

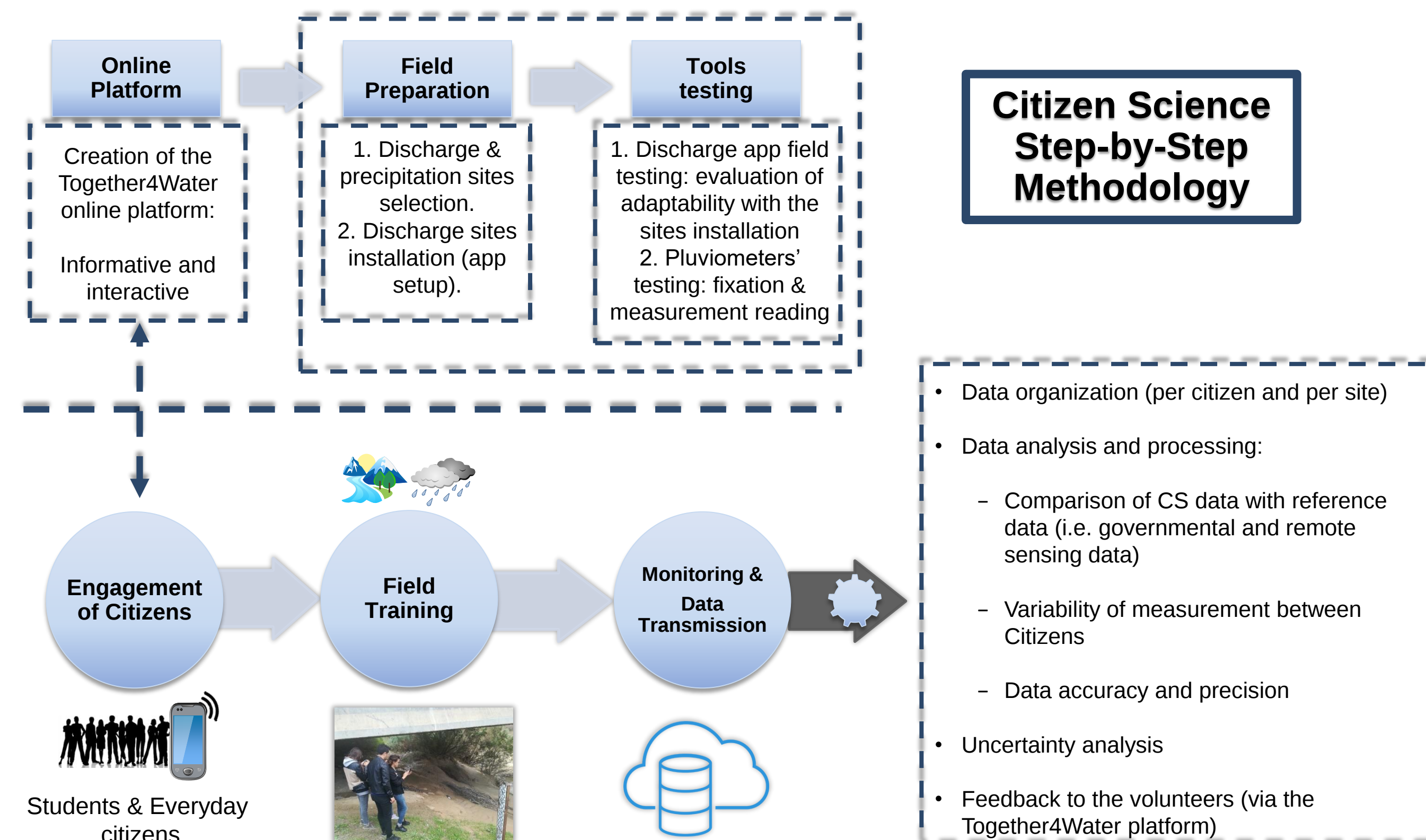


1. Introduction

- Citizen Science (CS) has been emerging in the last decade as a new field of environmental monitoring involving a direct collaboration between everyday citizens and scientists. The concept is now also introduced in hydrology.
- In Tunisia, several recent governmental efforts aimed at reinforcing the existing official water-related information through the renovation of the Tunisian monitoring systems. However, the lack of reliable hydrological data still an issue.
- This major point of concern can be partially addressed through a CS approach.
- In this study, we present results of the test phase of the Together4Water initiative, a water resources monitoring project that was launched last year in a test region in Tunisia. We focused on:
 - the engagement of citizens from different social categories in the project using a step-by-step approach
 - monitoring of river flow and precipitation using cost-effective tools
 - the level of agreement between CS data and the official reference data

2. Study area & Method

- The Together4Water project was launched in October 2018 in Tunisia. A test region (Medjez El Bab city) was selected in the Medjerda catchment which is most important river basin in the country (Fig. 1).
- This region has a huge socio-economic importance, agriculture represents the main activity with 51% of contribution to the total national production of wheat (~1,627,000 tons per year).
- A major problem in the region is the lack of consistent water data. Therefore, a Citizen Science approach is adopted in order to reinforce the existing databases [1] & [2].



3. Monitoring Process

Discharge monitoring

- A free mobile phone app “Discharge” was used to measure river flow [3], the concept is based on a non-invasive method of monitoring (Fig. 2). Two officially monitored sites were selected in the test region: Slouguia and Medjez El Bab sites.

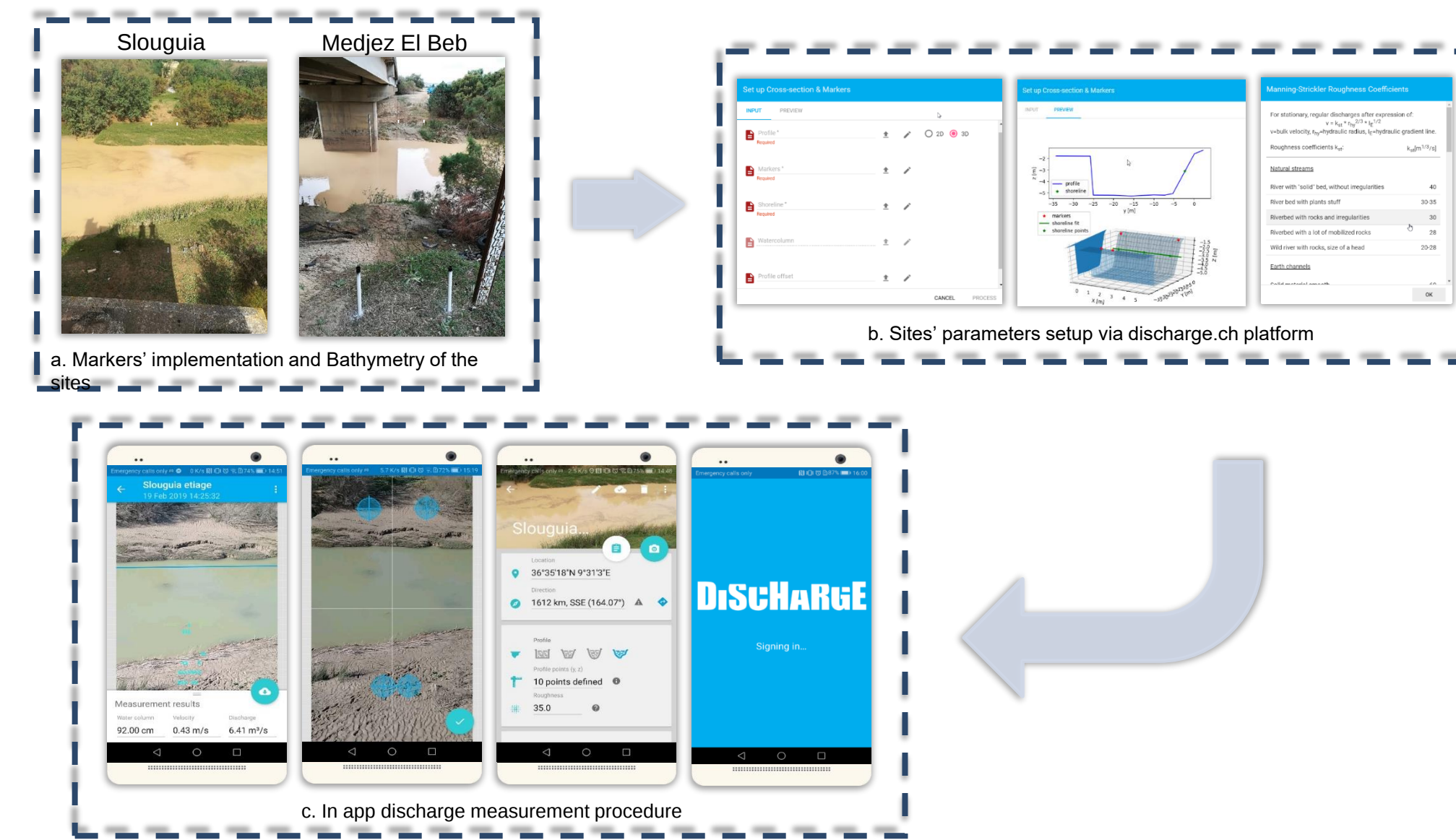


Fig. 2: Discharge monitoring methodology

Precipitation monitoring

- For monitoring precipitation, we used regular cost-effective pluviometers that can easily be placed at homes. The daily observations are sent via the Together4Water platform (Fig. 3).



Fig. 3: Precipitation monitoring methodology

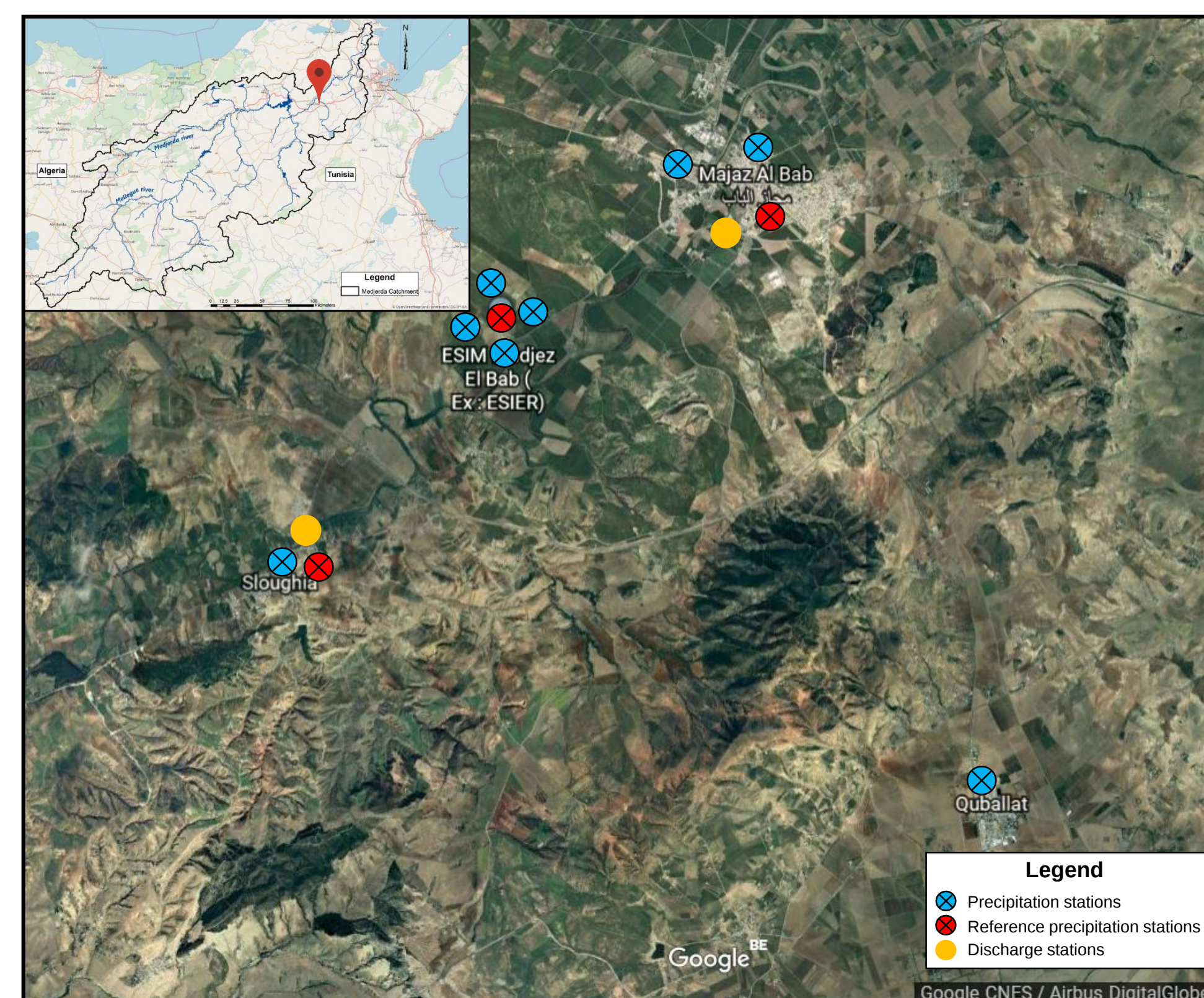


Fig. 1: Study area

4. Results

Discharge data validation

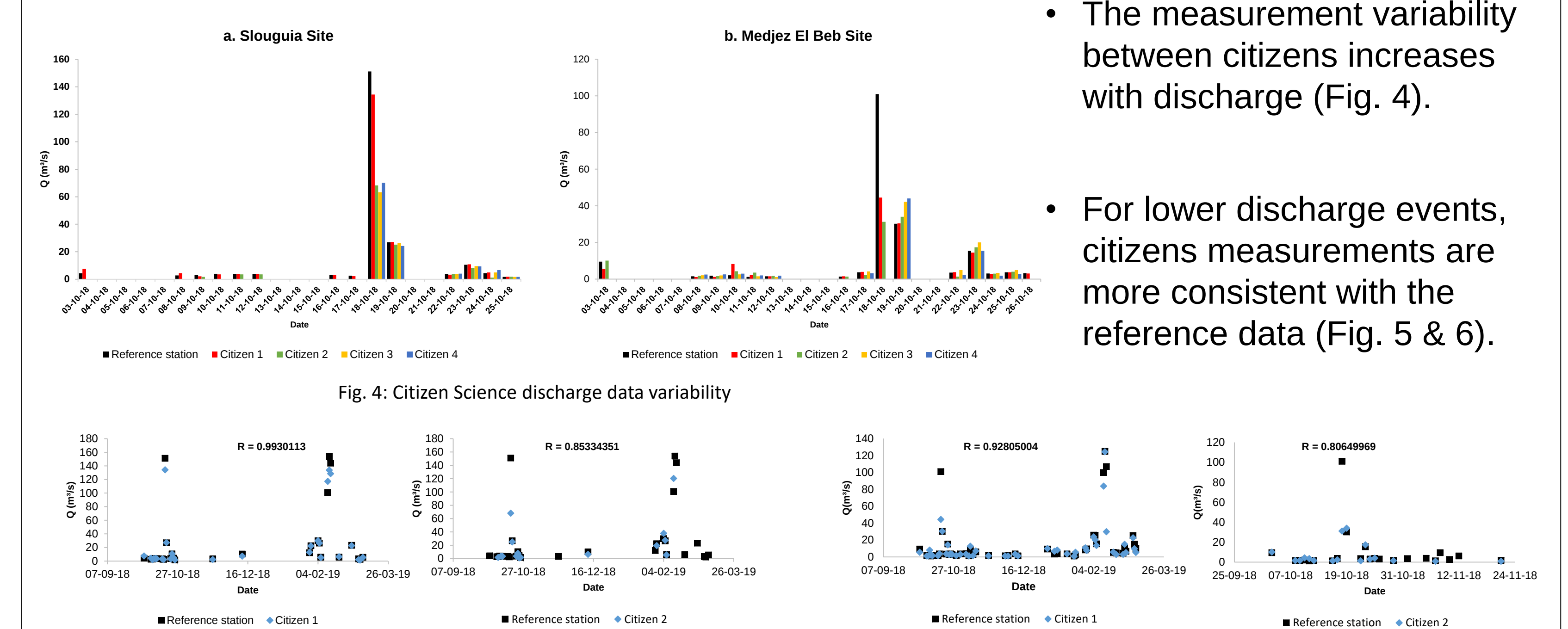


Fig. 4: Citizen Science discharge data variability

Fig. 5: Correlation between discharge reference data and CS data: Slouguia site

Precipitation data validation

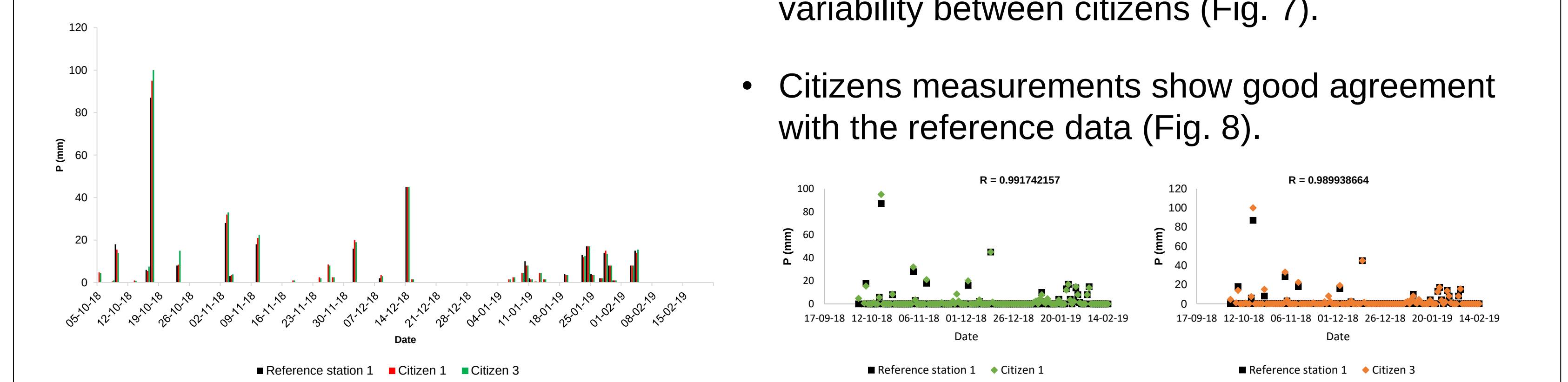


Fig. 7: Citizen Science precipitation data variability: Medjez El Bab site

Fig. 8: Correlation between precipitation reference data and CS data: Medjez El Bab site

5. Conclusion & Outlook

- The first Citizen Science mission in Tunisia and North Africa was successful and brought an innovative data collection approach by engaging a group of highly motivated citizens.
- The participation rate was significant, 90% of the engaged citizens participated in all of our activities.
- Citizen Science data showed good agreement with the reference data in all sites.
- Next steps are targeted to
 - provide an uncertainty analysis of the both discharge and precipitation CS data
 - combine CS measurements with the reference data to generate more robust information

Acknowledgments

We would like to thank the UCLouvain, WBI and IDB for funding this research and we'd like to thank all the citizens who volunteered to participate in the Together4Water project.

References

- W. Buytaert et al., "Citizen science in hydrology and water resources: opportunities for knowledge generation, ecosystem service management, and sustainable development," Front. Earth Sci., vol. 2, no. 26, Oct. 2014.
- W. Buytaert, A. Dewulf, B. De Blèvre, J. Clark, and D. M. Hannah, "Citizen Science for Water Resources Management: Toward Polycentric Monitoring and Governance?," J. Water Resour. Plan. Manag., vol. 142, no. 4, p. 0181602, Apr. 2016.
- M. Carrel, M. Detret, S. Peña-Haro, and B. Lüthi, "EVALUATION OF THE DISCHARGEAPP: A SMARTPHONE APPLICATION FOR DISCHARGE MEASUREMENTS," in HydroSenSoft, International Symposium and Exhibition on Hydro-Environment Sensors and Software, 2019, p. 8.