

# Swiss Pioneers of the Surveying of the Alps

Thomas GLATTHARD, Switzerland

**Key words:** surveying, mountains, alps, panoramas, reliefs, maps, engineer's projects

## SUMMARY

Swiss Pioneers of the Surveying of the Alps:

Samuel Bodmer (1652-1724): Correction of River Kander

Franz Ludwig Pfyffer (1716-1802): Relief of Central Switzerland

Ferdinand Rudolph Hassler (1770-1843): Baseline and triangulation

Guillaume-Henri Dufour (1787-1875): Swiss Map "Dufour"

Xaver Imfeld (1853-1909): Panoramas, reliefs, maps, engineer's projects

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## 1. INTRODUCTION

When we move through the landscape and over mountains – with maps or with GPS receiver – we hardly imagine the work and troubles of surveyors making the measurements and drawing these maps hundred and more years ago. In the age of Internet, GPS, communication satellites and geo data infrastructures the desired information about topography, landscape, traffic ways, food supply possibilities comes at any time and everywhere to us. The desire for such information is old. First plans are old thousands of years ago. Who possessed plans, could prevail over countries and trade routes. Long time maps were secret. Exact maps became only possible, as in 18th and 19th century precise surveying equipment and measurement procedures were developed. With heavy devices the pioneers of the alpine topography climbed on the mountain summits and – often under extreme weather conditions – accomplished their complex measurements.



Raphael Ritz, 1880

## 2. SAMUEL BODMER (1652-1724)

Alpine rivers and alpine lakes were always incalculable and inundated fields and settlements again and again. The city Thun at the lake of Thun in Bernese Oberland (Switzerland) was often inundated. Reason was the alpine river Kander, which flows near Thun into the river Aare coming out of the lake of Thun.

Surveyor Samuel Bodmer (1652-1724) had the idea to reroute the river Kander in the lake of Thun so that the rubble of the river was deposited in the lake. For this a several hundred meter of high hill had to be broken through. Some hundred workers worked during four years with simple devices, until the river Kander could flow into the lake. In Thun the discharge of the river Aare was increased only later, so that it came again to inundations. Later other rivers were rerouted in lakes in this model.



Samuel Bodmer



Correction of River Kander 1711-14



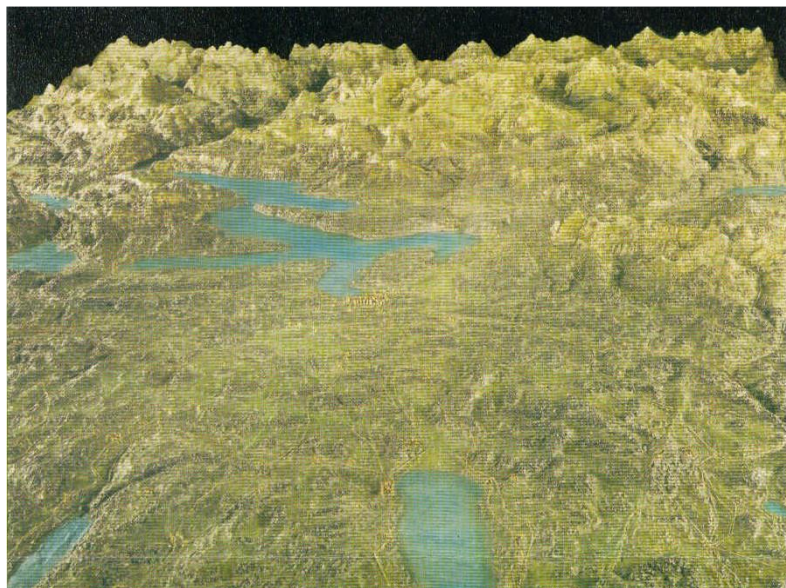
### 3. FRANZ LUDWIG PFYFFER (1716-1802)

Three dimensional models of landscape (reliefs) have a long tradition in Switzerland. The glacier garden museum in Lucerne accommodates the world-wide oldest mountain relief: the “Relief of the Central Swiss (Urschweiz)” (1747-1786) by Franz Ludwig Pfyffer. This oldest landscape representation illustrates topographic exactly an area of approximately 4100 km<sup>2</sup>. It enclosure nearly a tenths of the terrain of today's Switzerland and shows the cantons Lucerne and Unterwalden, and parts of the cantons Uri, Schwyz and Berne on a scale of 1:11`500. For the first time the principle of the three-dimensional landscape representation was applied to a spacious landscape of numerous valleys.

Franz Ludwig Pfyffer (1716 -1802), following a family tradition, promoted to general in Paris, which for Swiss officers was very rare. At the age of 52 years Pfyffer left the French services. For Lucerne’s government he realized different engineer’s projects: roads, bridges, river corrections. He made measurements and maps. Pfyffer had a number of distinguished measuring instruments, procured himself in half Europe.



Franz Ludwig Pfyffer



Relief of Central Switzerland

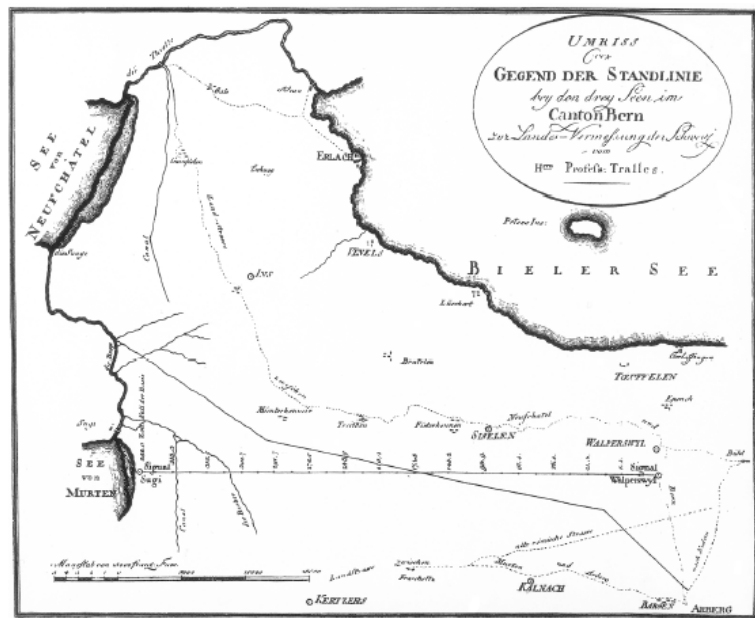
#### 4. FERDINAND RUDOLPH HASSLER (1770-1843)

Ferdinand Rudolph Hassler (1770-1843) studied mathematics and physics in Berne, capital of Switzerland, under professor Georg Tralles, geodesist from Hamburg, Germany. 1791 Tralles and Hassler measured a 7.6 mile long baseline near Berne for the survey of a part of Switzerland using a steel chain by Ramsden. Hassler and Tralles measured also a triangulation net of 50 points. 1794 Hassler ordered a 3 ft diameter azimuth circle from Ramsden. Unfortunately it did not reach Berne until 1797. In March 1798 was the French invasion to Switzerland; Switzerland became the Republic of Helvetien (1798-1804). The Ramsden theodolite was only saved by Tralles cunningly taking it to pieces and the French General Schauenberg considered the single parts to be worthless.

In 1798 Hassler proposed to the Helvetian Government a “General trigonometrical surveying of Helvetien” and the establishment of a “central card depot and surveying office”. The proposal was not accepted. So by 1804 Hassler arranged for large tracts of land to be purchased for him in South Carolina and Louisiana. He encouraged 120 immigrants to accompany him in a venture to establish a farming cooperative, providing much of the needed funds himself. He left Berne May 15 1805 and reached Philadelphia in September. In US the Swiss immigrant Ferdinand Rudolph Hassler initiated geodetic measurement and participated in the foundation of the US Coast and Geodetic Survey and the US Bureau of Standards and became first chief of it.



Ferdinand Rudolph Hassler



Baseline near Berne

## 5. GUILLAUME-HENRI DUFOUR (1787-1875)

Under the direction of General Guillaume Henri Dufour (1787-1875) the first precise map over those whole Switzerland was developed. It became well-known and world-famous under the name of Dufourkarte. Dufour issued exact instructions for the topographic admission, which took place in the central country on a scale 1:25'000 and in the mountains 1:50'000.

Already before conclusion of the Dufourkarte voices became loud to publish the measuring table sheets, not only in the reduction on 1:100'000, but in the original scale 1:25'000 and 1:50'000. Starting from 1870 Hermann Siegfried (1819-1879) took place the publication of the Swiss topographic Atlas (Siegfriedatlas), 1:50'000 for the mountain sheets and 1:25'000 for the map sheets in central country. As basis served the original sheets of the Dufouratlas, which was revised or remeasured.



Guillaume Henri Dufour



Dufour map



## 6. XAVER IMFELD (1853-1909)

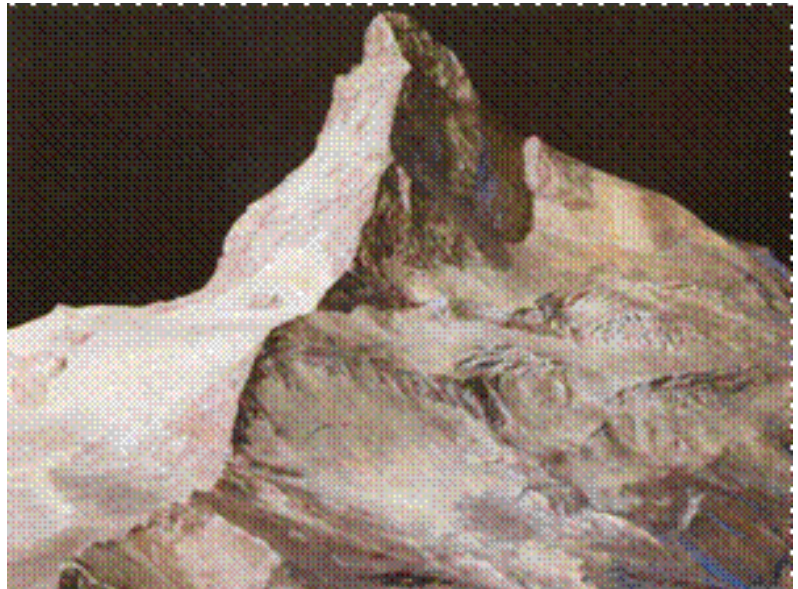
Xaver Imfeld (1853-1909) began his career 1876 in the Swiss federal topographic office (today Federal Office of Topography swisstopo) in Berne. As topographer of the mountains he was busy with revisions of map sheets of the Siegfriedatlas. 21 map sheets of Alpine Switzerland carry his name. As a specialist for rock designs Imfeld contributed to the world-wide admired “Swiss manner” of cartography.

In the second half of 19. century the mountain tourism began in the Alps. Maps for tourists and mountain climbers, panoramas as information and pleasure and three dimensional models of the landscape (reliefs) found grateful customers. The Swiss alpine club and its sections as well as associations, mountain railways and hotel owners ordered panoramas and maps. New mountain railways were projected. Xaver Imfeld found a welcome operating field. He drew mountain maps and panoramas, modelled numerous alpine reliefs and projected mountain railways

Where he worked, he made at the same time topographic measurements, drafts for panoramas, sketches for reliefs and projects. Xaver Imfeld was one of most important Swiss panorama draughtsmen, relief artists and cartographer. He won numerous national and international prizes. “Xaver Imfeld – master of the Alpin Topography” is called a book and an exhibition concerning the life and work of Xaver Imfeld ([www.xaverimfeld.ch](http://www.xaverimfeld.ch)).



Xaver Imfeld



Relief of Matterhorn

## REFERENCES

Xaver Imfeld: [www.xaverimfeld.ch](http://www.xaverimfeld.ch)

## BIOGRAPHICAL NOTES

Consulting engineer for geoinformation, environmental engineering and spatial and town planning

Editor of the Swiss professional journal „Swiss Geomatics – Geoinformation and Land Management“

Author of several papers in Swiss and German reviews

Committee of professional associations:

Swiss Association of Surveyors geosuisse (FIG delegate and responsible for public relations)

Swiss Association for Spatial and Town Planning

Swiss Association for Geo-Information

## CONTACTS

Thomas Glatthard

Museggstrasse 31

6004 Luzern

SWITZERLAND

Tel. + 41 41 410 22 67

Fax + 41 41 410 22 67

Email: [thomas.glatthard@geosuisse.ch](mailto:thomas.glatthard@geosuisse.ch)

Web site: [www.geomatik.ch](http://www.geomatik.ch), [www.geosuisse.ch](http://www.geosuisse.ch)