

Report of the Director

The year 2014, also known as the UN International Year of Crystallography, has brought additional space for conducting science. During summer 2014 a heated inlet system was installed at the Jungfrau East Ridge and soon after the first measurement results could be seen from the lowland. So, the East Ridge is operational! This new infrastructure will allow us to record climate and environmental information within the next couple of years and to eventually decide whether the East Ridge is a suitable additional site for this kind of investigations. We hope that the East Ridge will become as shiny as a rock crystal.

In contrast to the smoothly running activities at the East Ridge, the construction of the new protection roof of the Research Station Jungfraujoch called for tremendous patience. The weather conditions in summer and autumn were far from ideal for this project. Therefore, only the west side of the roof was finished in 2014, with the east side remaining to be done in 2015. We precatory wait for better conditions.

A first workshop to inform teachers of secondary and gymnasium level about the capabilities of the remote telescope installation at Gornergrat was organised by the Stellarium Gornergrat project-team in collaboration with the Pedagogical University of Bern and our Foundation in March 2014.

The Foundation HFSJG

In 2014 no Board meeting took place as according to the Foundation by-laws such a meeting is required only every second year. The activity report and the statement of accounts for the year 2013 have been approved by the Board Members and the HFSJG administration was given discharge.

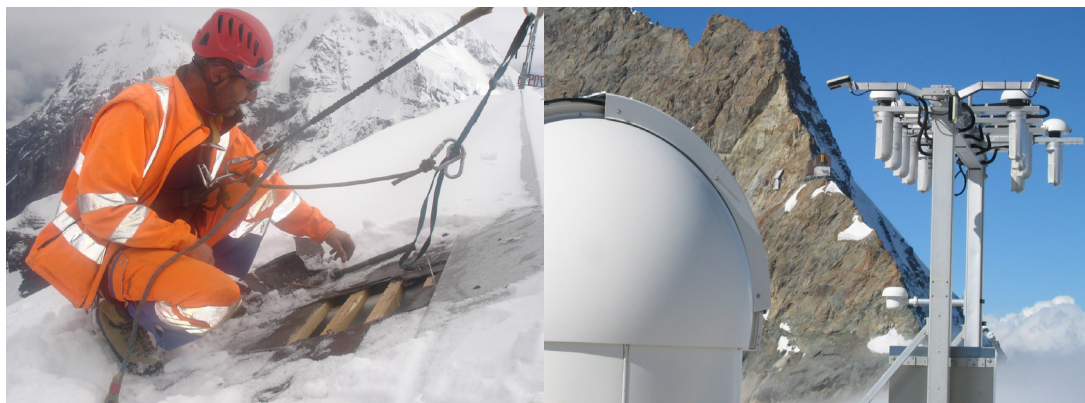


Figure 1: Installation of the inlet system (left) by a worker of the Seiler AG, Bönigen at the Jungfrau East Ridge (right) in August 2014.

Prof. em. Heinz Gäggeler took over the presidency of the Jungfraujoch Commission of the Swiss Academy of Sciences from Prof. Martin Huber. Its annual meeting was held on June 20, 2014 at the House of Sciences, Bern. A second workshop "Spawning the Atmosphere Measurements of Jungfraujoch, Schneefernerhaus and Sonnblick" has been initiated by Prof. Huber, and took place from January 22 – 24, 2014 in Bern.

The user meeting, the former Astronomic Commission meeting, took place at the Hotel Bern on May 9, 2014 with a focus on the temperature problem in the laboratory of the second level of the Sphinx observatory. The meeting was followed by two presentations, one by Dr. Timm Riesen about the Stellarium Gornergrat project and the second about "PermaSense Wireless Sensing at Jungfraujoch - Extending the Sphinx observatory to the surrounding mountain ridges" by Dr. Jan Beutel.

Another three year proposal of the HFSJG was submitted to the Swiss National Science Foundation (SNF) on April 1, 2014 and was positively evaluated, thereby securing the expenses for the period 2015 to 2017. We very much appreciate the continued support the Foundation has been experiencing since 1965. A particular thank you goes to Dr. Paul Burkhard, the head of the Division II of the SNF since 2001 and representative of the SNF at the meetings of the Board. He retired in autumn 2014.

We sadly took notice of the decease of two former supporters of our Foundation: Prof. Dr. Paul Wild, astronomer of the University of Bern and corresponding member of the HFSJG, on July 2, 2014 and Erwin Aufdenblatten, alt Burgerratspräsident of Zermatt and great benefactor of astrophysical research at Gornergrat, on May 2, 2014.

The High Altitude Research Station Jungfraujoch

Once more the High Altitude Research Station Jungfraujoch could welcome many science projects of national and international relevance. In 2014, 43 (2013:44) research institutions were active at Jungfraujoch. More than 25 of 62 (2013:60) research projects are automated and remotely accessible by their corresponding institutions.

A significant number of projects related to atmospheric science is contributing to the Global Atmosphere Watch (GAW) or the Network of Detection of Atmospheric Composition Change (NDACC) programmes. Involvements in international activities and programmes are, however, not only restricted to these two, a list of networks with active participation of the research conducted at Jungfraujoch can be found in Table 1.

In 2014, we welcomed principal investigators of nine different nations as displayed in Figure 2. Concerning collaborations of projects partners, many more nations appear (Figure 3). All this information can also be retrieved from the HFSJG Webpage (<http://www.hfsjg.ch/jungfraujoch/researchprojects/overview.php>).

The ranking of the working days spent on Jungfraujoch is again led by Swiss institutions followed by scientists from a Belgian, German or United Kingdom institution (Figure 5). Working days by German und United Kingdom scientists were primarily spent during the CLACE campaign 2014.

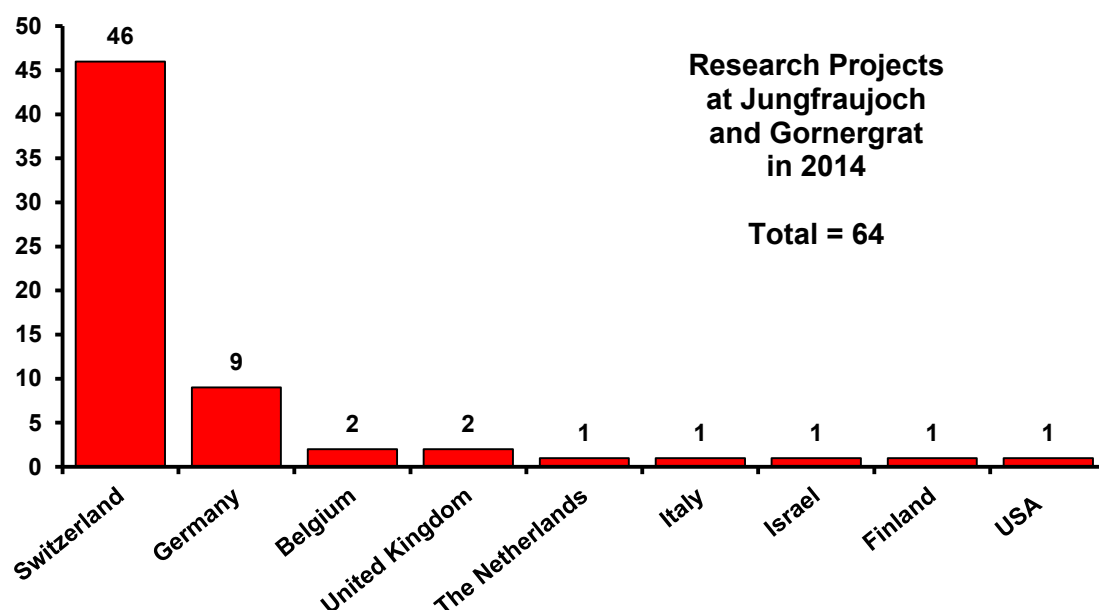


Figure 2: Number of research projects at the High Altitude Research Station Jungfraujoch and Gornergrat in 2014 by country.

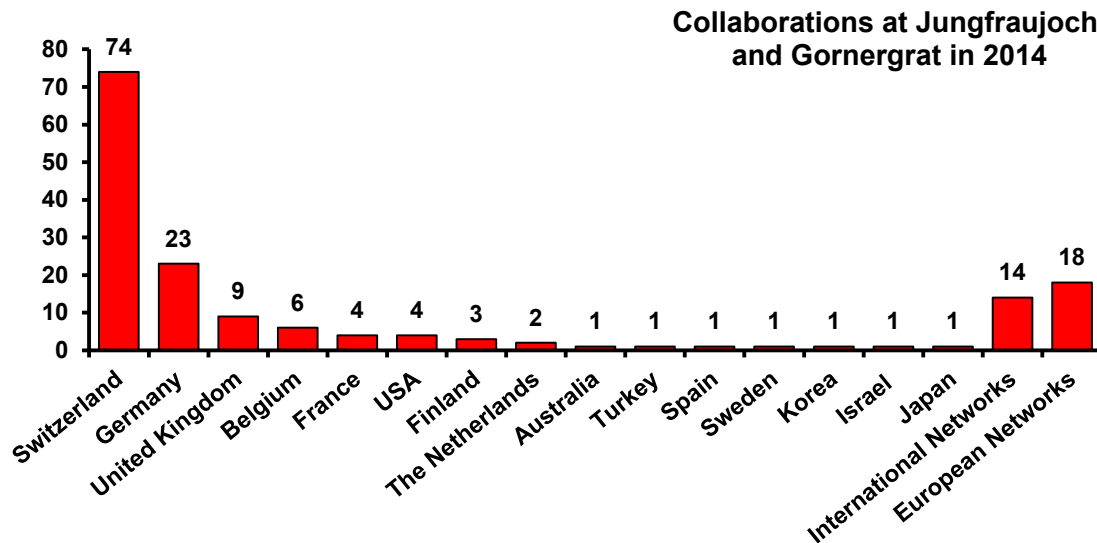


Figure 3: Number of collaborations at the High Altitude Research Station Jungfraujoch and Gornergrat in 2014.

After 2013 another large CLACE campaign was conducted in 2014. This resulted in a similar high number of person-working days at Jungfraujoch as last year, i.e. 1393 (1399 in 2013 and 1004 in 2012). The majority of the working days have been spent during campaigns such as CLACE or medical investigations with durations of several weeks.

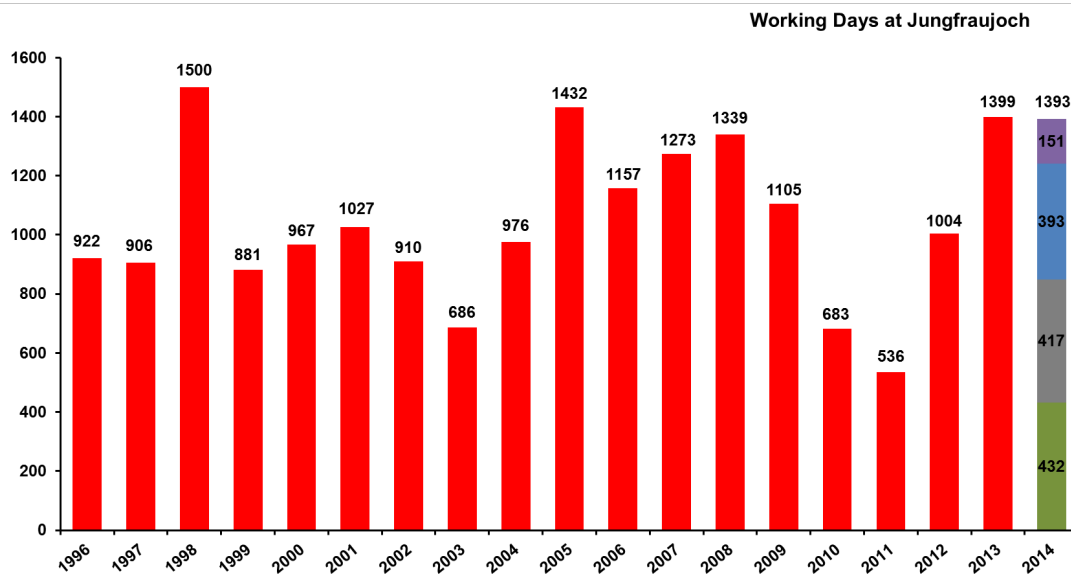


Figure 4: Number of working days spent by scientists at the High Altitude Research Station Jungfraujoch during the past years. The number in 2014 was split up into four categories, i.e. medical campaigns (green), CLACE campaign (grey), atmospheric research (blue), others (purple).

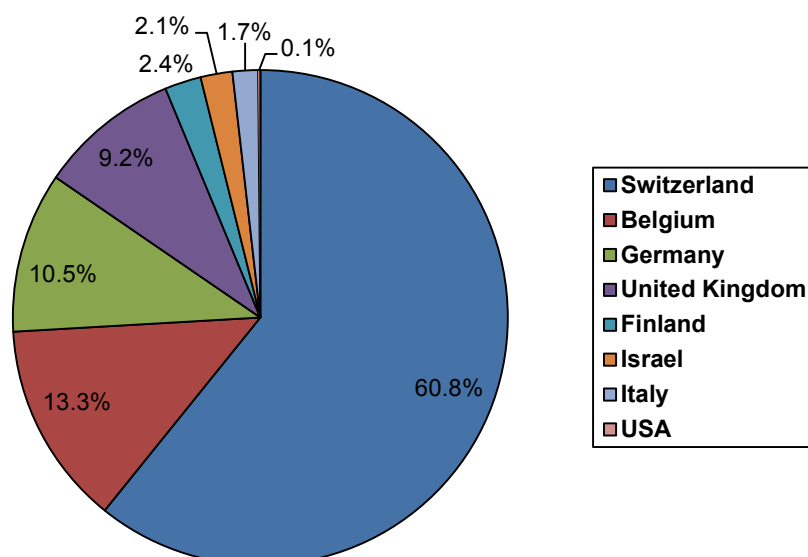


Figure 5: Percentage of person-working days in 2014 at the High Altitude Research Station Jungfraujoch per country.

The research conducted at Jungfraujoch resulted in the following output in 2014:

- 53 refereed publications
- 79 conference presentations / posters
- 4 popular publications and presentations
- 7 data publications and reports
- 4 bachelor- (0), master- (1), PhD (3) thesis and
- 0 book / edited books

Scientific results obtained at Jungfraujoch were presented by the various research groups at a number of international conferences in 2014, e.g. 14th Conference on Cloud Physics, Boston, July 7-11, 2014 (USA), International Conference on Atmospheric Dust (DUST), Castellana Marina, June 1-6, 2014 (I), Symposium in Atmospheric Chemistry and Physics at Mountain Sides, Steamboat Springs, August 11-15, 2014 (USA), Spawning the Atmosphere Measurements of Jungfraujoch, Schneefernerhaus and Sonnblick, Bern, January 22-23, 2014 (CH), AGU Fall meeting, San Francisco, December 15-19, 2014 (USA), 49th Meeting of AGAGE Scientists and Cooperating Networks, Ascona, April 26-May 2, 2014 (CH), Non-CO₂ Greenhouse Gases Conference, Amsterdam, November 5-7, 2014 (NL), Annual Meeting of the Swiss Society of Neuroscience, Fribourg, January 24, 2015, International Aerosol Conference, Busan, August 28 – September 2, 2014 (KR), EGU General Assembly, Vienna, April 27 – May 2, 2014 (A), iLEAPS Science Conference, Nanjing, May 12-16, 2014 (CN), 12. Nationale Photovoltaik-Tagung, Lausanne, April 10-11, 2014 (CH), 8th European Conference on Radar in Meteorology and Hydrology, Garmisch-Partenkirchen, September 1-5, 2014 (D), ICOS Science Conference, Bruxelles, September 23-25, 2014 (B), NDACC-IRWG and TCCON meeting, Bad Sulza, May 12-16, 2014 (D), 23rd International Conference on High Resolution Molecular Spectroscopy, Bologna, September 2-6, 2014 (I), 4th European Conference on Permafrost, Evora, June 18-21, 2014 (P), 12th Geoscience Meeting, Fribourg, November 21-22, 2014 (CH), 4th International Conference on Astroparticle Physics, Rome May 22-24, 2014 (I), 31th International Physics Congress, Bodrum, July 21-24, 2014 (TR), EUREF-Symposium, Vilnius, June 1-7, 2014 (LT), WMO Technical conference on Meteorological and Environmental Instruments and Methods of Observation, Saint-Petersburg, July 10, 2014 (RU).

I am extremely thankful to our Science partners, who are amazingly productive in publishing their results. I know this is hard work and therefore particularly appreciate the efforts. This output documents the importance of our infrastructures at Jungfraujoch and Gornergrat in many national and international networks as listed in Table 1.

As an appetizer for the following activity reports, I highlight three research results of 2014, two of them being on an applied science topic whereas one is basic research: (i) the performance test of methanol fuel cells, (ii) the extension of the photovoltaic power plant at the Research Station Jungfraujoch and (iii) investigations of mixed cloud physics.

(i) Dr Ronny Lorenzo from the test centre of armasuisse in Thun investigates the potential of fuel cells for a fail-safe power supply of unattended measuring equipment in remote areas. Jungfraujoch – with its rough weather conditions – is an ideal place to investigate the reliability of methanol based fuel cells. A basic requirement for uninterrupted operation under demanding outside conditions is a weatherproof casing of the fuel cells that allows coping with a large temperature, humidity and pressure range. Such a case is displayed in Fig. 6 which will be further improved over upcoming test periods in 2015.



Figure 6. Methanol Fuel Cell in its new weatherproof aluminium box on the lower platform of the Sphinx observatory during the winter trials.

(ii) A somewhat complementary project to (i) is the long-term project of investigating the energy production of photovoltaic cells in a high alpine surrounding by the Photovoltaic Laboratory of the Bern University of Applied Sciences BFH. In 2014 the small power plant – originally installed in 1993 – was extended with the most recent technology alongside the existing 20 year old technology (Figure 7). The new installation allows comparing the old and new photovoltaic cells and inverters and thereby the technological advancement during the last two decades in this field.



Figure 7. The extension mounted at Jungfraujoch in 2014 with new PV modules on the south and southwest wall (installations on the left) is located near the already existing PV installation from 1993 with 1'152 Wp. The two new grid-connected inverters and the new measuring equipment can be seen in the picture on the right.

(iii) Within the Global Atmosphere Watch Program at Jungfraujoch, scientists from the Paul Scherrer Institute investigate mixed clouds. A specifically designed inlet allows to differentiate between solid (ice), liquid and vapor phase by selectively removing droplets through evaporation without influencing the ice crystals. The latter was not convincingly achieved yet and requires further investigations. However, as shown in Figure 8, the evaporative removal of droplets is very efficient.

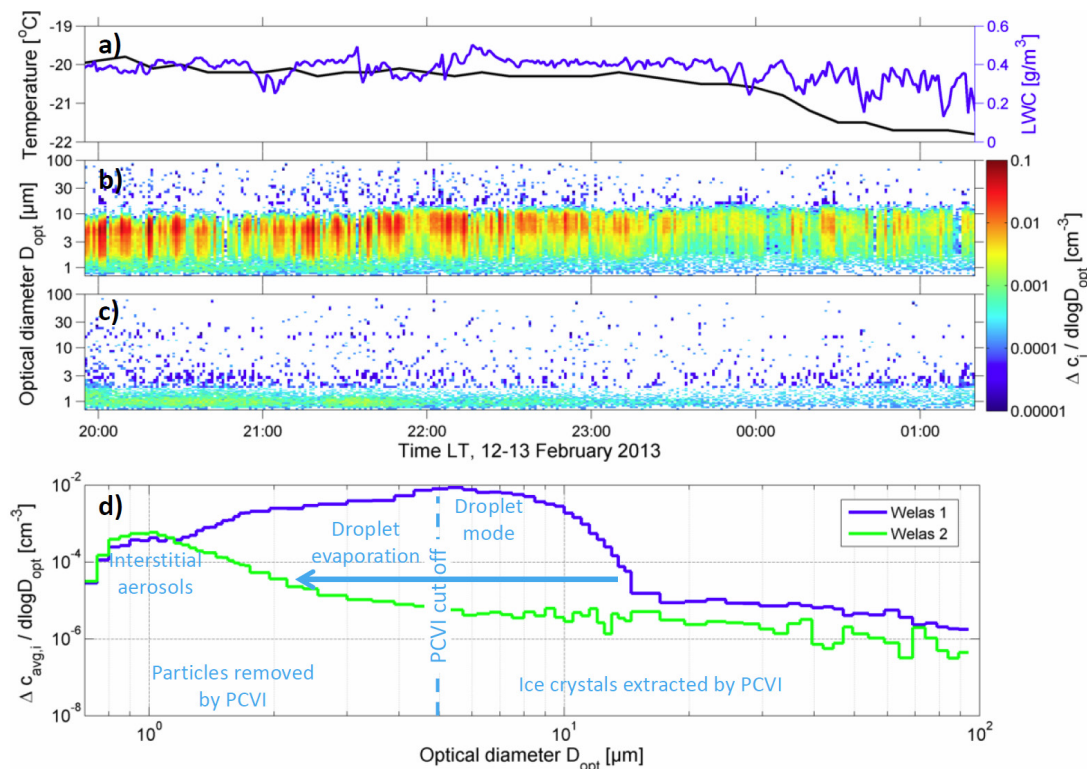


Figure 8. Measurements of liquid water content, air temperature and particle number size distributions during the case study period of 19:55 LT, 12 February 2013 to 01:20 LT, 13 February 2013. Panel (a) shows air temperature (black curve) and liquid water content (blue curve), panels (b) and (c) show time resolved size distributions measured with the upper and lower ISI WELAS 2500 sensors respectively and panel (d) shows average size distributions for the case study period from the two WELAS sensors with an overlaid description of the processes at work in the ISI, and the resulting size distribution characteristics. Note: Δc_i is the number concentration of particles with diameters that fall into size bin i ; $\Delta c_{avg,i}$ is the case study average number concentration of particles with diameters that fall into size bin i .

Kupiszewski, P., Weingartner, E., Vochezer, P., Bigi, A., Rosati, B., Gysel, M., Schnaiter, M., and Baltensperger, U.: The Ice Selective Inlet: a novel technique for exclusive extraction of pristine ice crystals in mixed-phase clouds, *Atmos. Meas. Tech. Discuss.*, 7, 12481-12515, doi:10.5194/amtd-7-12481-2014, 2014.

Additional scientific highlights were published in several peer-reviewed journals:

- Arnold, T., et al., *Geophys. Res. Lett.*, 2014 report HFC-43-10mee atmospheric abundances and global emission estimates.
- Bader, W., et al., *Atmos. Meas. Tech.*, 2014 present long-term evolution and seasonal modulation of methanol above Jungfraujoch.
- Barthlott, S., et al., *Atmos. Meas. Tech. Discuss.*, 2014 use XCO₂ retrievals for assessing the long-term consistency of NDACC/FTIR data sets.
- Beddows, D., et al., *Atmos. Chem. Phys.*, 2014 present variations in tropospheric submicron particle size distributions.
- Bergamaschi, P., et al., *Atmos. Chem. Phys. Discuss.*, 2014 report about top-down estimates of European CH₄ and N₂O emissions.
- Fang, S. et al., *Atmos. Chem. Phys.*, 2014 report about in-situ measurement of atmospheric CO₂ at the four WMO/GAW stations in China.
- Franco, B., et al., *Atmos. Meas. Tech. Discuss.*, 2014 discuss retrievals of formaldehyde from ground-based FTIR and MAX-DOAS observations at the Jungfraujoch.
- Gielen, C., et al., *Atmospheric Measurement Techniques*, 2014 present a simple and versatile cloud-screening method for MAX-DOAS retrievals.

- Griffiths, A. D. et al., *Atmos. Chem. Phys.*, 2014 report surface-to-mountaintop transport.
- Hall, B. D., et al., *Atmos. Meas. Tech.*, 2014 present results from the International Halocarbon in Air Comparison Experiment (IHALACE).
- Hammer, E., et al., *Atmos. Chem. Phys.*, 2014 investigate the effective peak supersaturation for liquid-phase clouds at Jungfraujoch.
- Hammer, E., et al., *Atmos. Chem. Phys. Discuss.*, 2014 discuss the sensitivity estimations for cloud droplet formation.
- Hammer, E., et al. *Atmos. Chem. Phys.*, 2014 report size-dependent particle activation properties.
- Harrison, J. et al., *Atmos. Chem. Phys.*, 2014 report satellite observations of stratospheric carbonyl fluoride.
- Hassler, B., et al., *Atmos. Meas. Tech.*, 2014 present ozone profile measurements: techniques, uncertainties and availability.
- Ketterer, C., et al., *Boundary-Layer Meteorology*, 2014 investigate the Planetary Boundary Layer in the Swiss Alps Using Remote Sensing and In Situ Measurements.
- Kropacek, J., et al., *Remote Sensing*, 2014 estimate the Mass Balance of the Grosser Aletschgletscher.
- Kubancak, J. et al., *Journal of Instrumentation*, 2014 discuss the Liulin silicon semiconductor spectrometers as cosmic ray monitors at Jungfraujoch and Lomnický.
- Langerock, B. et al., *Geoscientific Model Development Discussions*, 2014 describe algorithms for co-locating and comparing gridded model data with remote-sensing observations.
- Liang, Q., et al., *Geophys. Res. Lett.*, 2014 constrain the carbon tetrachloride (CCl₄) budget using its global trend and inter-hemispheric gradient.
- Lin, Y. et al., *Journal of Geophysical Research-Atmospheres*, 2014 report about stratospheric influence on the concentration and seasonal cycle of lower tropospheric ozone.
- Mahieu, E., et al., *Nature* 2014 report recent Northern Hemisphere stratospheric HCl increase due to atmospheric circulation changes.
- Mahieu, E., et al., *Atmospheric Measurement Techniques*, 2014 discuss spectrometric monitoring of atmospheric carbon tetrafluoride (CF₄).
- Maione, M., et al., *Atmos. Chem. Phys.*, 2014 estimate European emissions of methyl chloroform using a Bayesian inversion method.
- Mann, G. W., et al., *Atmos. Chem. Phys.*, 2014 intercompare and evaluate global aerosol microphysical properties among AeroCom models of a range of complexity.
- Mariani, I., et al., *Clim. Past*, 2014 report temperature and precipitation signal in two Alpine ice cores over the period 1961-2001.
- Nicolas, J. et al., *Science of the Total Environment*, 2014 report impacts on particles and ozone by transport processes recorded at urban and high-altitude monitoring stations.
- O'Doherty, S., et al., *Atmos. Chem. Phys.*, 2014 report global emissions of HFC-143a (CH₃CF₃) and HFC-32 (CH₂F₂) from in situ and air archive atmospheric observations.
- Pandey Deloal, S. et al., *Atmos. Chem. Phys.*, 2014 report analysis of elevated springtime levels of Peroxyacetyl nitrate (PAN) at the high Alpine research sites Jungfraujoch and Zugspitze.
- Parrish, D. D., et al., *Journal of Geophysical Research*, 2014 discuss long-term changes in lower tropospheric baseline ozone concentrations.
- Pavlova, P. et al., *Environ. Sci. Technol.*, 2014 report polychlorinated biphenyls in glaciers: 1. Deposition history from an Alpine ice core.
- Portin, H., et al., *Atmospheric Chemistry and Physics*, 2014 discuss the effect of local sources on particle size and chemical composition and their role in aerosol-cloud interactions at Puijo measurement station.
- Ripoll, A., et al., *Atmospheric Chemistry and Physics*, 2014 report three years of aerosol mass, black carbon and particle number concentrations at Montsec.
- Scheepmaker, R. A., et al., *Atmos. Meas. Tech. Discuss.*, 2014 validate the SCIAMACHY HDO/H₂O measurements using the TCCON and NDACC-MUSICA networks.
- Schenk, L., et al., *Atmos. Meas. Tech. Discuss.*, 2014 characterize and give first results of an ice nucleating particle measurement system based on counterflow virtual impactor technique.
- Schwikowski, M., et al., *Annals of Glaciology*, 2014 discuss a new thermal drilling system for high-altitude or temperate glaciers.
- Sepulveda, E., et al., *Atmos. Meas. Tech.*, 2014 report tropospheric CH₄ signals as observed by NDACC FTIR at globally distributed sites and comparison to GAW surface in-situ measurements.
- Steinlin, C., et al., *Environ. Sci. Technol.*, 2014 discuss polychlorinated biphenyls in glaciers: 2. Model results of deposition and incorporation processes.
- Thompson, R. L., et al., *Atmos. Chem. Phys.*, 2014 present TransCom N₂O model inter-comparison, Part 2: Atmospheric inversion estimates of N₂O emissions.
- Tsamalis, C., et al., *Atmospheric Research*, 2014 report mixing of free-tropospheric air with the lowland boundary layer during anabatic transport to a high altitude station.
- Van Geffen, J., et al., *Atmos. Meas. Tech. Discuss.*, 2014 discuss improved spectral fitting of nitrogen dioxide from OMI in the 405–465 nm window.
- Vander Auwera, J., et al., *Journal of Quantitative Spectroscopy & Radiative Transfer*, 2014 present self-broadening coefficients and improved line intensities for the nu(7) band of ethylene near 10.5 μ m, and impact on ethylene retrievals from Jungfraujoch solar spectra.
- Vigouroux, C., et al., *Atmos. Chem. Phys. Discuss.*, 2014 present trends of ozone total columns and vertical distribution from FTIR observations at 8 NDACC stations around the globe.
- Weaver, C. J., et al., *Atmos. Chem. Phys.*, 2014 discuss retrieval of methane source strengths in Europe using a simple modeling approach to assess the potential of space-borne lidar observations.
- Worringer, A., et al., *Atmos. Chem. Phys. Discuss.*, 2014 present single-particle characterization of ice-nucleating particles and ice particle residuals sampled by three different techniques.
- Zieger, P., et al., *Tellus Series B-Chemical and Physical Meteorology*, 2014 discuss the influence of water uptake on the aerosol particle light scattering coefficients of the Central European aerosol.

Table 1. List of major nationally and internationally coordinated networks and/or research programs where Jungfraujoch is a key station

NDACC	Network for the Detection of Atmospheric Composition Change Primary Site (http://www.ndacc.org/)
GAW, GAW-CH	Global Atmosphere Watch, Global GAW Station (http://www.wmo.int/pages/prog/arep/gaw/gaw_home_en.html), and http://www.meteoschweiz.admin.ch/home/forschung-und-zusammenarbeit/internationale-zusammenarbeit/gaw.html)
GAW-PFR	GAW Aerosol Optical Depth (AOD) Network (http://www.pmodwrc.ch/worcc/index.html)
GCOS	Global Climate Observing System (http://www.wmo.int/pages/prog/gcos/)
GCOS-CH	Swiss GCOS office (http://www.meteoschweiz.admin.ch/home/suche.subpage.html/de/data/publications/2013/10/schweizer-gcos-daten-in-internationalen-datenzentren.html)
AGAGE	Advanced Global Atmospheric Gases Experiment Collaborative Sampling Station (http://agage.eas.gatech.edu/)
NADIR/NILU	NILU's Atmospheric Database for Interactive Retrieval (http://www.nilu.no/nadir/)
EUMETNET	Network of European Meteorological Services (http://www.eumetnet.eu/)
SwissMetNet	Automatic Measuring Network of MeteoSwiss (http://www.meteoschweiz.admin.ch/home/mess-und-prognosesysteme/bodenstationen/automatisches-messnetz.html)
RADAIR	Swiss Automatic Network for Air Radioactivity Monitoring (http://www.bag.admin.ch/themen/strahlung/00045/02372/02374/index.html?lang=de)
ICOS	Integrated Carbon Observation System (http://www.icos-infrastructure.eu/)
NADAM	Netz für automatische Dosis-Alarmierung und Meldung (https://www.naz.ch/de/aktuell/tagesmittelwerte.shtml)
NABEL	Nationales Beobachtungsnetz für Luftfremdstoffe - National Air Pollution Monitoring Network (http://www.empa.ch/plugin/template/empa/699/*/--/l=1)
AGNES	Automated GPS Network for Switzerland (http://www.swisstopo.admin.ch/swisstopo/geodesy/pnac/html/en/statjujo.html)
PERMASENSE	Wireless Sensing in High Alpine Environments (http://www.permasense.ch/)
PERMOS	Permafrost Monitoring Switzerland (http://www.permos.ch/)
NMDB	Real-Time Database for High Resolution Neutron Monitor Measurements (http://www.nmdb.eu)
E-GVAP I + II	The EUMETNET GPS Water Vapour Programme (http://egvap.dmi.dk/)
ACTRIS	Aerosols, Clouds, and Trace gases Research InfraStructure Network (http://www.actris.net)
Swiss Glacier Monitoring Network	Federal Office for the Environment (BAFU) (http://glaciology.ethz.ch/messnetz/?locale=en)
InGOS	Integrated non-CO ₂ Greenhouse Gas Observing System (http://www.ingos-infrastructure.eu/)
NORS	Network of Remote Sensing (http://nors.aeronomie.be/)
AGACC-II	Advanced exploitation of Ground based measurements, Atmospheric Chemistry and Climate applications (http://agacc.aeronomie.be/)
EMEP	European Monitoring and Evaluation Programme (http://www.emep.int/)

Most of the measurements made at Jungfraujoch are publicly available via the respective databases, many of them in real or near real-time. Further information can be found at www.hfsjg.ch.

As in previous years the interest in our Research infrastructures and the ongoing activities there was unbroken. Several visited our two sites partly as excursions during a conference or workshop with a participation of the HFSJG. A selection of individual and group visitors in 2014 is given in the following:

- Top to Top Award / Dario Schwörer, 17.01.2014
- Université de Liège, Département de Géographie / Prof. Michel Erpicum and students, 03.04.2014
- Fachschaft für Physik und Astronomie, Universität Bern, 03.05.2014
- Oberstufenzentrum Belp / Tina Gmach and students, 26.06.2014
- Sookmyung Women's University, Seoul, Korea / Prof. Jung Jin Oh and students, 09.07.2014
- Department of Geography, University of Zürich / Dr. Samuel Nussbauer and students, 28.08.2014
- Hokkaido University, Japan / Shin Sugiyama and students, 03.09.2014
- Amt für Geoinformation, Basel, 05.09. 2014
- Empa, Technology and Society Lab, 12.09.2014
- Dokumentationsstelle Luft und Gesundheit LUDOK, Schweizer Tropen- und Public Health Institut Basel, 15.09.2014
- Kollegium Stans, 19.09.2014
- Volkshochschule Ludwigsburg, Germany, 03.10.2014
- Karlsruhe Institut für Technologie, Institut für Meteorologie und Klimaforschung / Prof. Ch. Kottmeier and students, 16.10.2014
- ETH Zürich, VAW-Glaziologie / Dr. Andreas Bauder and students, 26.11.2014
- Institut für Geologie, Gruppe Gestein-Wasser Interaktion, Universität Bern, 03.12.2014

The Foundation HFSJG was particularly honoured to welcome the following official delegations at the Research Station Jungfrauoch:

- Welcome and guided tour for the workshop attendees „Spawning the Atmosphere - Measurements of Jungfrauoch, Switzerland, Schneefernerhaus, Germany, and Sonnblick, Austria“, January 24, 2014.
- Meeting and guided tour for the Research Council of Division II of the Swiss National Science Foundation (SNF), June 11, 2014.
- Welcome and guided tour for the “Grüne Fraktion des Bernischen Grossen Rates” (Demission der Fraktionspräsidentin Christine Häsler), May 30, 2014.
- Welcome and guided tour for the government of the Canton of Fribourg, July 2, 2014.
- Welcome and guided tour for the Emeriti of the Phil.-nat. Faculty of the University of Bern, July 4, 2014.
- Welcome and guided tour for three sections of the Swiss National Science Foundation, August 29, 2014.
- Welcome and guided tour for the UA College of Science of the University of Arizona, Texas, USA, September 6, 2014.
- Welcome and guided tour for the Photovoltaics Research Group of the Bern University of Applied Sciences, October 4, 2014.
- Welcome and guided tour for the KWO/Grimselstrom, Team Christine Häsler, December 12, 2014.



Figure 9: Visit of the Research Council Division II of the Swiss National Science Foundation on June 11, 2014 (left); visit of the Photovoltaics Research Group of the Bern University of Applied Sciences, October 4, 2014 (right).

Besides the many visits to our infrastructure we have also been continuously attractive for the media, which resulted in 46 contributions in 2014 (2013: 30).

During the year 2014 the renovation project of the Research Station's protective roof started. However, it became soon clear that the difficult weather conditions throughout the summer and autumn period would result in a large delay of scheduled work and finally in a postponement of the east part of the roof renewal to 2015. Associated with these circumstances are significant additional costs due to (i) continued snow removal of the working place as well as (ii) additional working hours. Since the new protection roof is steeper, safety equipment had to be installed and the two custodian couples had to be trained how to use it. Furthermore, the replacement of the pyramid roof on the Sphinx terrace had to be postponed since the planned metal-only construction was not feasible; an updated combined wood-metal construction is presently under review. It should allow additional outside work space for instrument placement. At the Sphinx laboratories, an additional three way valve plus a circulation pump were installed at a slightly changed location to minimise temperature as well as noise variations.

Several coordinative discussions and meetings took place with the management of the Jungfrau Railway. The main annual coordination meeting for all institutions working at Jungfraujoch took place on October 14, 2014 and was attended by the director of the Research Station and Mr. Urs Oetz. Prime topics related to the HFSJG were (i) the removal of the research related pages in the passport handed out to each Jungfraujoch visitor; (ii) the temperature issue at the 2nd level Sphinx laboratory, which is still not solved adequately, however improvement has been achieved. Emissions in 2014 have been in acceptable ranges except when the snow blower of the Funpark was dislocated with a daily frequency.

The High Altitude Research Station Gornergrat

At Gornergrat only two projects were running in 2014 (2013: 3), i.e. "*Stellarium Gornergrat*" and the cosmic ray research of the University of Bern. The installations of Stellarium Gornergrat have been further tested and optimised. However, the main telescope optics has still not been exchanged and therefore the scientific photography is of slightly lower quality. Dr. Timm Riesen is in charge of the replacement. HFSJG has investigated the noise interference of the dome movement on the hotel rooms, in particular the stopping noise, and could significantly dampen it with the help of the driving motor company and with staff of the University of Bern. In March 2014, a first workshop for teachers about the capabilities of the remote telescope installation at Gornergrat, i.e. "*Stellarium Gornergrat*" project, has

been organized by project responsible staff, the Pedagogical University of Bern and our Foundation. Unfortunately, the second planned workshop in the French speaking part of Switzerland had to be cancelled due to low interest.

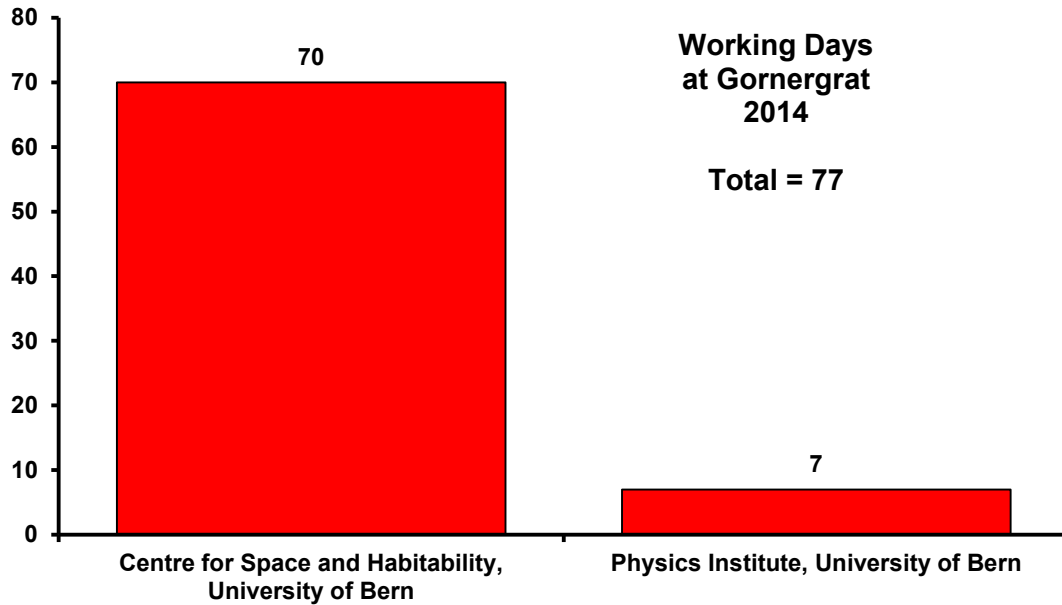


Figure 10: Number of working days at the High Altitude Research Station Gornergrat in 2014 by research groups.



Figure 11: Panoramic view of the Gornergrat site with the two domes and the world-known Matterhorn between them.

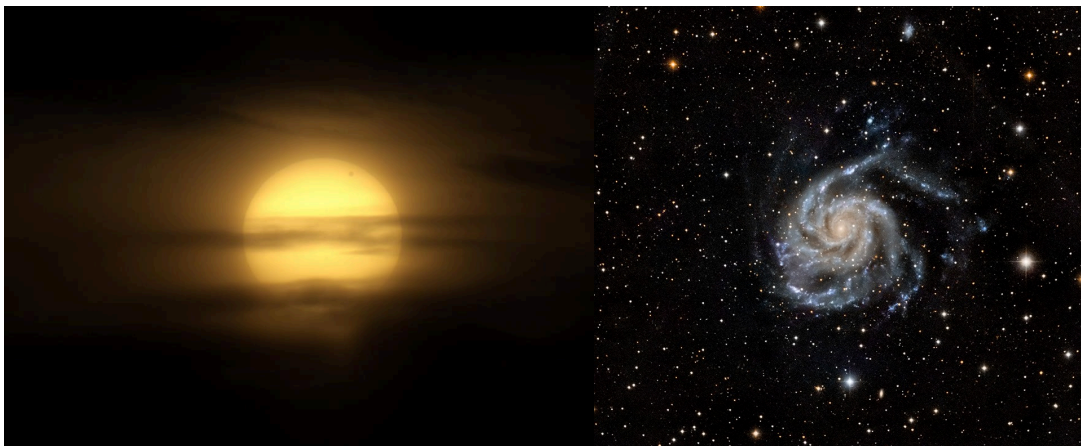


Figure 12: The left panel shows the Venus transit (upper right part of the Sun) in June 2012 (picture taken by Michael Affolter with a Pentax K-5 camera). The right panel shows the Firewheel Galaxy (M101) taken with the Rila main instrument in B, V, R filters with a total exposure time of 3 x 1500s.

Summary and Acknowledgements

The year 2014 has been intensive for the Foundation HFSJG, the bad weather conditions resulted in a significant delay of the work on the renewal of the protection roof on the one hand, but the smoothly running installation on the Jungfrau East Ridge initiated valuable measurements at a new location on the other hand. I am convinced that this new endeavour will be helpful in further enhancing the renowned position of the Jungfrau Research Station as a key site in Europe as well as world-wide.

The scientific output by research groups active at the HFSJG infrastructures remained as high as ever. The peer-reviewed publications, conference presentations or the individual activity reports document the lively science performed at Jungfrau and Gornergrat and justify the continued efforts being taken by the HFSJG management and administration as well as the Foundation members and supporters, driven by the fact that success today does not guarantee success in future.

We are well aware that contributions from many partners are essential to continue being strong. The basis is certainly the international structure of our Foundation with its members, their annual contributions and their representatives, in parallel with the prime financial support by the Swiss National Science Foundation since 1965. The personnel at the front, i.e. the custodian couples Mrs. and Mr. Fischer, Mrs. and Mr. Otz, and Mrs. and Mr. Seiler at Jungfrau, is most important and guarantees the close contact with the researcher's needs. I heartily thank them, in particular because 2014 was again a year with many work-intensive campaigns.

I would like to thank the organisers of the CLACE campaign 2014, which ran mostly very smoothly and resulted, as can be seen by the presented activity reports, in many important observations that have not yet been fully exploited. It was a pleasure for me as director to see a completely booked out Research Station. All principal investigators of current projects as well as all researchers having spent a day or two at the stations belong my sincere thanks in choosing our infrastructure for performing their research.

Once again all of us could enjoy the seemingly easy running train access to both research stations; however, we know how much daily work it requires to guarantee such an excellent service. Therefore, I congratulate the Jungfrau Railway Holding AG (Prof. Thomas Bieger, president of the Board and Mr. Urs Kessler, Chief Executive Officer), the Matterhorn Gotthard Railway (Jean-Pierre Schmid, president and Fernando Lehner, Chief Executive Officer and his representative in the HFSJG Board, Mr. René Bayard) and the Gornergrat Railway to this continued achievement and thank them for the good collaboration. Both research stations benefit year by year from their goodwill and their substantial support.

Related to the White Paper that will be released in these days, I would like to thank in particular Mr. Jürg Lauper who was involved since the first idea appeared a couple of years ago – besides heading the Jungfrau Railway infrastructure. Sincere thanks are also expressed to Mr. Heinz Schindler, to Mr. Gabriel Roth, head of Zugförderung und Werkstätte (ZfW/JB) und Leiter Jungfraubahnen AG, to Mr. Andreas Wyss, chief of technical services and maintenance division, and his team. HFSJG experienced once again the friendly and good service of Mrs. Brigitte Soche and Mr. Martin Soche and their personnel of the restaurants at the Top of Europe, hosting our staff, scientists, and visitors.

The support of the Burgergemeinde Zermatt towards our Foundation and in particular for the project Stellarium Gornergrat is very much appreciated, especially the always welcoming personalities of Mr. Andreas Biner, president and Mr. Fernando Clemenz. Last year I did not have many opportunities to visit and enjoy the heartily atmosphere of Mrs. Nicole Marbach and Mr. Thomas Marbach at the Kulmhotel Gornergrat, but I guess the time will come again once the Stellarium Gornergrat is in full operation. Thank you for all your support throughout the year and your patience with the noise interferences that we faced and which we hopefully solved to your satisfaction.

Both locations – despite being three to four hours away from Bern and even more from other places – can be reached within seconds through fast internet connections. However, in contrast to Jungfrauoch – being equipped with a high-speed and broadband connection – an update is required for Gornergrat due to the presently limited bandwidth. We are working on this issue in collaboration with the Burgergemeinde Zermatt, the Matterhorn Gotthard Bahn, the Zermatter Bergbahnen, Stellarium Gornergrat as well as the institutions who have the knowledge in IT-issues, i.e. SWITCH and the computer department of the University of Bern. I am convinced that we can find a solution that will fulfil our as well as the needs of the Stellarium Gornergrat. Thank you very much for your dedication.

I sincerely thank the administrative staff at Bern. They did once again a marvellous job. Claudine Frieden (secretary) and Dr. Rolf Bütikofer (IT responsible person) have besides their work to also deal with my requests, often on short notice. Mr. Karl Martin Wyss for his competent services as our treasurer, Mrs. Theres Trachsel for the bookkeeping, and the CORE Treuhand Cotting AG, Bern (Mr. Harro Lüdi) for the professional auditing, deserve my sincere credit.

Despite the fact that Prof. Dr. Martin Huber has handed over the presidency of the Jungfrauoch Commission to Prof. Dr. Heinz Gäggeler, he was busy for many hours throughout the year improving the draft version of the White Paper. Thank you very much indeed Martin.

I am particularly grateful to the University of Bern, its Rector Prof. Dr. Martin Täuber, the Administrative Director, Dr. Daniel Odermatt, and the Director of the Physikalisches Institut, Prof. Willy Benz, for being a member of our organization, for their hospitality and support of our administration. Finally, I would like to thank Prof. Erwin Flückiger and Prof. Hans Balsiger for their continuous and enthusiastic involvement in the “Stellarium Gornergrat” project.

I conclude with the hope that the year 2015 will bring us better weather conditions than we faced last year, in order to finalize the construction of the protective roof and to successively continue our endeavour at the Jungfrau East Ridge. On behalf of the HFSJG, best regards to all of you.



Bern, February 5, 2015

Markus Leuenberger

