

EGU21-10906

<https://doi.org/10.5194/egusphere-egu21-10906>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Continuous water level monitoring using time-lapse imagery

**Simone Noto**<sup>1</sup>, Flavia Tauro<sup>2</sup>, Andrea Petroselli<sup>3</sup>, Ciro Apollonio<sup>4</sup>, Gianluca Botter<sup>1</sup>, and Salvatore Grimaldi<sup>2</sup>

<sup>1</sup>Department of Civil, Environmental and Architectural Engineering, University of Padua, 35131 Padova, Italy

<sup>2</sup>Department for Innovation in Biological, Agro-food and Forest Systems, University of Tuscia, 01100 Viterbo, Italy

<sup>3</sup>Department of Economy, Engineering, Society and Business, University of Tuscia, 01100 Viterbo, Italy

<sup>4</sup>Department of Agriculture and Forest Sciences, University of Tuscia, 01100 Viterbo, Italy

Monitoring ephemeral and intermittent streams is a major challenge in hydrology. While direct field observations are best to detect spatial patterns of flow persistence, on site inspections are time and labor intensive and may be impractical in difficult-to-access environments. Motivated by latest advancements of digital cameras and computer vision techniques, in this work, we describe the development and application of a stage-camera system to monitor the water level in ungauged headwater streams. The system encompasses a consumer grade wildlife camera with near infrared (NIR) night vision capabilities and a white pole that serves as reference object in the collected images. Time-lapse imagery is processed through a computationally inexpensive algorithm featuring image quantization and binarization, and water level time series are filtered through a simple statistical scheme. The feasibility of the approach is demonstrated through a set of benchmark experiments performed in controlled and natural settings, characterized by an increased level of complexity. Maximum mean absolute errors between stage-camera and reference data are approximately equal to 2 cm in the worst scenario that corresponds to severe hydrometeorological conditions. Our preliminary results are encouraging and support the scalability of the stage camera in future implementations in a wide range of natural settings.