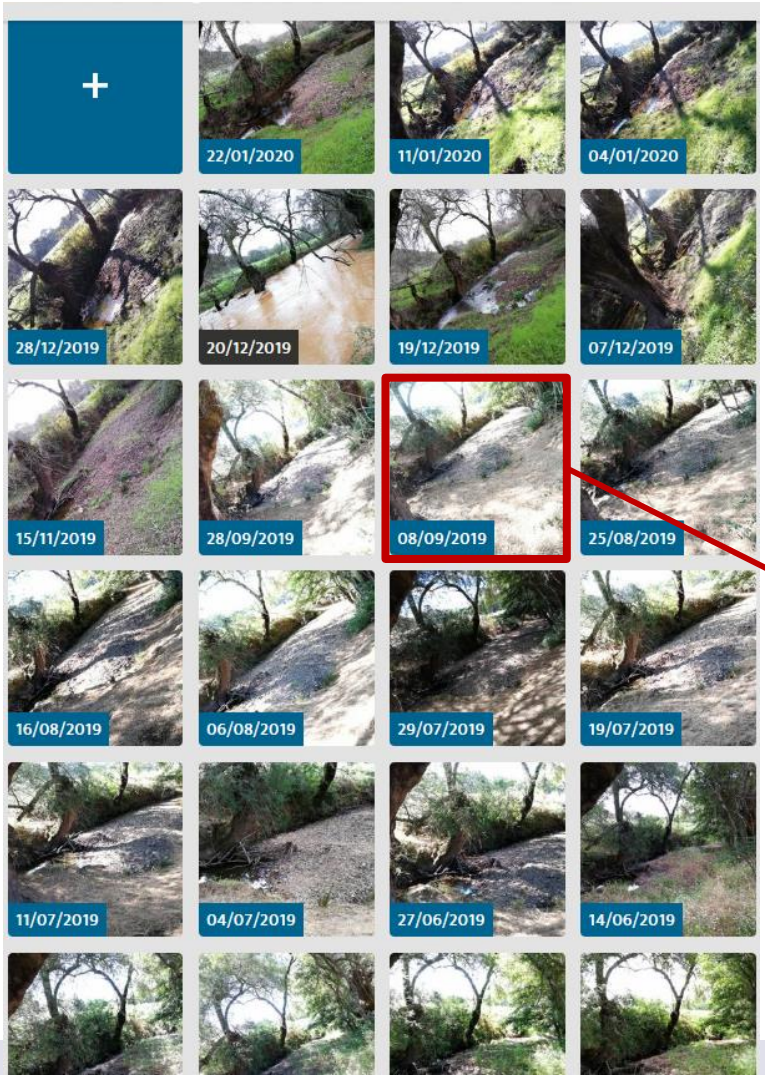
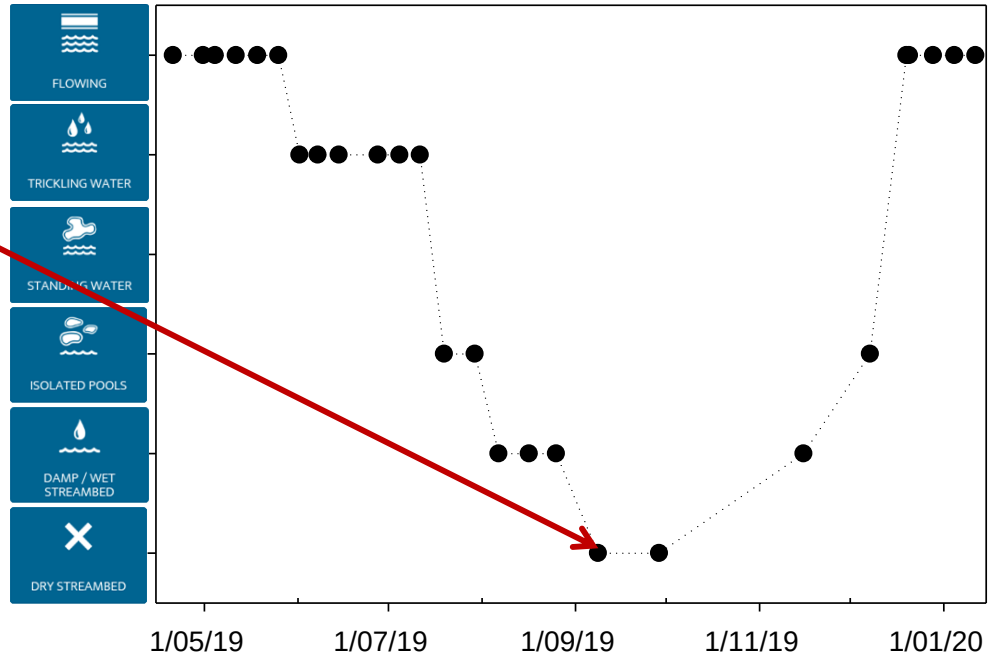
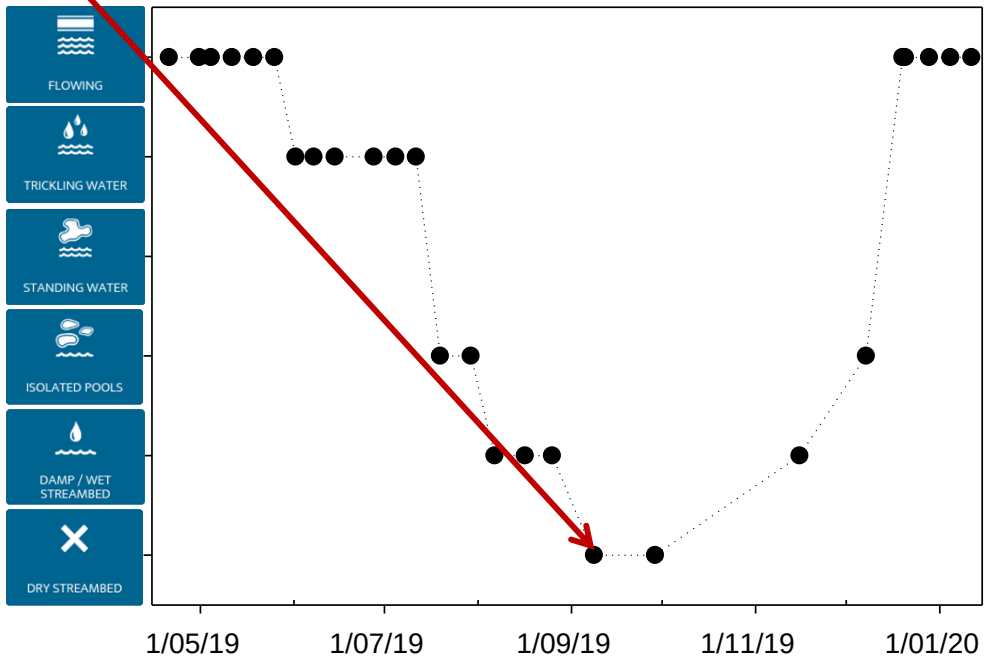




Example:
temporal variation Portugal



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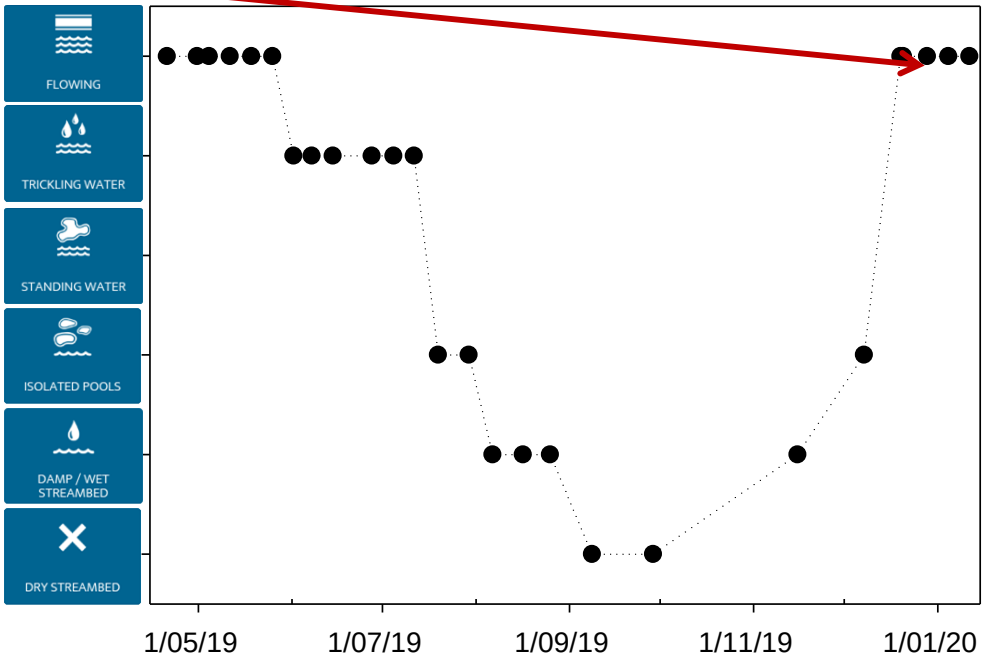
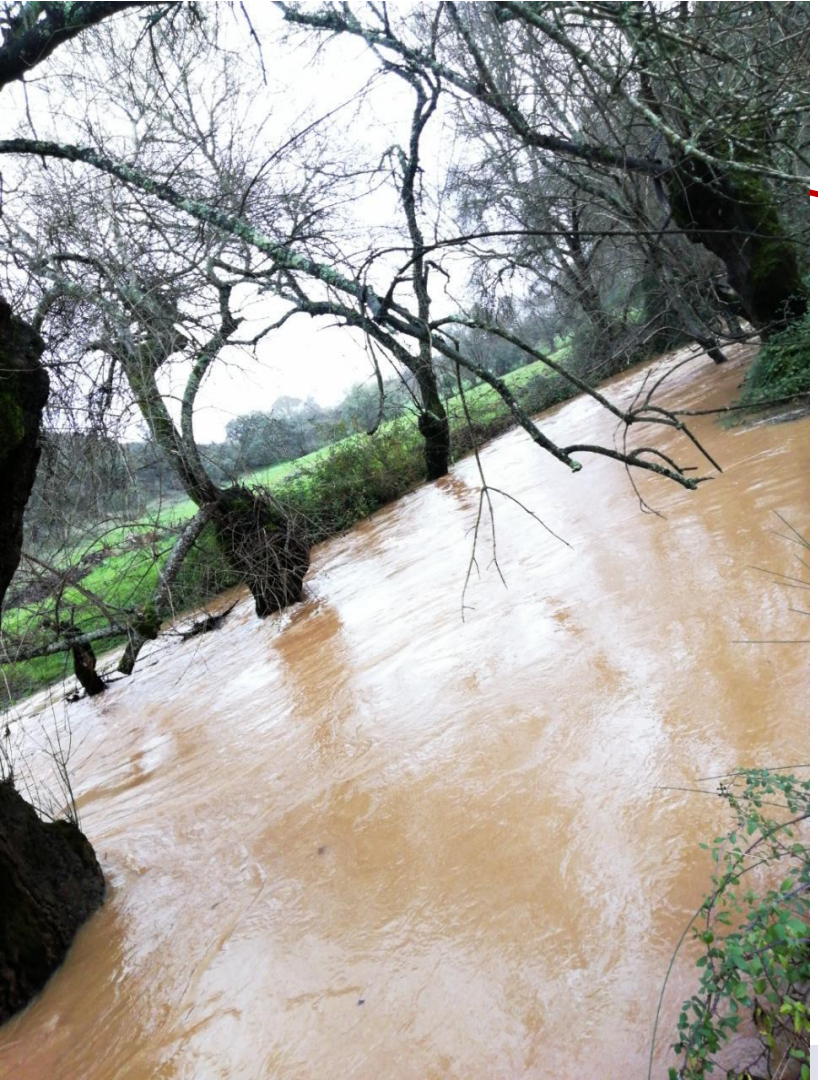
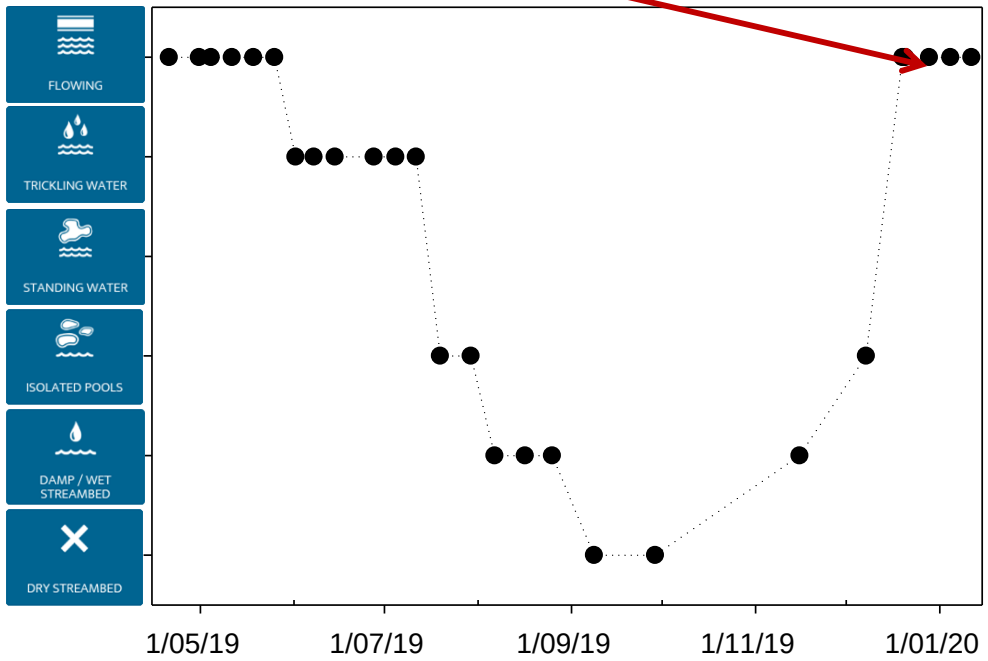
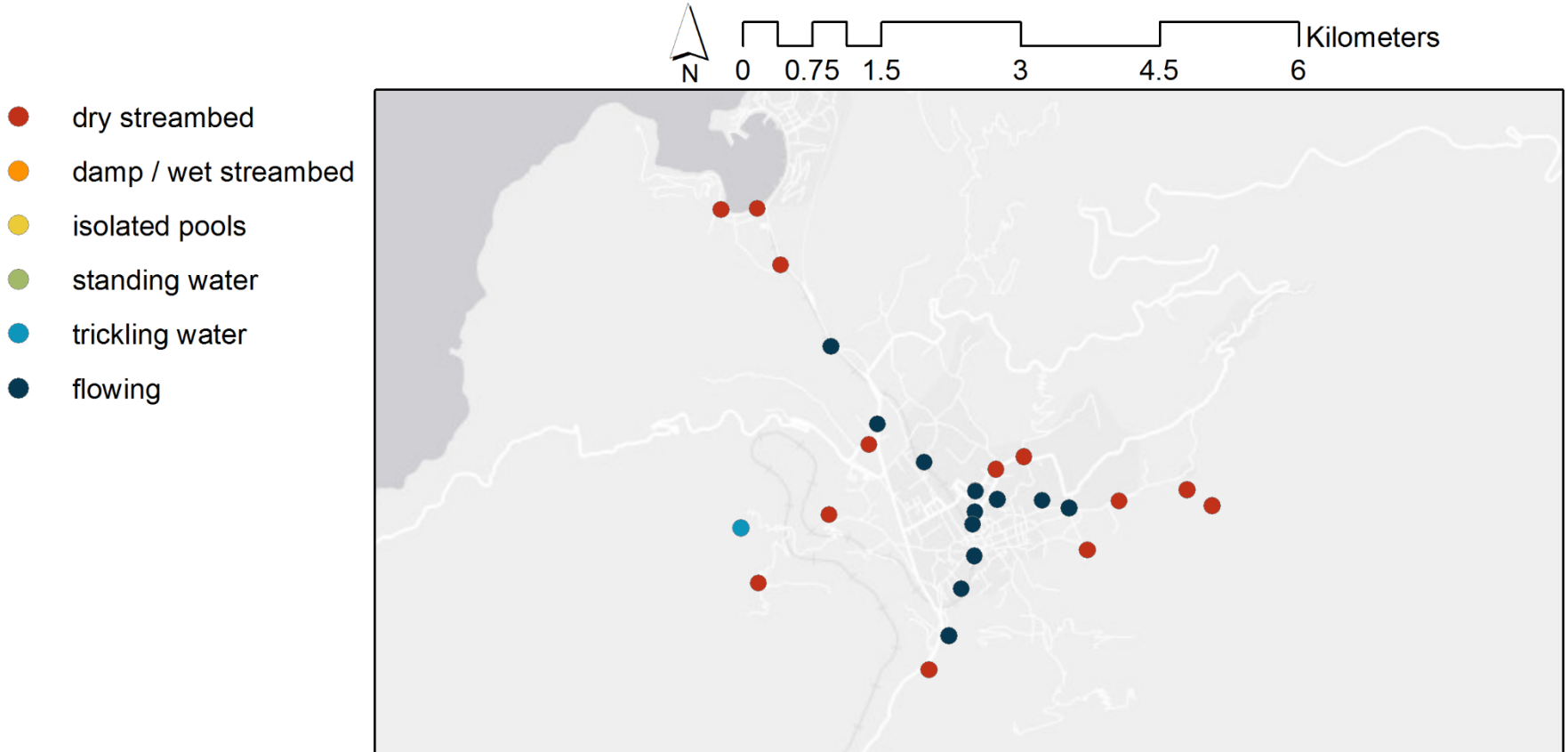




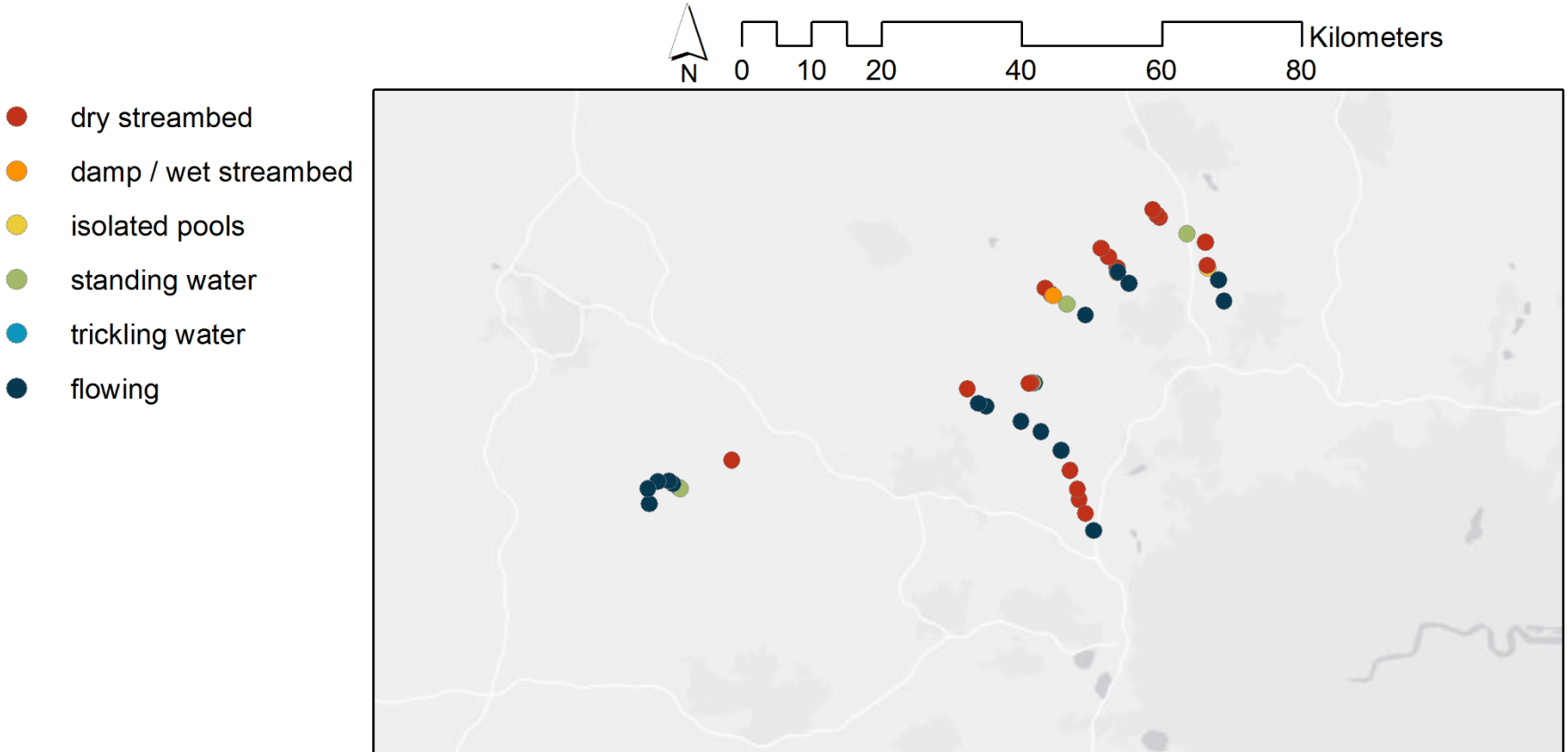
Example:
temporal variation Portugal



Example spatial-temporal variation: Mallorca



Example spatial-temporal variation: England



Meet some of our most active citizen scientists: What do you like about the app?

PhD student

- It allows in an **easy and fast way** to simple organize the pictures of different fieldwork trips. For this reason, I integrated the app as a **tool** during my fieldwork visit at the gauging stations. In this way, I can save time in the office working.

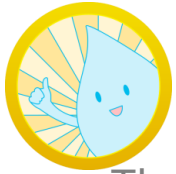
Biologist at a Water Development department

- It is a **very easy and straightforward app** to use, does not require more than **10 seconds** to add a new spot and does not require much effort either.

Nature lover. Enjoy walking with my dogs along (and inside!) them

1. It's focus on Trivers
2. **Different stages** to identify
3. Possibility to save observations made on field without internet and download later at home,
4. Possibility to **add comments**
5. **Openness** to other participants observations and profile

Our most active citizens: Where to monitor?



PhD student

- The first streams that I decided to monitor were **the gauging stations of the main study areas** of the research group
- Then I enlarged the monitoring sites to that streams that cross the urban areas, especially bridges and **areas to go on walk**
- Finally, I added spots near **hiking routes**

Biologist at a Water Development department

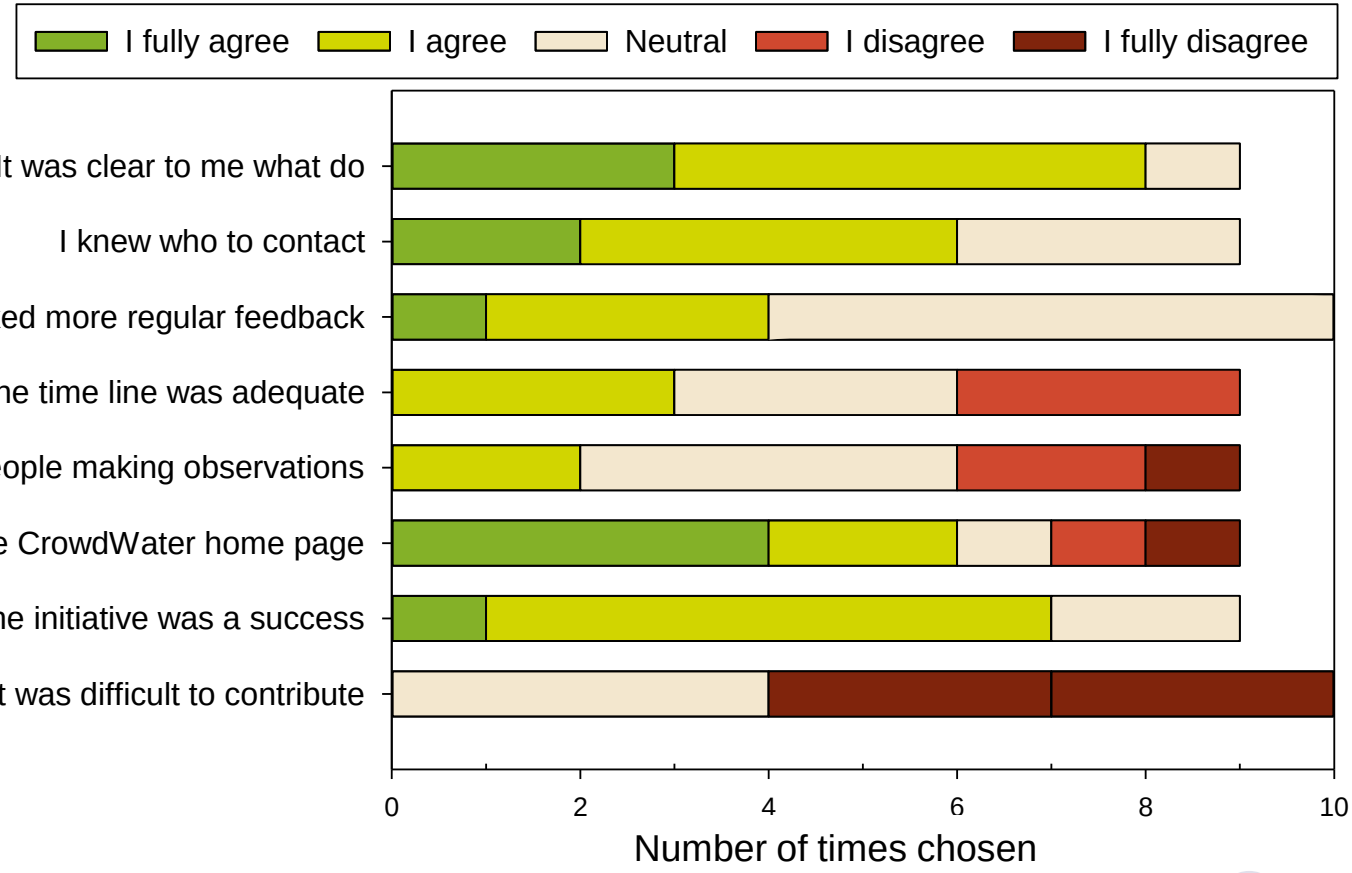
- Mostly based on the **streams I come across more often**, but also whenever I had the chance to visit a stream, I would do so

Nature lover

- First, the **places I usually go to**, to make multiple observations along the year
- Then I choose different tributaries of the same watershed and various places on each and also on the main River, because **I was curious** about to find eventual patterns of flow/dry dynamics

Evaluation of the SMIRES CrowdWater Initiative

Results of a poll sent to all national representatives



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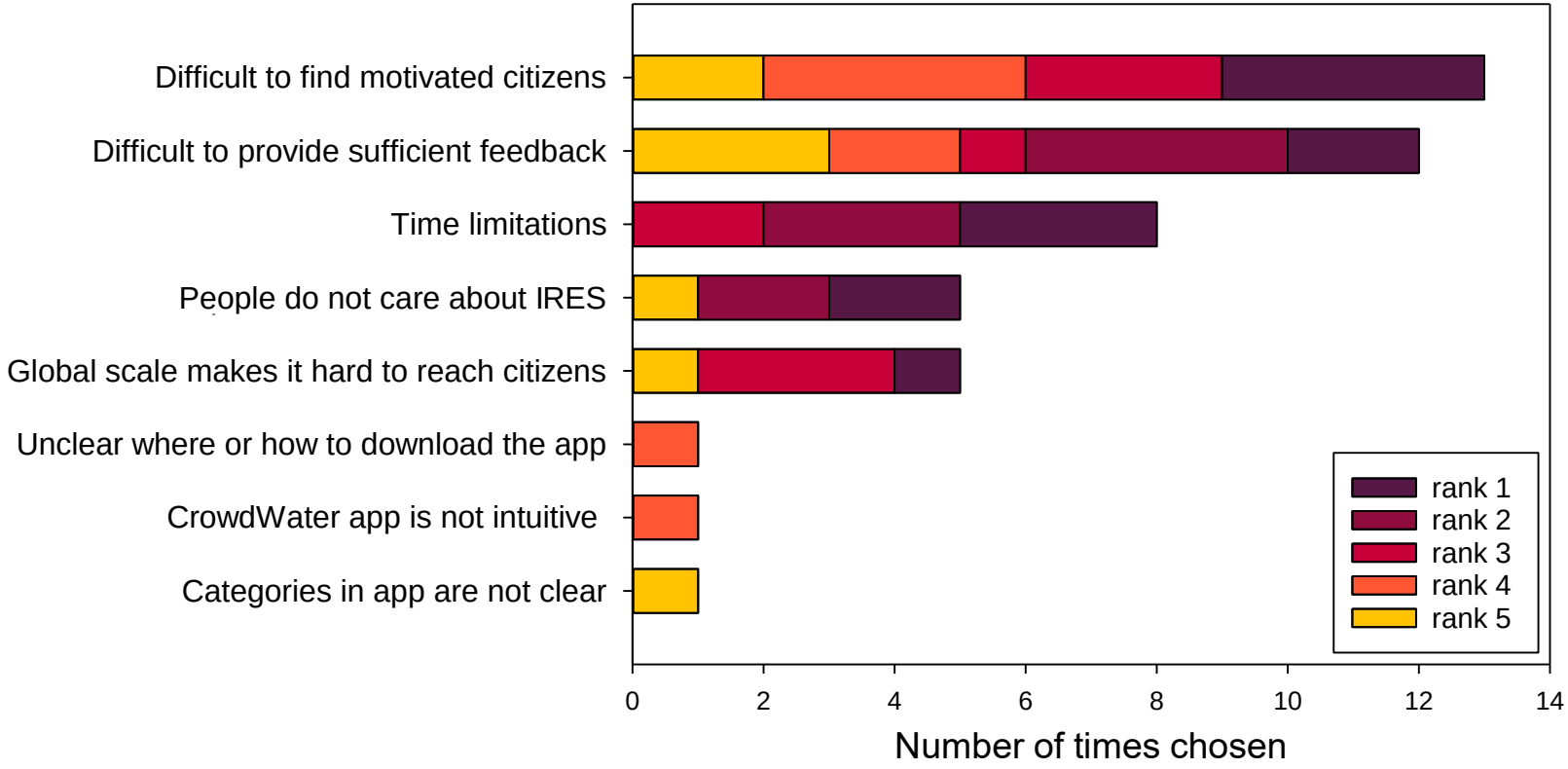
Results of a poll sent to all national representatives



Conclusions

- We received interesting data on the state of intermittent rivers and ephemeral streams
- Most observations are made by a small group of dedicated observers
  - This is typical for citizen science projects
  - It is difficult to reach the general public

- The app is freely available
  - You can contribute as well!!

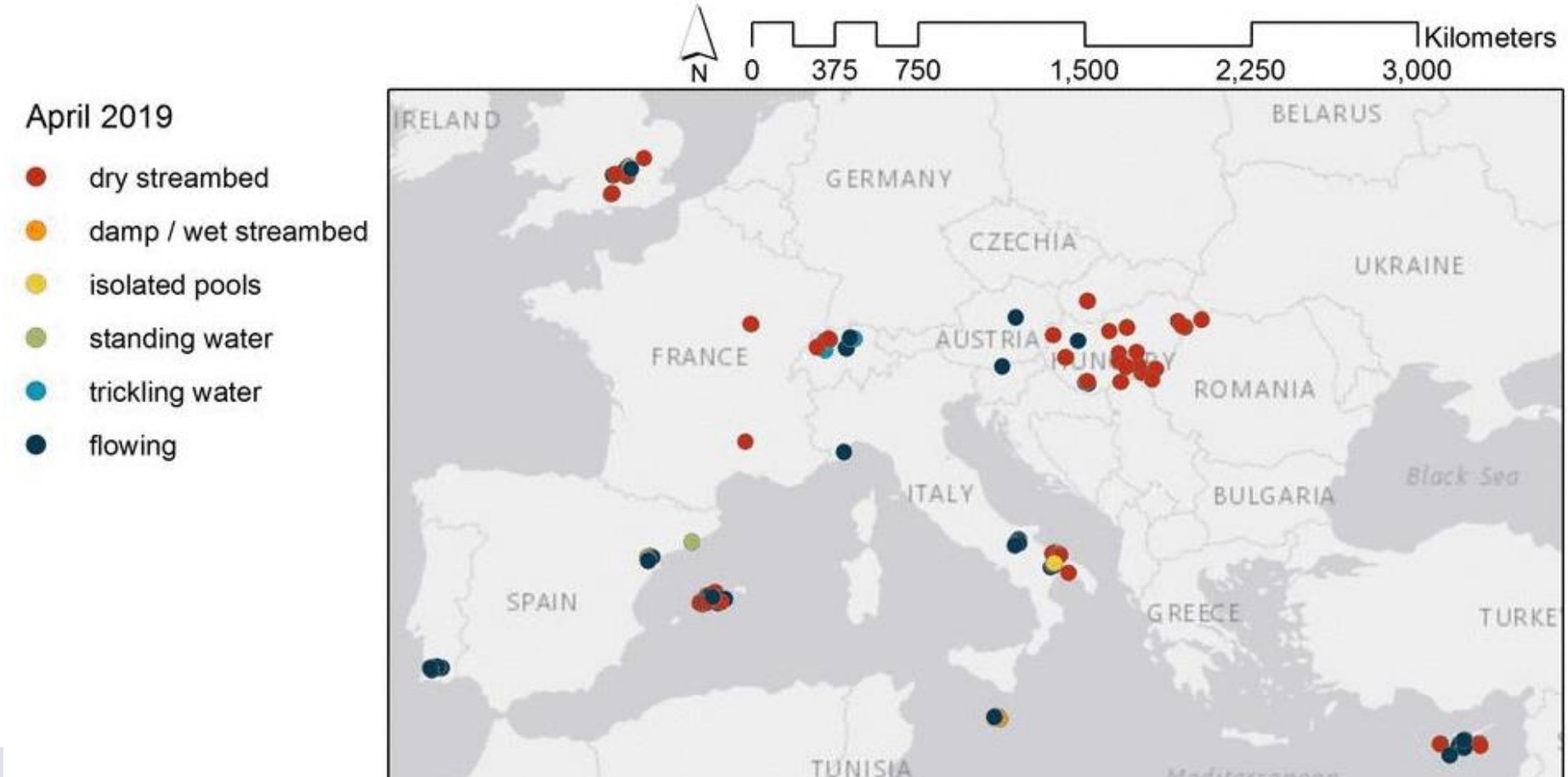
Feedback / questions?

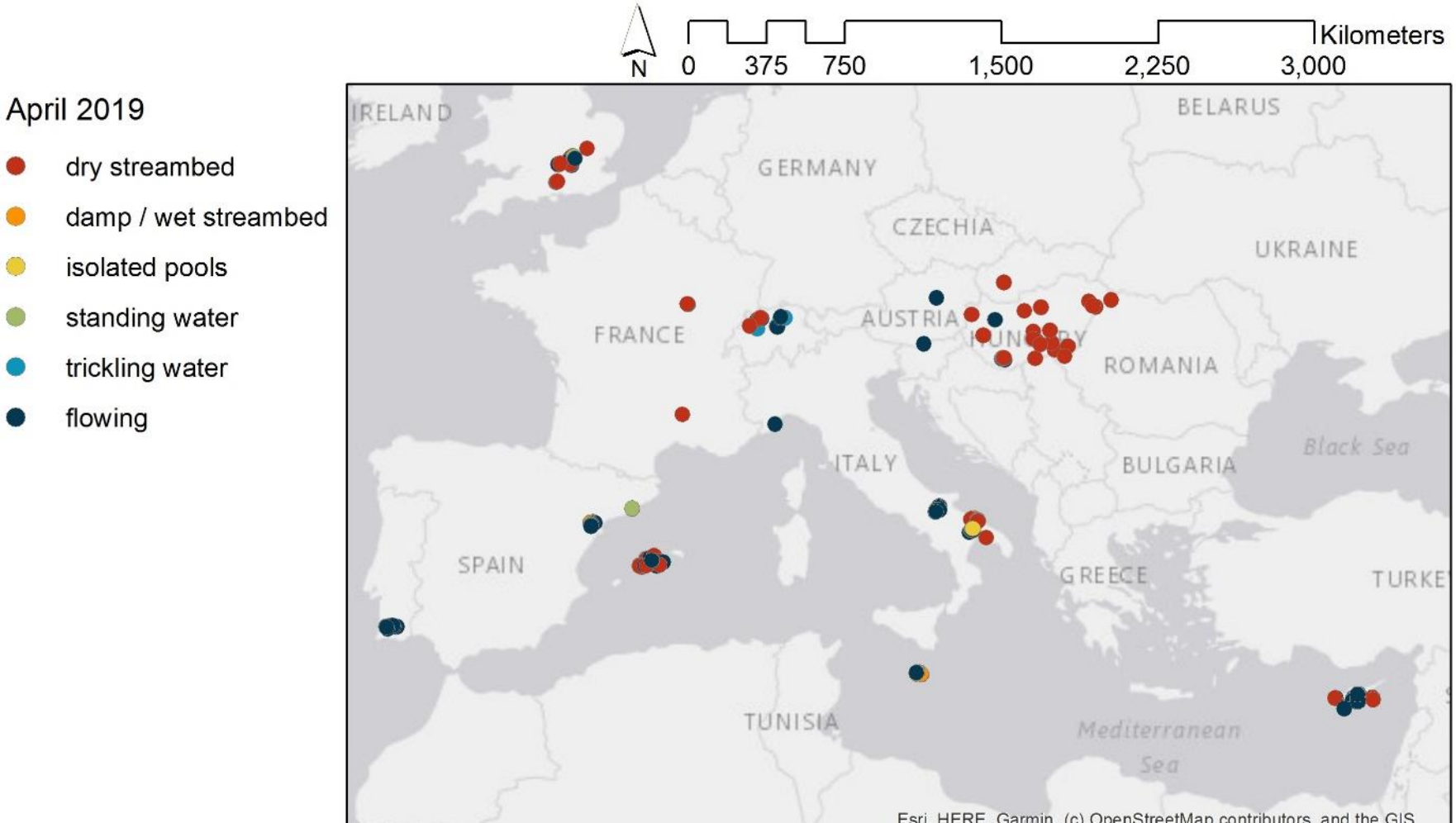
- Website: www.CrowdWater.ch
- Videos:

  https://www.youtube.com/channel/UC088v9paXZyJ9TcRFh7oNYg
- Email: ilja.vanmeerveld@geo.uzh.ch

Bonus material

Example spatial-temporal variation: Europe




April 2019
dry streambed
damp / wet streambed
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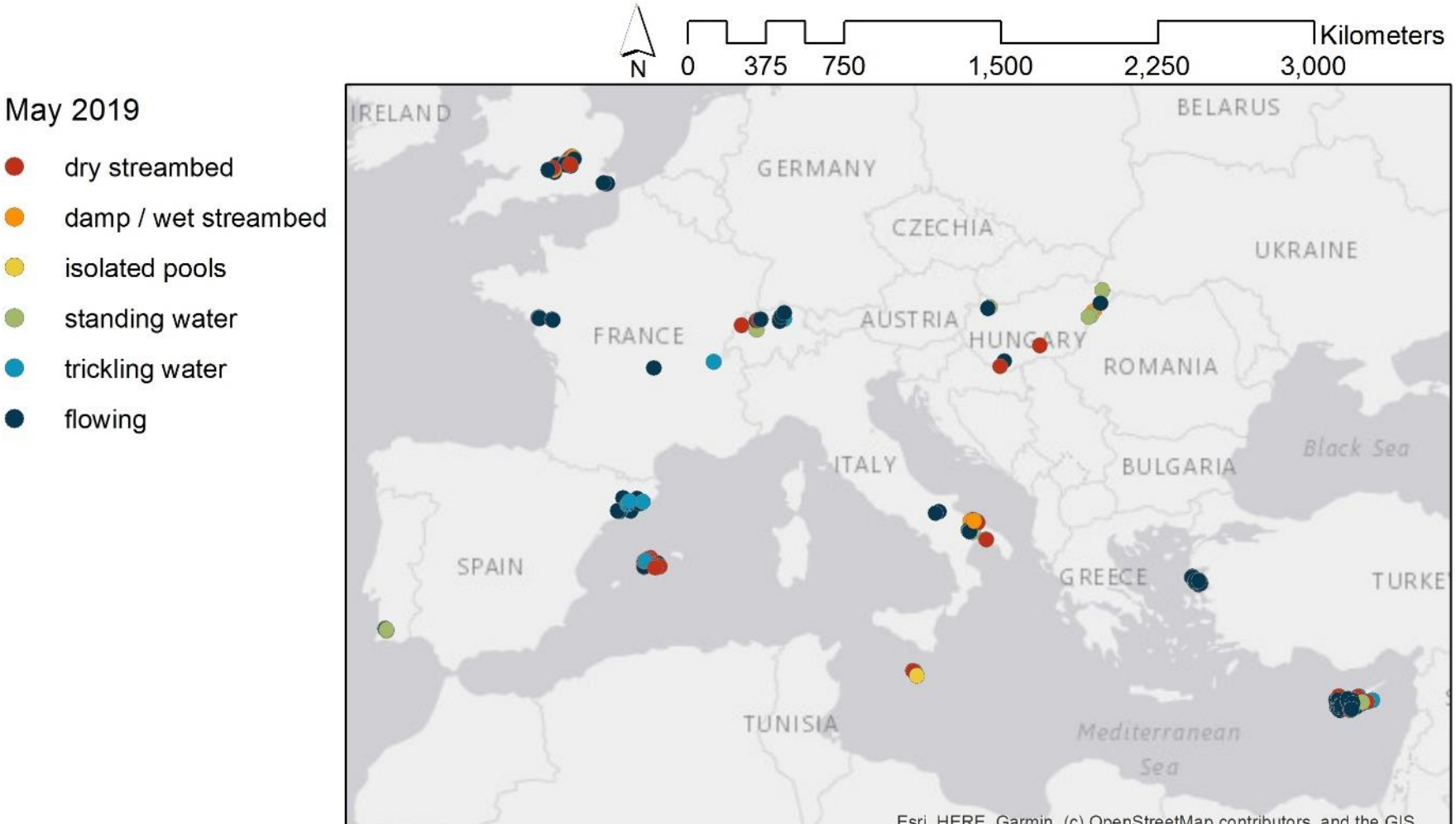
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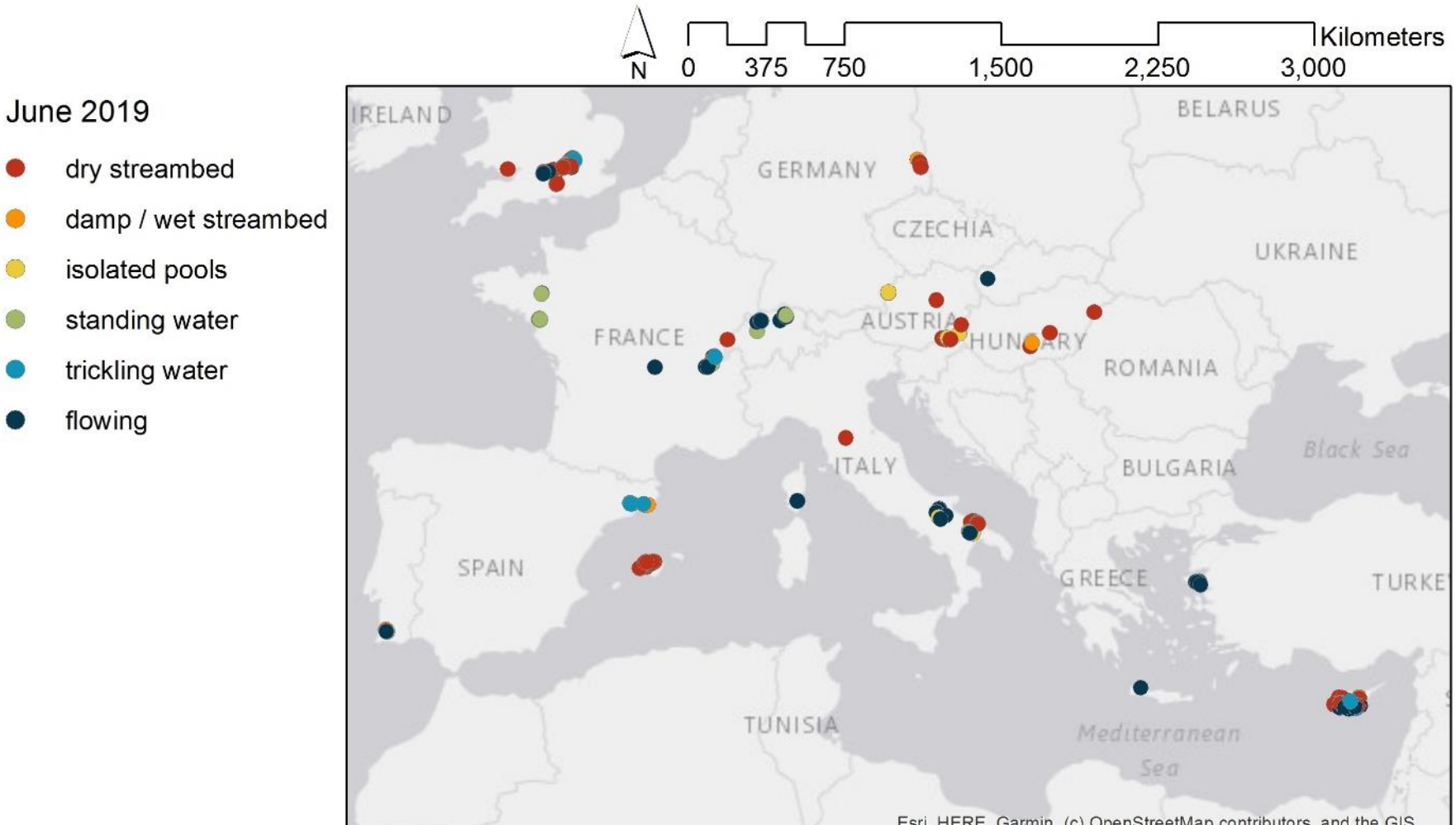
June 2019
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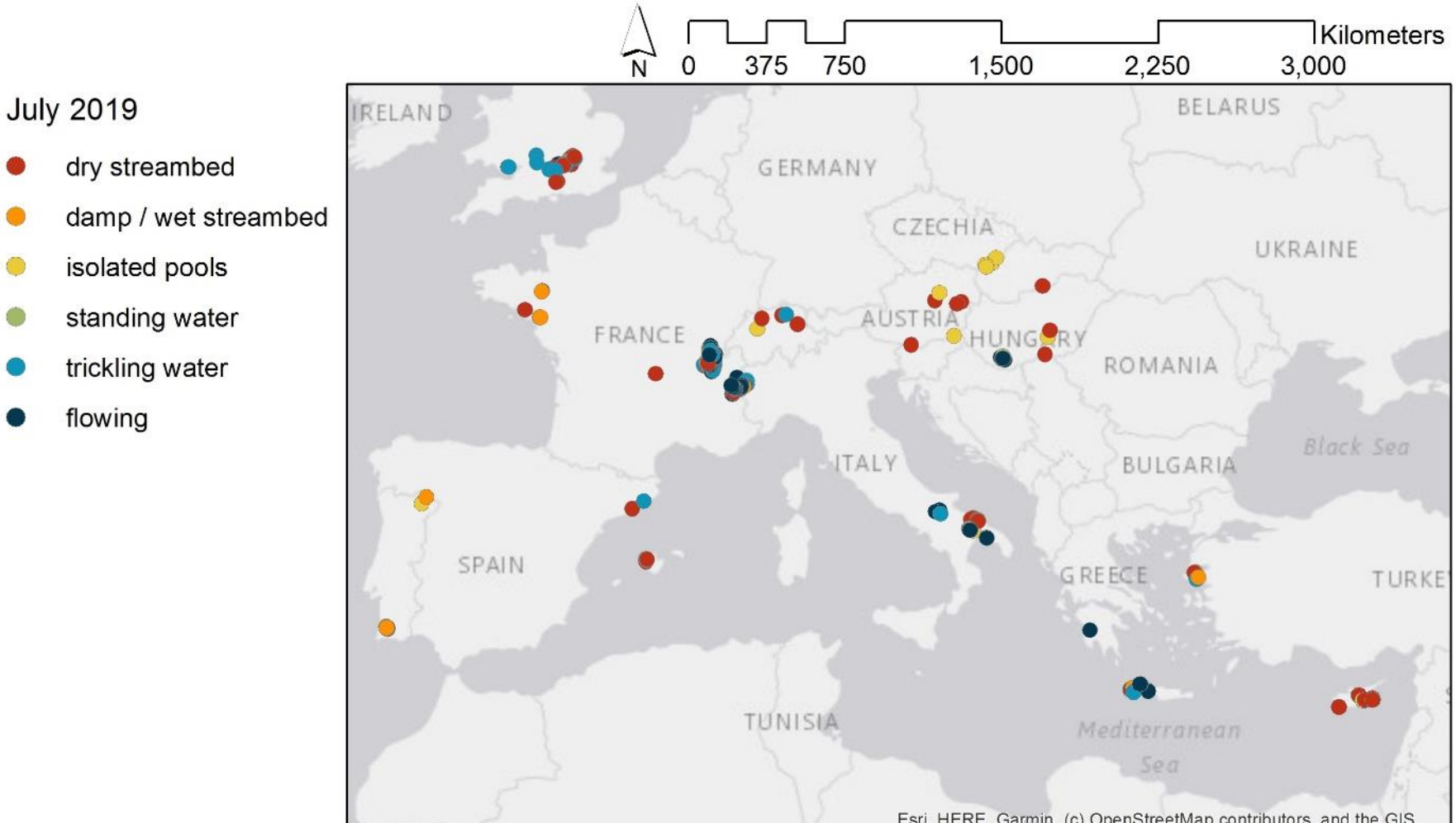
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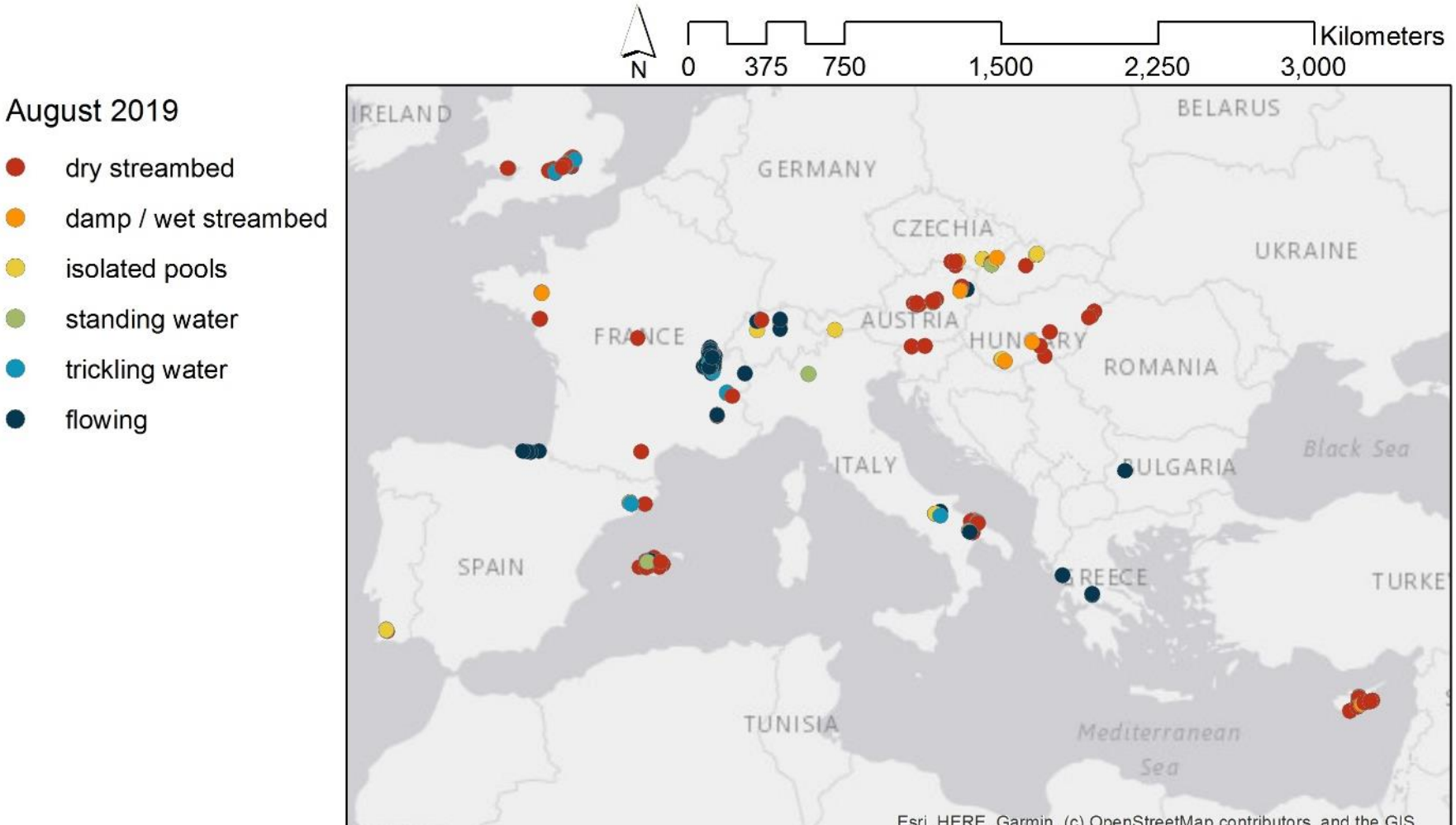
August 2019
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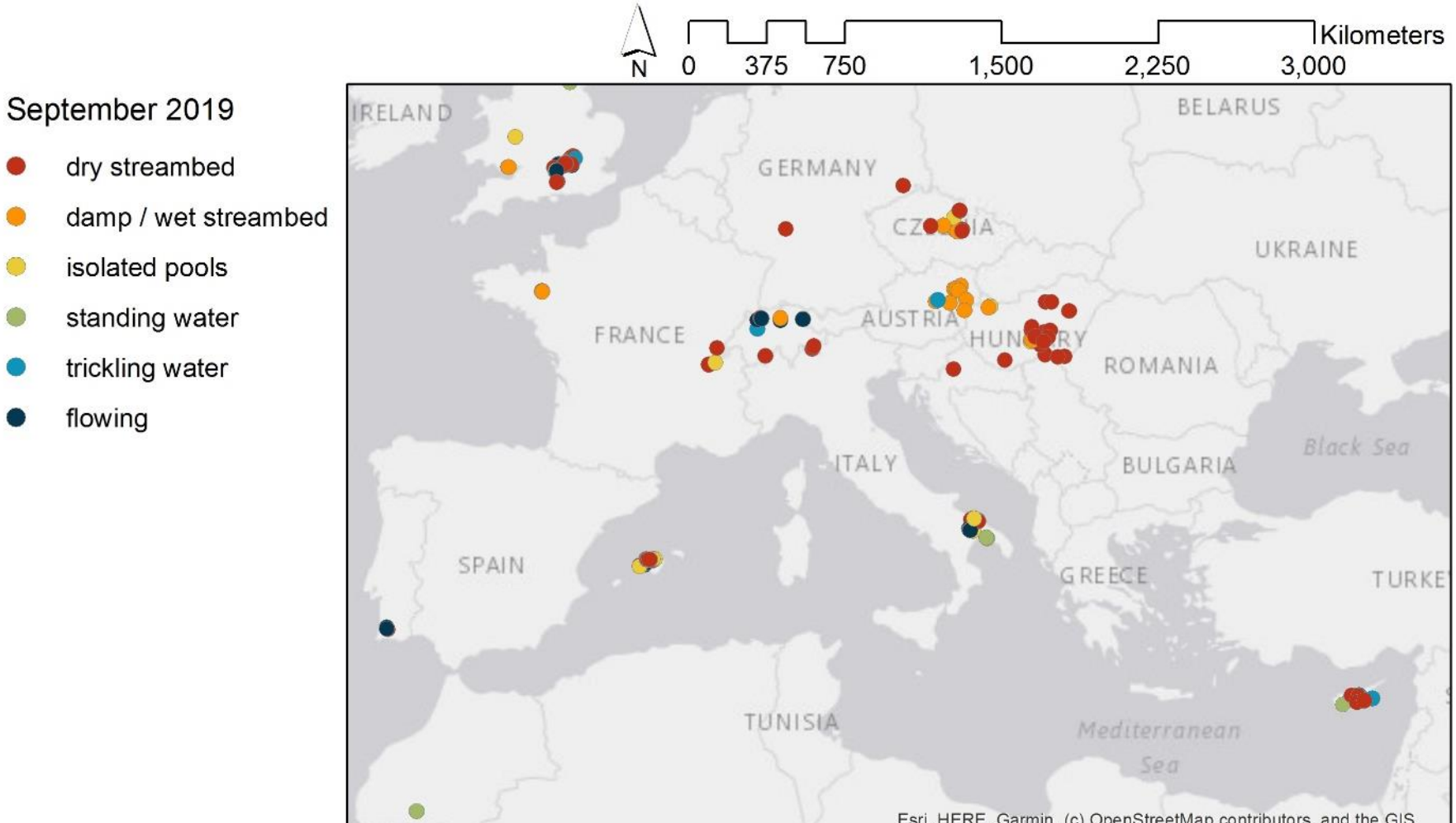
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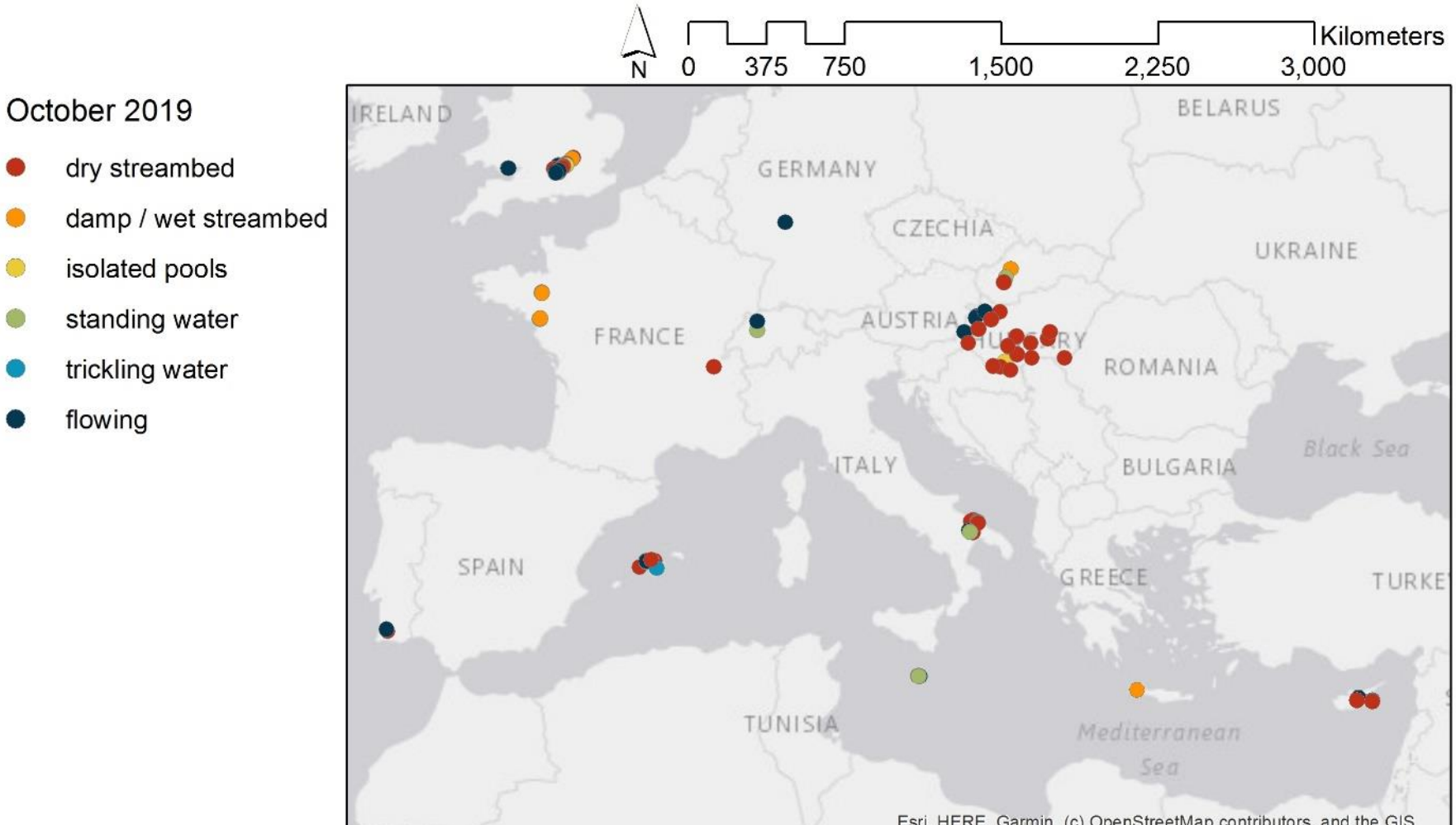
October 2019
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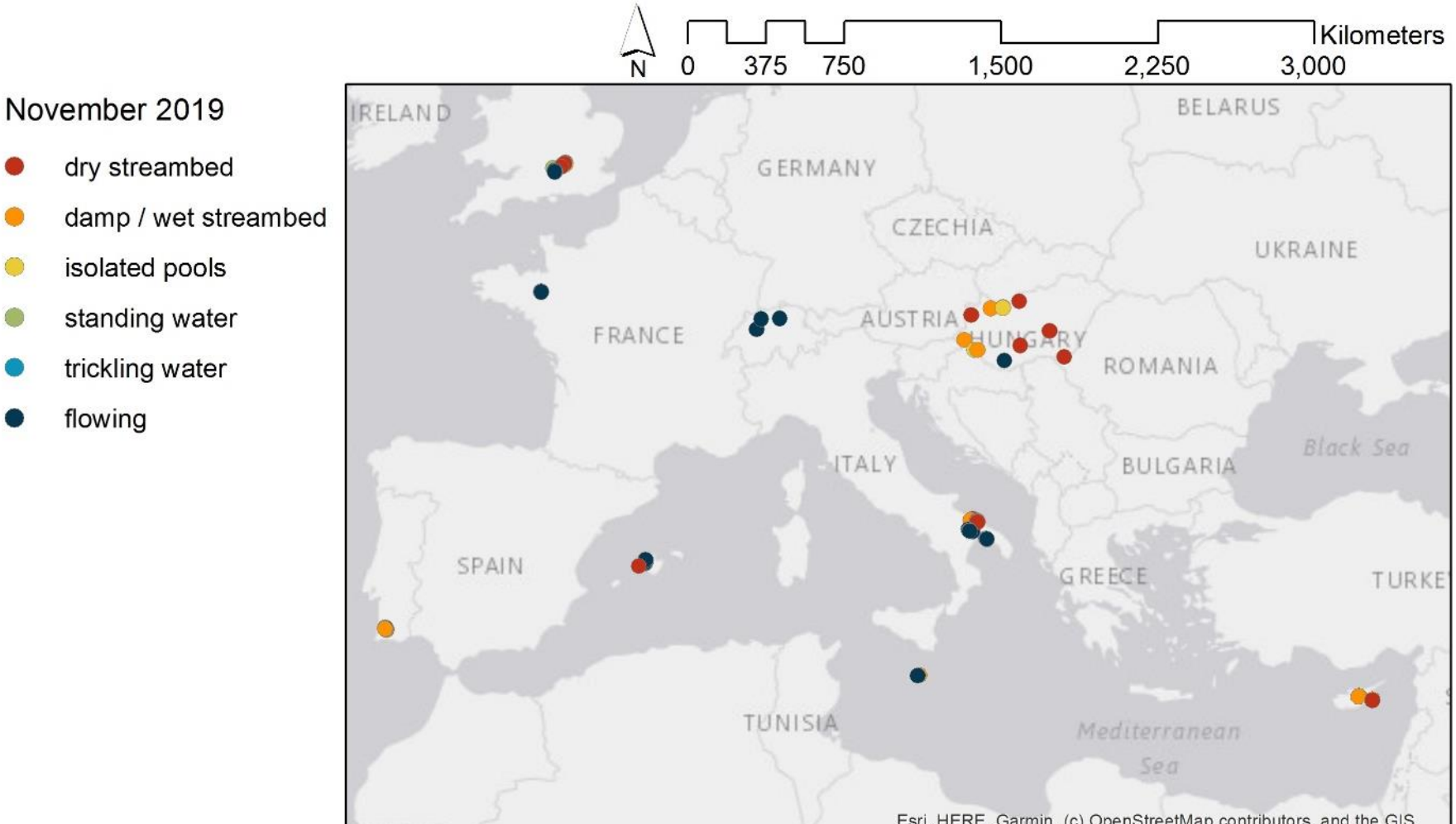
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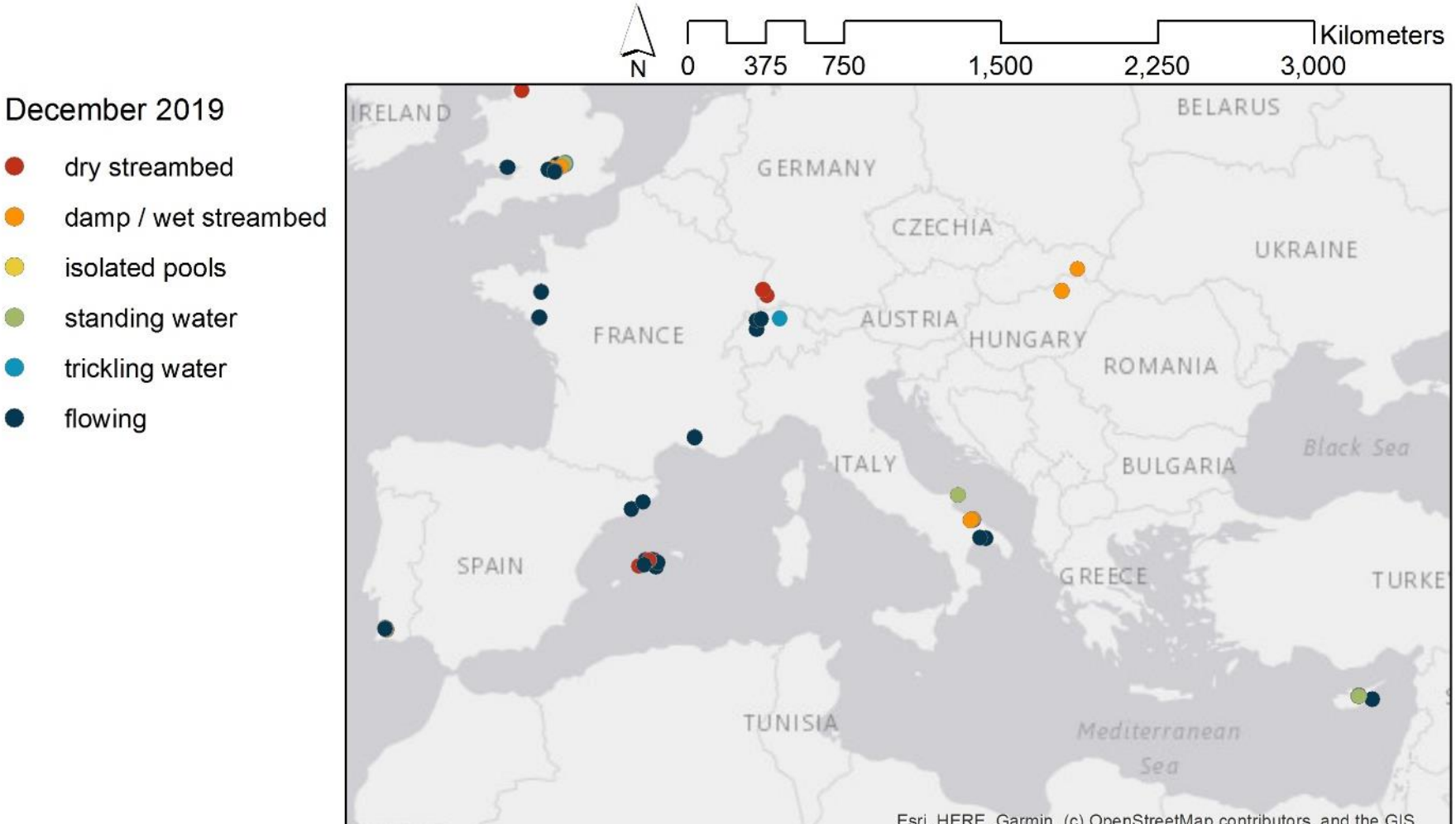
December 2019
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0
375
750
1,500
2,250
3,000
Kilometers
IRELAND
BELARUS
GERMANY
CZECHIA
UKRAINE
FRANCE
AUSTRIA
HUNGARY
ROMANIA
Black Sea
ITALY
BULGARIA
SPAIN
GREECE
TURKE
TUNISIA
Mediterranean Sea
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS

crowd water

SMIRES

Science and Management of Intermittent Rivers and Ephemeral Streams

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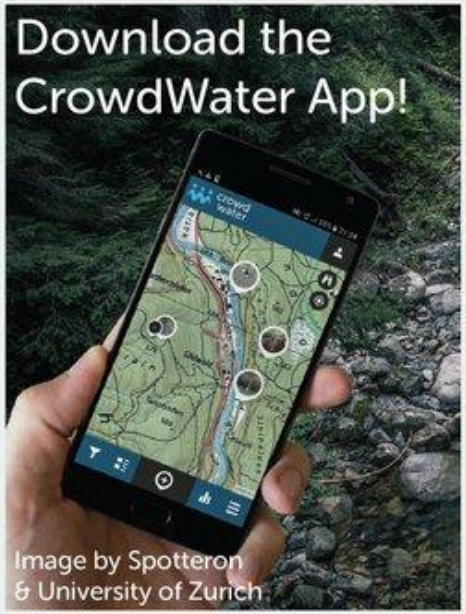

Image by Spotteron & University of Zurich

Android

iPhone

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CrowdWater Game

Thank you for your attention!
And your contributions

Hydrological Citizen Science

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