



# Trip Report 2011

The Fifth annual Geomatics Engineering Student  
Trip to Switzerland

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## Introduction

In September 2010 the preparations had begun for the fifth installment of the hugely popular educational trip to Switzerland. Twenty students from the department of Geomatics Engineering at the University of Calgary, Canada, were selected for the trip and were joined by fellow professor Dr. Petovello. The ten day trip took place in May 2011 and proved to be a great success due to the enthusiastic input from the students and our professor, and the continuing support from the Schulich school of engineering and the department of Geomatics Engineering.

The purpose of the educational trip was to provide students with practical and theoretical experience of the Geomatics industry in Switzerland, where many world leading Geomatics technologies are researched, developed and implemented. The Switzerland trip also provided an opportunity to learn from other cultures and give students a well rounded foundation upon which to build their knowledge for future careers in the industry. This report highlights some of the aspects of the trip and in particular, focuses on the educational experiences with Geomatics related companies and universities.

As well as learning about various programs and research within the Geomatics industry, the Switzerland trip also provided an opportunity to showcase student life at the University of Calgary, and in particular, discuss the types of research and programs that are taking place within the department of Geomatics Engineering.

This fantastic opportunity would not have been possible without the generous funding provided by Mr. Seymour Schulich in the form of the Schulich Student Activities Fund. Each student was awarded the grand total of \$1250 towards the cost of this trip, which made it much more affordable and accessible for everyone involved. **Thank you Seymour Schulich!**

Many thanks to all of the industries, universities, and tour guides that were responsible for making this trip the success that it was. This experience would not be possible without your continued support. Thanks also to PhD student Erwan Renoudin for providing industry contacts at CERN, EPFL and SwissTopo. These contacts were invaluable and helped make the trip what it was.

## Itinerary

Date	Detail
Monday May 2 <sup>nd</sup>	Depart Calgary
Tuesday May 3 <sup>rd</sup>	Arrive in Geneva
Wednesday May 4 <sup>th</sup>	Tour of CERN + High Precision Survey Department
Thursday May 5 <sup>th</sup>	Travel to Lausanne Tour of Federal Polytechnic School in Lausanne (EPFL) Travel to Bern
Friday May 6 <sup>th</sup>	Tour of the Federal Office of Topography (SwissTopo)
Saturday May 7 <sup>th</sup>	Travel to Interlaken Day off in Interlaken
Sunday May 8 <sup>th</sup>	Day off in Interlaken and Luzern Travel to Zurich
Monday May 9 <sup>th</sup>	Travel to Heerbrugg Tour of Leica Geosystems
Tuesday May 10 <sup>th</sup>	Tour of the Federal Institute of Technology in Zurich (ETH)
Wednesday May 11 <sup>th</sup>	Day off in Zurich
Thursday May 12 <sup>th</sup>	Depart Zurich Arrive in Calgary

The itinerary provided a good mix of education and free-time. This allowed the entire group to learn a lot about the Geomatics industry and explore the culture and landscape of Switzerland. Ten days was an ideal length of time for this trip due to the large number of activities involved.

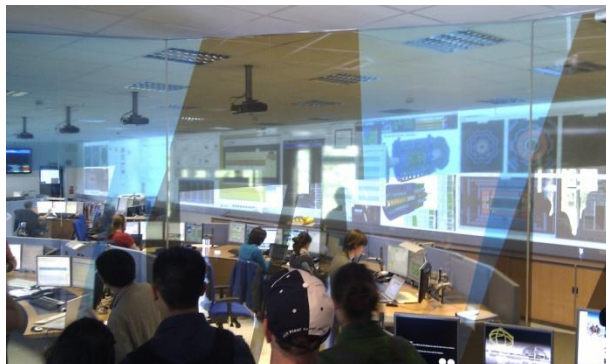


After a long flight to Geneva and half a day to recover the following morning, we were on our way to the European Organization for Nuclear Research (CERN) near the French border in South Western Switzerland. As the world's largest particle physics laboratory and home to some of the most widely used technology (the World Wide Web, for instance), CERN is a

buzzing hive of research and development, particularly in high-energy physics. The opportunity to visit operational experiments was delightful, and it was easy to see why the tours are booked almost a year in advance. Our guide for the three hour tour was a CERN veteran with over 30 years of experience working at the facility on research and development. He was extremely eager and enthusiastic to share his in-depth knowledge of the ins and outs of particle physics. It was both fascinating and utterly perplexing at the same time. The tour consisted of a 2 hour lecture describing the history of CERN, the various research branches within the facility and a detailed explanation of the experiments situated at various intervals around the Large Hadron Collider (LHC). Afterwards, we were driven to an experimental area known as ATLAS (A toroidal LHC apparatus), which is a 7000 ton experiment designed to detect various particles travelling through the LHC. ATLAS uses two superconducting magnets that bend the fast moving particles in order to determine their momentum, and ultimately their identity.

This particular visit to CERN was the first time that we were fortunate to meet with Dominique Missiaen, the section leader of the Large Scale Metrology department. Dominique and his team are responsible for the high precision surveying and monitoring of all the experiments at the CERN facility. They were very generous to provide a quick presentation about the work that they do, and the custom products that they implement in order to work on such large and challenging projects. They use laser ranging, terrestrial photogrammetry and Geomatics networks in order to monitor and install the experiments to accuracy within tenths of millimeters.

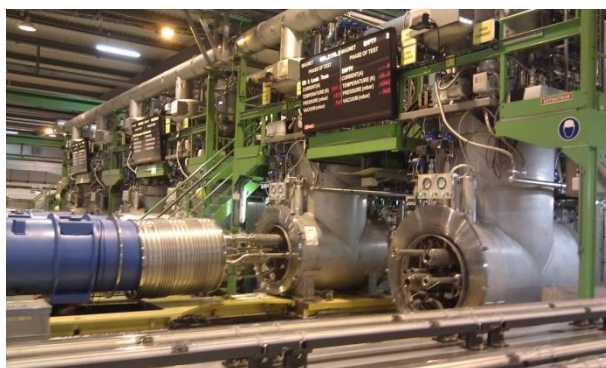




*Control Room of the ATLAS experiment*



*Cross section of the particle accelerator*



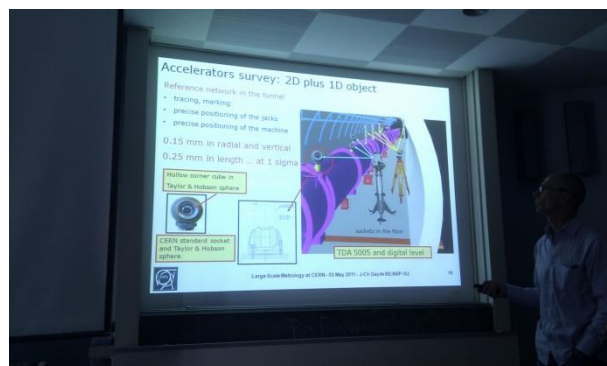
*Testing facility for the particle accelerator*



*Sample section of the particle accelerator*



*Cut-away of the particle accelerator*



*Metrology and survey presentation*



After a short two nights in Geneva we were on the train heading to Lausanne for yet another unique experience, in the form of a visit to the Federal Polytechnic School in Lausanne (EPFL). We were generously welcomed by Bertrand Merminod, the director of the geodetic engineering laboratory, who was keen to show us around the lakeside campus. Dr.

Merminod gave a presentation on the Switzerland education system and informed us of the Geomatics related courses available and the research taking place at EPFL. One of the research projects led by Dr. Jan Skaloud, was called 'Close Search' and was part of an autonomous search and rescue operation that aims to assist in remote and difficult-to-access areas in time critical situations. Close Search relies on a GPS-EGNOS-based UAV flight control with thermal imaging sensors and 3D geospatial databases, all mounted on a small unmanned aircraft. Another research project was led by a doctorate student who was developing an erosion analysis tool using GIS and remote sensing. Dr. Petovello then had the opportunity to give a short presentation from the Geomatics department to discuss our Bachelor/Masters Curriculum and student experiences. The Professors and students of EPFL were interested to learn the differences between our two programs.

After the classroom presentations, Dr. Merminod gave us a tour of the campus. Our first stop was the Engineering Student lounge, which had a balcony on the fourth floor that overlooked the campus with a beautiful view of Lake Lemman and the French Alps in the distance. We were then taken to one of the newest buildings on the campus known as the RLC, which is a wave shaped building that resembles a melting slice of Swiss cheese. The RLC is a modern study facility with open spaces, glass conference rooms and colourful bean-bags.

After a short visit to the geodetic laboratory, and a quick demonstration of a custom built remote sensing camera, we were whisked off to the student bar known as 'Satellites', which provided further discussions with the professors and a taste of salty Swiss bread sticks.



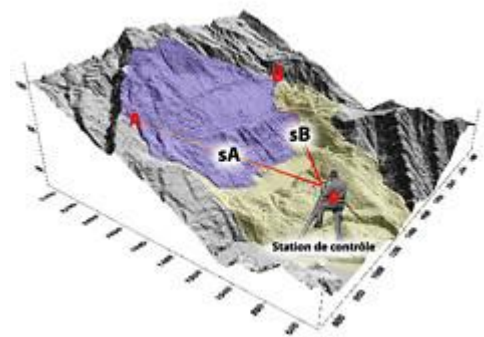
*View of Lake Lemman and the French Alps*



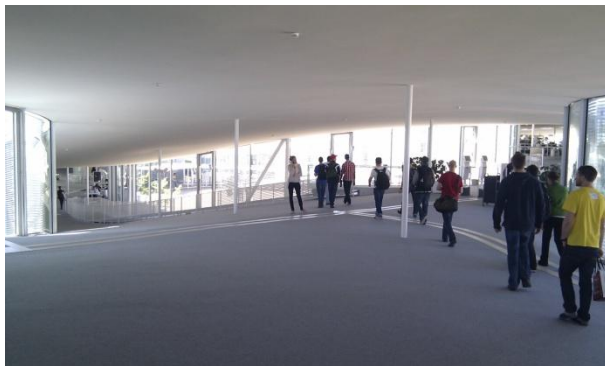
*View of Lake Lemman and the French Alps*



*'Close-Search' AUV*



*Terrain Analysis Model*



*View of inside the RLC*



*View of outside the RLC*





Bern is a beautiful city full of history. Our hostel was a perfect example as it was located at the bottom of a steep funicular behind the government buildings overlooking the river Aare. After a pleasant evening of sight seeing we were on a short tram ride heading for Wabern, where SwissTopo is located. This was our first full day of activities and proved to be one of

the most popular during our 10-day trip. As the federal office of topography, SwissTopo is responsible for the mapping, monitoring and development of the entire Swiss landscape. This includes periodic surveys of the countryside to report new or depleted pathways with the use of hand-held survey equipment. SwissTopo is also responsible for providing customers with detailed maps ranging from 1:1 million - 1:25000 in print, digital and mobile media formats (including fashionable ties!).

Our tour of SwissTopo began with some detailed presentations on mapping with the use of GPS, remote sensing and 3D modeling software. We also learnt about the digitization of historical maps for record keeping and analysis. At lunchtime we were taken to the government cafeteria and generously provided some traditional Swiss food in the form of Sausage and Rösti - Delicious!

After lunch we were taken on a scenic bus journey to Zimmerwald in the nearby hillside overlooking Bern where the SwissTopo observatory was located. We were very fortunate to be taken to the observatory as the weather was stunning and provided for a great view of the landscape. The SwissTopo observatory in Zimmerwald is home to several experiments including satellite laser ranging, monitoring of coordinates, gravity measurements and searching for space debris. Most importantly, Zimmerwald is home to the 'fundamental point', which is the first survey marker in Switzerland from which 200 points in the Swiss coordinate reference network are based. One of the last exhibits of the observatory was the highly precise FK5 absolute gravimeter that was mounted on a 10 m deep foundation of concrete in the basement. Of course, our mere presence at the site invalidated any gravity measurements!



*Our greeting at the Wabern office*



*Survey Network Presentation*



*Zimmerwald Observatory*



*Gravimeter Measurements*



*Star Telescope*



*Space Debris Telescope*



Our Monday morning started with an early 06:30 departure on a two hour train journey to Heerbrugg near the Austrian border in the far North East of Switzerland. As one of the world leading manufacturers of survey equipment, Lieca Geosystems is a company that the department of Geomatics Engineering is very familiar with. Our tour began with some

presentations on the history of Leica and the various products and markets that they are involved with. We were then given a tour around the showroom where some of the earliest theodolites and total stations were on display, as well as the latest survey equipment including 3D laser ranging and remote control total stations.

We were then given a tour of Swiss Optics, which is the company that now takes care of the manufacturing of prisms and glassware that is used in all of the Leica Geosystems products. It was fascinating to see the processes involved in all of the glassware and our guide even allowed us to take samples of some imperfect prisms before heading to the assembly plant! The assembly plant was completely mesmerizing. It is an amazing opportunity to see how each item goes through a rigorous procedure in order to produce such accurate equipment. Each item is made by hand goes through a series of detailed calibration checks.

Lunch was served at the employee cafeteria before we were given some outdoor demonstrations. Here we were able to see a remote controlled total station coupled with a hand-held prism and receiver using Bluetooth. The Total station can be set to search for a prism using a variety of algorithms that can be defined by the hand-held receiver.





*Hand-held GPS antenna and receiver*



*Close-up of the hand-held receiver*



Leica TPS 1200+





Our last tour of the 10-trip to Switzerland was at the Swiss Federal Institute of Technology in Zurich. Here we visited the Geodetic Metrology and Engineering Geodesy department at the Hönggerberg campus in the North West of the city. We were generously welcomed by Dr. Hilmar Ingensand who gave presentations on the Bachelor/Masters curriculum and Geodetic

Metrology. We were also joined by other professors who gave talks on Photogrammetry and remote sensing, land use planning and urban development, geographical information systems and cartography.

ETH Zürich is known for its contribution to the Geomatics industry, and the presentations were a true reflection of the dedication involved. One particular example, led by Dr. Lorenz Hurni, was a digital atlas of Switzerland. The digital atlas was a project in collaboration with the Swiss federal office of Topography that provides a comprehensive encyclopedia of geographic information for all of Switzerland. There are 2000 themes available that range from transport and environment, to religious denominations and politics, which are all available to view in either a 2d, or 3d panorama, block, or prism mode.

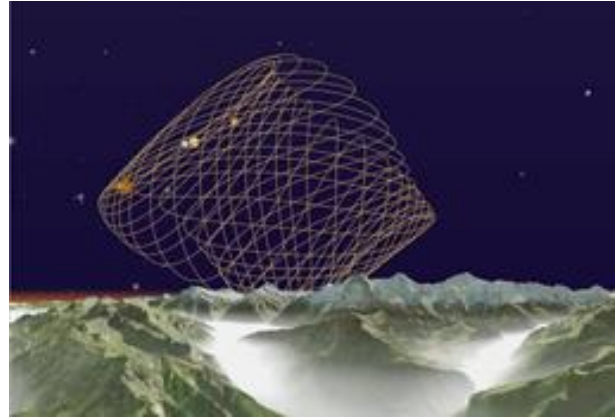
Once the presentations were finished we headed to the staff cafeteria for some delicious grub. Two students from the GUV students' society joined us before taking us on a tour of Zurich, which included the Main ETH Campus in the centre of Zurich, and the observation tower overlooking the city.

In the evening we were welcomed back at the Hönggerberg campus where ETH students were hosting a student gathering, which involved a small orienteering course and a BBQ. It was a fantastic way to get to know some of the students and was an excellent end to the educational tours in Switzerland.





*3D model of geographic data across Switzerland*



*Simulation of planets' orbits from the mountains*



*Radio mast during our tour of Zurich*



*Observation tower overlooking Zurich*

## Accommodation

Our accommodation for the entire trip was in a series of International Youth Hostels, which not only provided inexpensive living, but always came with a free breakfast (essential), comfortable beds, friendly staff and sometimes free Wi-Fi. Most of the hostels were in an extremely accessible part of the city, although sometimes they came with bus loads' of school children. One of the most favoured hostels was in Zurich, which was the largest of all hostels and provided very clean and spacious areas along with tourist gifts and laundry facilities. Some other hostels, such as the one in Interlaken, were much more quiet and quaint and provided a pleasant relaxing stay.

## Transport

The easiest way to get around Switzerland is by train. They are fast and comfortable, but most importantly, on time! Planning a schedule around Switzerland in advance becomes very easy as you can rely on when the trains are arriving. Purchasing a Swiss Pass allows you to travel freely on any mode of transport for the duration of the trip.

## Conclusion

This years' trip to Switzerland brought students together from the University of Calgary, EPFL and ETH Zurich to share their knowledge of Geomatics engineering. The trip was a great success proving to be highly educational, not only in the field of Geomatics Engineering, but in Swiss culture and particle physics! International experiences such as these are invaluable for enhancing a students' understanding of the world, which greatly improves networking and personal development. The opportunity to visit Switzerland is an asset to students in Geomatics Engineering at the University of Calgary, and it would be great to continue the tradition. Thanks again to Dominique Missiaen (CERN), Dr. Bertrand Merminod (EPFL), Leila Kislig and Elmar Brockmann (SwissTopo), Monica Meni (Leica Geosystems), Dr. Hilmar Ingensand and Simone Grindat (ETH Zurich), Dr. Petovello, Erwan Renoudin, Dr. Lynne Cowe Falls and of course Seymour Schulich for making this trip possible.

## Testimonials

"Getting to go outside and demo the TPS as well as GPS instruments got me really excited for my future in Geomatics"

*Jesper Pedersen - 2nd year*

"Walking around streets filled with buildings that have historical meaning was an enjoyable part of the trip."

*Roman Abdoullaev - 3rd year*

"The Geomatics trip to Switzerland was definitely a highlight during my undergraduate degree. I was able to learn a lot as well as travel overseas."

*Brian Yee - 4th year*

"This trip was an amazing way to end my four years at the University of Calgary and expand my scope to include future options internationally."

*Stephanie deBoer - 4th year*

"I found that the services SwissTopo provided included many topics that we have learned in our Geomatics courses, such as least squares, photogrammetry, remote sensing, and GIS."

*Henry Hy - 4th year*

"You get to learn about Geomatics in the world abroad, but most importantly you get to know your classmates very well and it's these relationships that will serve us well in the future."

*Jordan Maretzki - 3rd year*

"The Geomatics Switzerland trip is an event I will never forget."

*Adam Hussein - 3rd year*

"The surveying techniques and the contraction of the materials [at CERN] were right out of our third year survey class with Dr. Barry."

*Mark Hornemann - 3rd year*

"The experience of our day with SwissTopo was, by far, the most engaging and comprehensive tour of the entire trip."

*Tasha Wong-Ken - 3rd year*

"Apart from the sightseeing, I was able to gain a better understanding into the real world applications of Geomatics."

*Harry Singh - 4th year*

"It was an amazing experience that I would not have had the means to do on my own."

*Ben Trodd - 2nd year*

Overall the one thing I have taken away from this trip can be described in one word: Inspired."

*Jesse Vanneste - 2nd year*

"The trip seemed to go by really fast as we saw so many different cities, and tours which provided a nice cultural and educational experience, not to mention a whole lot of fun."

*Curtis Wazney - 4th year*

"While I have a new found respect for Leica, the equipment we use, and the research, development, and production of this equipment, every tour we participated in made this trip everything that it was."

*Emanuel Lys - 4th year*

"This type of a trip is tremendous in its impact on the student experience."

*John Lee - 4th year*

"Not only did our group travel across the country meeting people from various regions, we also had the opportunity to see how many of the courses studied in our degree are implemented in real life."

*Miranda Airriess - 4th year*

"The time spent in Switzerland provided us a chance to experience things that very few people are fortunate enough to see and these will be memories that stay with me for the rest of my life."

*Andrew Moody - 4th year*

"Through the trip I was also able to achieve a deeper understanding of the opportunities that my chosen profession has in store for me upon completion of my bachelor degree in Geomatics engineering."

*Curtis Pidgeon - 3rd year*