

EGU2020-9943

<https://doi.org/10.5194/egusphere-egu2020-9943>

EGU General Assembly 2020

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



Wind effect on image-based river surface velocity measurements

Salvador Peña-Haro¹, Beat Lüthi¹, Robert Lukes², and Maxence Carrel¹

¹photrack ag, Zurich, Switzerland (pena@photrack.ch)

²Federal Office for the Environment FOEN, Bern, Switzerland

Image-based methods for measuring surface flow velocities in rivers have several advantages, one of them being that the sensor (camera) is not in contact with the water and its mounting position is very flexible hence there is no need of expensive structures to mount it. Additionally, it is possible to measure the whole river width. On the other hand, environmental factors, like wind, can affect the surface velocity and they have an impact on the accuracy of the measurements.

Herein we present an analysis of the wind effect on the image based surface velocity at Rhine river, at the border between Switzerland and Austria. At this location the river width is of approximately 100 meters under low flow conditions, while the width of its floodplain is of about 200 m. An ATMOS 22 ultrasonic anemometer was installed at the site to measure the wind intensity as well as its direction.

A time series of flow velocities and wind from May to October 2019 was analyzed. During this period, the average discharge was 320 m³/s and the average flow velocity 1.7 m/s. While the average wind velocity was of 2.3m/s which roughly follows the same direction of the river flow.

A rating curve following a power law function was fitted to the image based surface flow measurements. It was found that for maximum wind speeds of 10 m/s, blowing in the opposite direction of the river flow, there was a deviation of 8%. For the average wind speed of 2.3m/s, the deviation was found to be 3%.