

Name of research institute or organization:

**Federal Office of Topography, swisstopo, Wabern**

Title of project:

Absolute gravimetric calibration line Interlaken-Jungfrauoch

Project leader and team:

Dr. Urs Marti, swisstopo

Dr. Christian Gerlach, Bavarian Academy of Sciences (BAdW)

Dr. Henri Baumann, Federal Institute of Metrology (METAS)

Dr. Sébastien Guillaume, ETH Zurich

Project description:

The first gravimetric calibration line Interlaken-Jungfrauoch has been established 1980 and been published in 1982 (Klingelé, E. and H.-G. Kahle, 1982). The aim of these measurements is to provide precise absolute gravity and gravity difference values along the line, thus providing information on drifts and scale factors of relative gravimeters. The calibration line consists of 7 stations with gravity differences not extending the measurable range of relative gravimeters. In comparison with other existing gravimetric calibration lines consisting of two stations located at different altitudes, this matter of fact represents a unique feature.

In 2013, the calibration line has been renewed and re-measured with the absolute gravimeter FG-5 of METAS. At the same time, 3 relative gravimeters of swisstopo, BAdW and DGFİ (deutsches Geodätisches Forschungsinstitut, München) have been calibrated (see [http://www.hfsjg.ch/wordpress/reports/2013/139\\_ETHZ\\_Buerki\\_cf.pdf](http://www.hfsjg.ch/wordpress/reports/2013/139_ETHZ_Buerki_cf.pdf)). In October 2016, a first small verification of the measurements of 2013 was performed by the FHNW (Fachhochschule Nordwestschweiz, Muttenz) (see Condamin, 2016). These activities are described in [Marti, 2017].

On four days in August 2017, a complete re-observation of the calibration line took place with 4 relative gravimeters Scintrex CG-5 of swisstopo/ETHZ, the University of Lausanne, the University of Neuchâtel and the private company geo2x SA. These are all the existing CG-5 in Switzerland. In addition, the ZLS Burris instrument of the BAdW (Munich) was used (see figure 1).

A first preliminary comparison of the results of the different instruments showed rather large differences, which are mainly caused by scale factors. This demonstrated again the necessity and the usefulness of this calibration line.



Figure 1. The operators with their instruments on the Sphinx terrace.

Key words:

---

Gravimetry, gravimetric calibration line

Collaborating partners/networks:

---

Université de Neuchâtel, Centre d'Hydrogéologie et de Géothermie (CHYN)  
Université de Lausanne, Institut des sciences de la Terre  
Geo2x SA, Geophysics for Geology, Oulens-sous-Echallens

Scientific publications and public outreach 2017:

---

**Conference papers**

Marti, U., H. Baumann, B. Bürki and Ch. Gerlach, A First Traceable Gravimetric Calibration Line in the Swiss Alps, IGFS 2014 (Jin and Barzaghi, eds.), Proceedings of the 3rd International Gravity Field Service (IGFS), Shanghai, China, June 30 - July 6, 2014, IAG Symposia Series Nr. 144, doi: 10.1007/1345\_2015\_52, Springer Verlag, 2016.

**Theses**

Condamin, S., Validierung von Schweregradienten auf LSN2004 Punkten, Master-Thesis 2016/Nr. 7 des Instituts Vermessung und Geoinformation der Fachhochschule Nordwestschweiz, Muttenz, 2016.

**Data books and reports**

Klingelé, E., and H.-G. Kahle, The Swiss gravimetric calibration line from Interlaken to Jungfrauoch (Switzerland), Institute of Geodesy and Photogrammetry, ETH Zurich, Separata, Nr. 120, 1982.

Marti, U., Gravimeter-Eichstrecke Interlaken-Jungfrauoch, Arbeiten in den Jahren 2010-2016, Swisstopo Report 17-04, Wabern, 2017.

Address:

---

Bundesamt für Landestopografie swisstopo  
Seftigenstrasse 264  
CH-3084 Wabern

Eidgenössisches Institut für Metrologie, METAS  
Lindenweg 50  
CH-3084 Wabern

Eidgenössische Technische Hochschule Zürich  
Mathematical and Physical Geodesy  
Robert-Gnehm-Weg 15  
CH-8093 Zürich

Contacts:

---

Dr. Urs Marti (swisstopo)  
Tel.: +41 58 469 03 78  
e-mail: [urs.marti@swisstopo.ch](mailto:urs.marti@swisstopo.ch)

Dr. Henri Baumann (METAS)  
Tel.: +41 58 387 02 43  
e-mail: [henri.baumann@metas.ch](mailto:henri.baumann@metas.ch)

Dr. Sébastien Guillaume (ETH Zürich)  
Tel.: +41 44 633 67 82  
e-mail: [guillaume@geod.baug.ethz.ch](mailto:guillaume@geod.baug.ethz.ch)