

# Analysis and mapping of natural hazards using common photography

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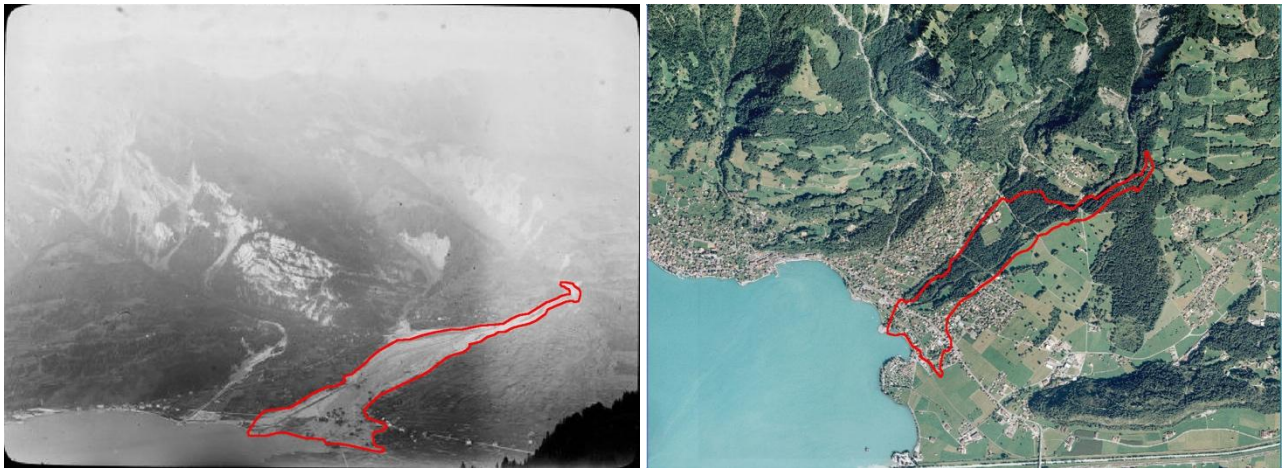
## Abstract:

Since its invention, photography has been a simple and direct means of documenting landscapes. Historical or current terrestrial oblique photographs capturing natural hazards often provide detailed information and can nowadays be easily taken by anyone using various devices.

The *image2world* software, originally developed at WSL ([wsl.ch/monoplotting](http://wsl.ch/monoplotting)) and now taken over by the company *image2world GmbH* ([i2w.ch](http://i2w.ch)), allows the use of individual terrestrial or aerial oblique images to map natural hazards (and other landscape features) in a cost-effective and efficient manner. Conventional photographs taken by smartphone, drone, or helicopter are transformed into 3D maps available to professionals, researchers, or just the curious.

This presentation will show examples of the software's use in the context of natural hazards, including the mapping of floods, landslides, and rockfalls, the analysis of the effectiveness of snow bridges, as well as in the field of immediate geolocation of natural events (Rapid Mapping), which can contribute to the organization of search and rescue operations.

Lammbach debris flow - Brienz/Schwanden (Canton Bern, Switzerland), 1896



On 26 May 1896, a landslide with a volume of 300,000 m<sup>3</sup> was deposited in the Lammbachgraben forming a natural dam. A lake formed behind it. On 31 May, the water broke through the dam causing a first, huge debris flow, which damaged houses and cultivated and arable land in Kienholz. A second debris flow occurred on the night of 11-12 June. Between 20 and 23 August, further debris flows caused extensive damage to houses, the national road, the Brünig railway line and farmland; the layer of debris and mud was up to 3 meters thick. Although it was possible to make a rough estimate of the total area affected by the debris flows on the basis of existing event descriptions, it was only possible to precisely delineate the debris flow deposits (right image: *swisstopo* orthophoto, 2012) by georeferencing an image from the image archive of the ETH Library (left image).

## Flood in Fontana - Valle Maggia (Canton Ticino, Switzerland)



During the night from Saturday 29 to Sunday 30 June 2024, a violent thunderstorm swept through the upper Maggia Valley, in the Swiss Alps of Ticino. Precipitation exceeded 120 mm, locally 200 mm, with the epicenter in Bignasco, where 250 mm were recorded. In about one hour, as much water fell locally as normally falls in the whole month of June. This storm combined with the river already swollen by the late spring snowmelt and the heavy rains of recent weeks, and the saturated soils that no longer allow infiltration, caused unprecedented landslides and flooding throughout the upper Maggia Valley, leaving devastation in its wake. *image2world* georeferenced the landslide by orthorectifying a *swisstopo* photograph taken immediately after the event (right image). The impressive image shows how the landscape has radically changed. The systematic documentation and recording of these events is a very effective way to better understand the phenomena, improving the institutional infrastructure and preventing future damage. The comparison of before (left image: *swisstopo* orthophoto, 2021) and after (right image: *swisstopo*, 2024) the event gives a detailed overview of the catastrophe.

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