River panoramas – “RiverView”

Abstract
The river panoramas map provides a tool for viewing 360° panoramas at pre-defined points along the rivers. As a rule, the panoramas are taken from the middle of the river at a height of about 10 m above the water surface. Individual images were recorded using Octocopters (drones) and subsequently processed into panoramas. In the river panorama map, each item can be clicked on directly to display the corresponding image. The initial view of the panorama is always oriented to the north. The viewing field can be swivelled in all directions and enlarged or reduced using the mouse. As a result, the viewer can move about freely in the image.

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1 Introduction

A map is an abstract image of a region; as such, it only captures some aspects about the reality of that region. No single map can contain all the relevant information about a region although, as a generalized image of the space, a map does allow for orientation. A photograph, in contrast, can provide a detailed visual impression of the space but cannot convey measurable properties. The combination of maps and photographs is therefore an ideal way to visualize and obtain information about a space without actually entering it. The abstract maps of the Hydrological Atlas of Switzerland can now be expanded to include photographs that provide a visual impression of the reality on the ground.

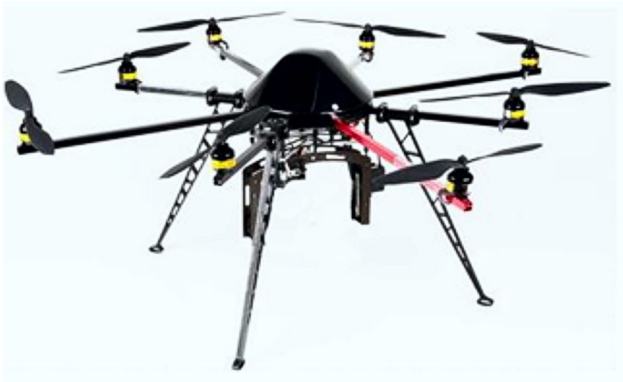

Figure 1. The octocopter used to obtain the images, with a holding device for the camera (Photo: Fabian Kunz)

In concrete terms, the river panoramas map provides a tool for viewing 360° panoramas at pre-defined points along a river. As a rule, the images can be viewed from a height of about 10 m above the water surface.

2 Approach

The river panoramas map aims, to the extent possible, to provide a visualization of the continuously changing characteristics of a river from its source to its mouth. It is possible to photographically capture the riverine zone in one of several ways [1]. For example, video recordings along a stretch of river would provide an excellent visual impression. However, this method produces a very large amount of data and was, for this reason, not used. Instead, the panoramas were acquired by equipping an octocopter (or drone) with a high resolution camera (Fig. 1).

The recording sites were chosen in such a way as to document the changing characteristics of the river as completely as possible. Characteristics such as the ecomorphological classes of the riverbanks, hydrologically interesting features and major structural interventions were taken into consideration. In urban areas, the river banks were documented as completely as possible. In the case of the Aare River, this was only possible in the city of Bern, as the Aare does not flow directly through densely populated areas. Due to the often inclement weather during the 2014 and 2017 field seasons, it was not possible to photograph every location. Some regions also lacked appropriate launch and landing sites near the recording site, or heavily wooded shores or ravines prevented a safe flight. Although it is technically possible to fly and photograph many of these hard-to-reach places, it is not allowed to fly a drone in Switzerland without visual contact. As a result, it was necessary to dispense with some of the recording locations.

Overlapping images were taken at each site and subsequently assembled into panoramas. To create the illusion of actually viewing a site, the pixel grid of a digital photograph must be brought into a spherical projection. This process results in increasing distortion of the image with increasing distance from the horizontal center of the image. In order to view the panorama in a viewer, the images must be converted into a spherical shape. The spherical panorama is effectively converted into six cube faces. Thanks to the calculated distortion, this results in an almost perfect illusion of viewing the site locally (Fig. 2).

3 Use

In the river panoramas map, each item can be clicked on directly to display the panorama image. Gap-less panoramic images are available for several sites along the rivers. The viewing field can be swivelled in all directions and enlarged or reduced using the mouse. As a result, the viewer can move about freely in the im-

Figure 2. The apparently spherical panorama for an area near Niederried bei Kallnach, “unwound” into six cube faces (left) and the resulting panorama, which provides an illusion of actually viewing the site. The image on the right has an invisible cube edge at its center [1]

age. The picture arrows visible can be used to directly browse the panoramas of neighbouring locations.

References

[1] Kunz, F. (2015). *RiverView - Geoinformation und Panoramafotografie als Werkzeuge zur Visualisierung und Bewertung von Fliessgewässern*. Publikation Gewässerkunde. Bern: University of Berne, Institute of Geography.