Report of the Director

Temperature rise has continued, yet 2017 was not the warmest but the second or third warmest year on record. 2017 has brought many devastating storms in many parts of the world. Therefore, the Global Risks Report of the World Economic Forum notes that "Over the course of the past decade, a cluster of environment-related risks – notably extreme weather events and failure of climate change mitigation and adaptation as well as water crises – has emerged as a consistently central feature of the GRPS risk landscape". The awareness of environmental and climate related risks at economy level is certainly a step in the right direction. With the research at Jungfraujoch we have continued to contribute to these issues.

I was very happy to see an immediate reaction of the visitors at Jungfraujoch to our newly fixed boards on the tourist terrace which inform them about our sensitive science measurements on top of the Sphinx and ask them to refrain from smoking. There is a clear effect visible, e.g. in the aerosol particle number concentration.

At Gornergrat the Stellarium project is now in full operation mode after launching the Web-Portal and the telescope was replaced with the RiFast 600 from Officina Stellare. The interest from the public is steadily growing. Yet, further work needs to be done regarding the pedagogical activities.

The Foundation HFSJG
In 2017, the Board meeting was held on October 20 in Interlaken. Prof. Silvio Decurtins, the president of the Foundation welcomed three new Board Members, Dr. Elke Ludewig, delegate of the Österreichische Akademie der Wissenschaften, Prof. Dr. John Pyle, delegate of the British Royal Society and Dr. Emmanuel Mahieu, delegate of the Belgian Fonds National de la Recherche Scientifique, F.R.S.-FNRS. The activity report and the statement of accounts for the year 2016 have been approved by the Board Members and the HFSJG administration was given discharge.

Figure 1. New representatives in the HFSJG Foundation: Prof. Dr. John Pyle, Dr. Elke Ludewig, and Dr. Emmanuel Mahieu, (left), group picture of the HFSJG Board members and guests on the Meteo-terrace, Sphinx Observatory Jungfraujoch.

The Jungfraujoch Commission of the Swiss Academy of Sciences (SKHFJ) held the annual meeting on May 19, 2017 at the House of Sciences, Bern. The "Prix de Quervain" is announced annually, alternately for research activities related to polar regions or high altitude research. In 2018, the prize will again be awarded in the field of polar research. The commission is also active for the Foundation "Schweizer Jugend forscht" by offering a prize to visit the research facility of the HFSJG. Jürg Lauper, representative of the Jungfrau Railway, stepped back. Prof. Dr. Heinz Gäggeler, president of the Jungfraujoch Commission, thanked Jürg for keeping an eye on the issues relevant for research and reporting these back into the directorate of the Jungfrau Railway. In particular, his engagement during the process of writing the White Paper as well as the help with setting up the information boards on the tourist platform was very much appreciated.

Figure 2. Prof. Dr. Heinz Gäggeler, president of the Jungfraujoch Commission of the SCNAT, Jürg Lauper representative of the Jungfrau Railway and Markus Leuenberger, director of HFSJG after the Jungfraujoch Commission meeting.

The annual HFSJG user meeting took place at the Hotel Kreuz at Bern on May 5, 2017. The director informed participants about (i) the SNF proposal submission for the support of the HFSJG to run the two research stations, (ii) the infrastructural updates during the next years, (iii) the freed-up space at the Sphinx Observatory and (iv) the status of the East Ridge. The presentation was given by the director about the status of the Virtual Alpine Observatory (VAO).

We sadly took notice of the decease of one of our former custodians, Mr Hansruedi Staub, on February 22, 2017.

The High Altitude Research Station Jungfraujoch
In 2017, Maria and Urs Otz stepped back as facility managers. We, from the executive office of the HFSJG, thank Maria and Urs for their appreciated engagement and we wish them all the best in the future. We welcome Christine and Ruedi Käser who were selected from 40 applications as new Chief facility managers at our Research Station on Jungfraujoch since Joan and Martin Fischer decided to recede from this position and to replace Otzes.

Figure 3. Change at Jungfraujoch Research Station, new Chief facility managers Christine and Ruedi Käser (left) and former facility managers Maria and Urs Otz (right).

We are happy that once again the High Altitude Research Station Jungfraujoch was very attractive for researchers. In 2017, 36 (2016:36) research institutions were active at Jungfraujoch. About 25 of 53 (2016:53) research projects at Jungfraujoch are automated and remotely accessible by their corresponding institutions.

Involvement in international programmes is essential for many of the above mentioned projects: The two programmes, Global Atmosphere Watch (GAW) and the Network of Detection of Atmospheric Composition Change (NDACC), can count on many projects conducted at Jungfraujoch. Of particular interest are the two European infrastructures ICOS (Integrated Carbon Observation System) with associated projects such as Ringo and ACTRIS (Aerosols, Clouds, and Trace gases Research InfraStructure Network). In both networks Jungfraujoch is a central site. However, international embedment is not restricted to these networks but extends to a large variety of programmes, listed in Table 1.

In 2017, projects with principal investigators from eight different countries as displayed in Figure 4 could be welcomed and hosted at Jungfraujoch. When taking collaborations into account, the number of countries involved increases to 17 as visible in Figure 5. All this information can also be retrieved from the HFSJG Webpage. (http://www.hfsjg.ch/jungfraujoch/researchprojects/overview.php).

From experience over the last decades, the number of working days is varying quite strongly from year to year. This is mainly due to the number of campaigns present during a year. In 2017, two campaigns were held at Jungfraujoch, hence the working days increased slightly from 674 in 2016 to 818 this year. The importance of campaigns is visualised in Figure 6 with the number of working days split into different categories. The spent working days show an unusual distribution with the lead of German organisations followed by Switzerland and Belgium as seen in Figure 7.

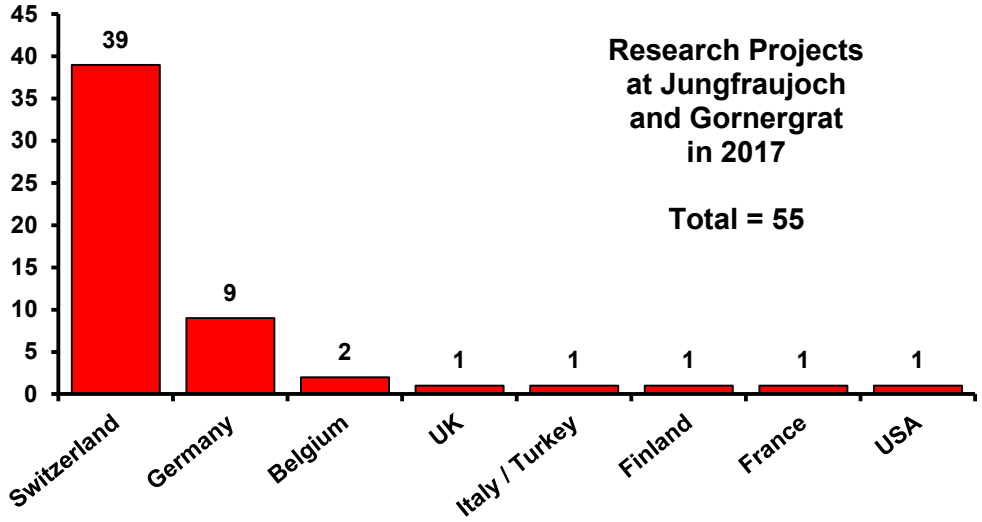

Figure 4. Number of research projects at the High Altitude Research Stations Jungfraujoch and Gornergrat in 2017 by country.

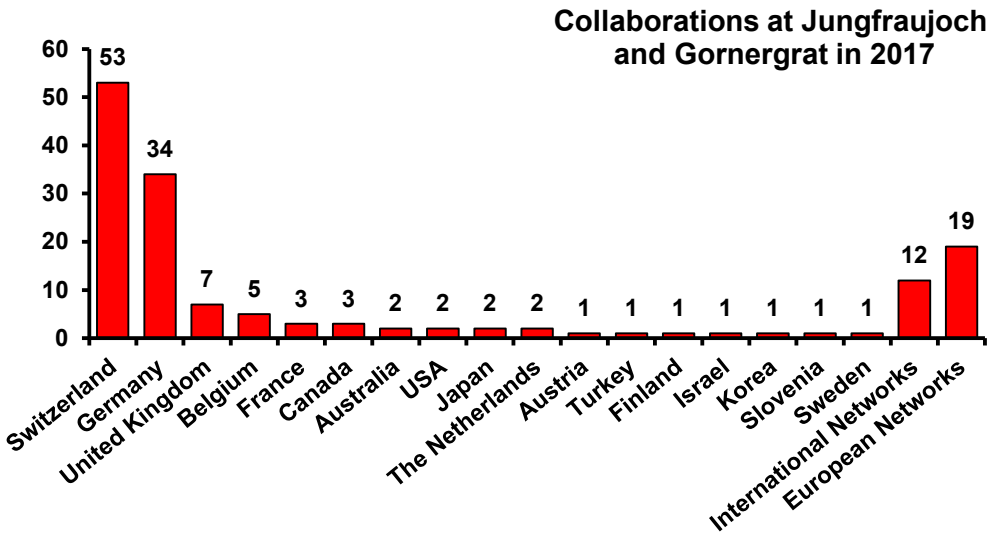

Figure 5. Number of collaborations at the High Altitude Research Stations Jungfraujoch and Gornergrat in 2017.

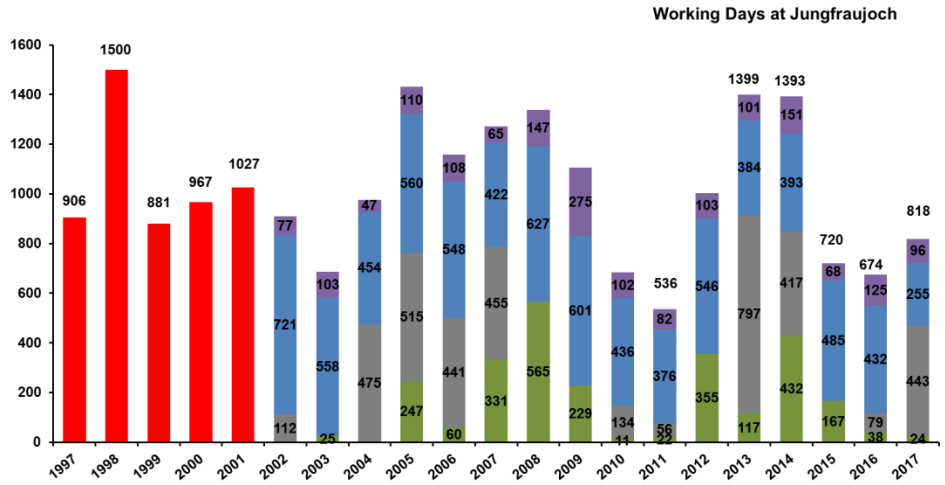

Figure 6. Number of working days spent by scientists at the High Altitude Research Station Jungfraujoch during the past years. The number are split into four categories since 2002, i.e. medical campaigns (green), CLACE campaign (grey), atmospheric research (blue), others (purple).

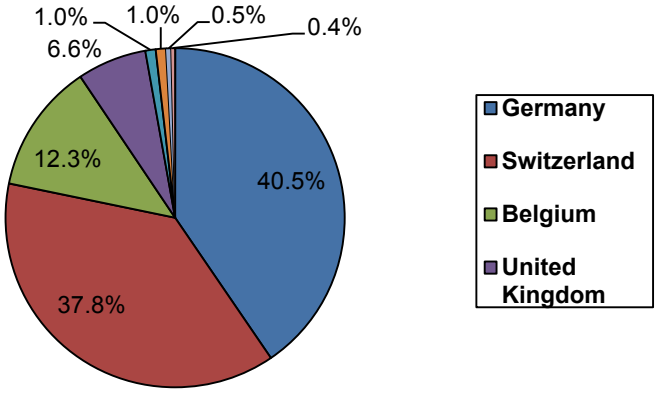

Figure 7. Percentage of person-working days in 2017 at the High Altitude Research Station Jungfraujoch per country.

The research conducted at Jungfraujoch resulted in the following output in 2017:

34 refereed publications
37 conference presentations / posters
5 popular publications and presentations
9 data publications and reports
7 bachelor- (3), master- (0) and PhD (4) theses
2 book / edited books

Jungfraujoch research was presented once again at many national and international conferences in 2017 including:

10th International Carbon Dioxide Conference, Interlaken, Switzerland, August 21-25, 2017; 15th Swiss Geoscience Meeting, Davos, Switzerland, November 17-18, 2017; European Geophysical Union 2017, Vienna, Austria, April 23 – 28, 2017; European Aerosol Conference 2017, Zurich, Switzerland, August 27 – September 1, 2017; EUREF-Symposium, Wroclaw, Poland, May 17-19, 2017; IAG-IASPEI scientific Assembly, Kobe, Japan, July 30 – August 4, 2017; EGVAP expert meeting, De Bilt, Netherlands, November 28-29, 2017; Swiss Global Change Day, Bern, Switzerland, April 11, 2017; ACPM2017, Gotemba, Japan, November 6-10, 2017; 3rd BACCHUS Annual Meeting, Zurich, Switzerland, January 10-12, 2017; Atmospheric Ice Nucleation Conference – Focus Meeting 9, Leeds, U.K., January 16-17, 2017; 5th workshop Microphysics of Ice Clouds, Vienna, Austria, April 22-23, 2017; AGU fall meeting, New Orleans, USA, December 11-15, 2017; NOAA ESRL Global Monitoring Conference, Boulder, Colorado, USA, May 23–24, 2017; Swiss Tech Convention Center, EPFL Lausanne, Lausanne, Switzerland, November 2, 2017; Scientific Advisory Board, ICOS-CH National Meeting, Davos, Switzerland, November 17, 2017; VAO Symposium 2017, Bolzano, Italy, March 28-30, 2017; Se2017, Stockholm, Sweden, August 13-17, 2017; ICOBTE 2017, Zurich, Switzerland, July 16-20, 2017; Turkish Physical Society's 33th International Physics Congress (Oral), Bodrum, Turkey, September 6-10, 2017.

I will remember the year 2017 since we have – at least in part – successfully dealt with local contamination by fixing several boards on the Sphinx tourist terrace, which inform tourists about the sensitive measurements we do just above their heads. Obviously, this information worked and the number concentration of the aerosol didn't show spikes anymore (Figure 8).

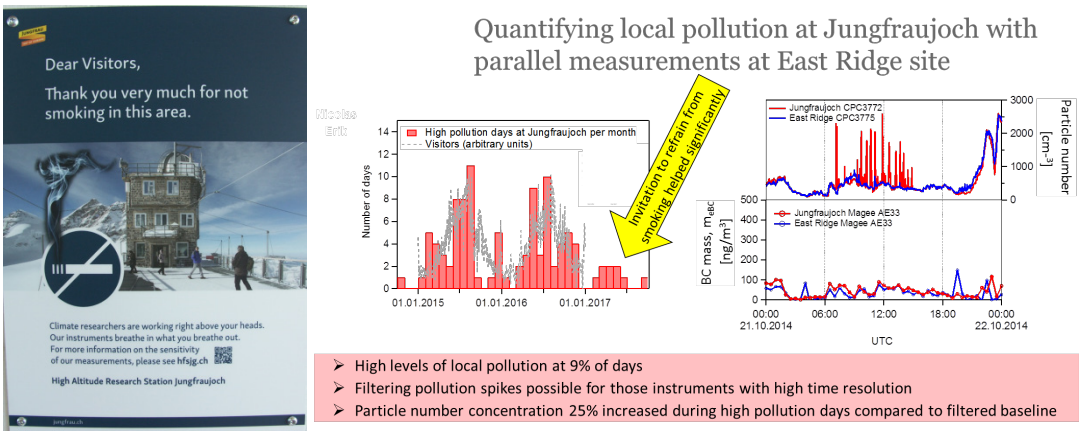

Figure 8. Information board as visible on the tourist terrace of the Sphinx building since spring 2017 (left) and aerosol particle numbers from the East Ridge in blue and Sphinx observatory in red. In 2017 there were significantly less spikes observed than before.

Regarding research, I would like to highlight three investigations: (i) Inversion Approach to Validate Mercury Emissions; (ii) Hydrofluorocarbons are powerful greenhouse gases developed by industry after the phase-out of the ozone depleting chlorofluorocarbons and hydrochlorofluorocarbons required by the Montreal Protocol; (iii) Ozone profile trends over the period 2000 to 2016.

(i) The reduction of emissions of mercury is a declared aim of the Minamata Convention, a UN treaty designed to protect human health and the environment from adverse effects of mercury. To assess the effectiveness of the convention in the future, better constraints about the current mercury emissions is a premise. In our study, we applied a topdown approach to

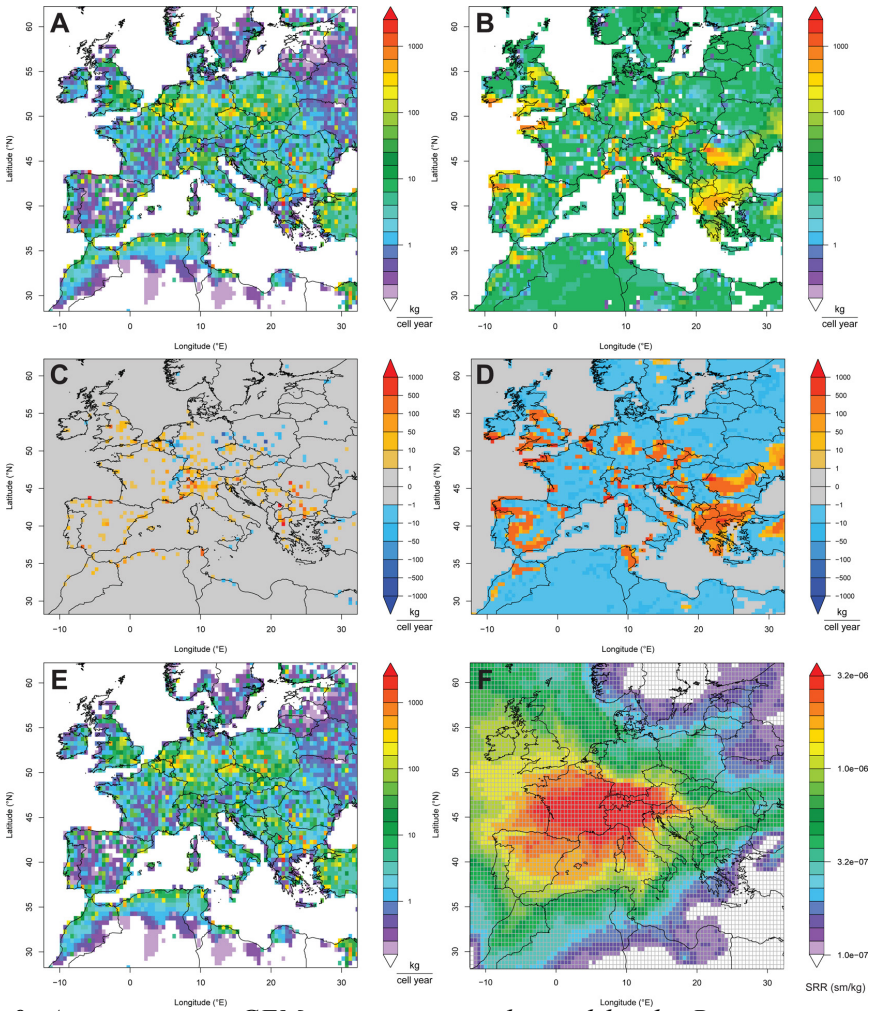

Figure 9. A: a posteriori GEM emission map obtained by the Bayesian optimization from AMAP a priori with a total emission of 89 ± 14 t/a. B: a posteriori GEM emission map obtained by the Bayesian optimization from homogeneous a priori emissions with a total emission of 177 ± 31 t/a. C: difference between a priori and a posteriori emissions. Emission increase from a priori to a posteriori shown in red decrease in blue. D: difference between homogeneous a priori and a posteriori emissions. Emission increase from a priori to a posteriori shown in red decrease in blue. E: a priori emissions based on the GEM emissions of the AMAP mercury emission inventory over all height levels shown only for the inversion domain. For the inversion the emissions for the whole model region were used. F: Source receptor relationship (SRR) normalized by area of grid cell for inversion domain.

quantify mercury emissions on the basis of atmospheric mercury measurements conducted at the remote high altitude monitoring station Jungfraujoch, Switzerland. We established the source-receptor relationships and by the means of atmospheric inversion we were able to quantify spatially resolved European emissions of 89 ± 14 t/a for elemental mercury. Our European emission estimate is 17% higher than the bottom-up emission inventory, which is within stated uncertainties. However, some regions with unexpectedly high emissions were identified. Stationary combustion, in particular in coal-fired power plants, is found to be the main responsible sector for increased emission estimates. Our top-down approach, based on measurements, provides an independent constraint on mercury emissions, helps to improve and refine reported emission inventories, and can serve for continued assessment of future changes in emissions independent from bottom-up inventories.

Denzler, B. et al., Inversion Approach to Validate Mercury Emissions Based on Background Air Monitoring at the High Altitude Research Station Jungfraujoch (3580 m), Environmental Science & Technology, 51, 5, 2846-2853, doi: 10.1021/acs.est.6b05630, 2017.

(ii) Hydrofluorocarbons are powerful greenhouse gases developed by industry after the phase-out of the ozone depleting chlorofluorocarbons and hydrochlorofluorocarbons required by the Montreal Protocol. The climate benefit of reducing the emissions of hydrofluorocarbons has been widely recognised, leading to an amendment of the Montreal Protocol (Kigali Amendment) calling for developed countries to start to phase-down hydrofluorocarbons by 2019 and in developing countries to follow with a freeze between 2024 and 2028. In this way, nearly half a degree Celsius of warming would be avoided by the end of the century. Hydrofluorocarbons are also included in the basket of gases controlled under the Kyoto Protocol of the United Nations Framework Convention on Climate Change. In this study we used atmospheric data from four European sites combined with the FLEXPART dispersion model and a Bayesian inversion method, in order to derive emissions of nine individual hydrofluorocarbons from the whole European Geographic Domain and from twelve regions within it, then comparing our results with the annual emissions that the European countries submit every year to the United Nations Framework Convention on Climate Change, as well as with the bottom-up Emissions Database for Global Atmospheric Research. We found several discrepancies when considering the specific compounds and on the country level.

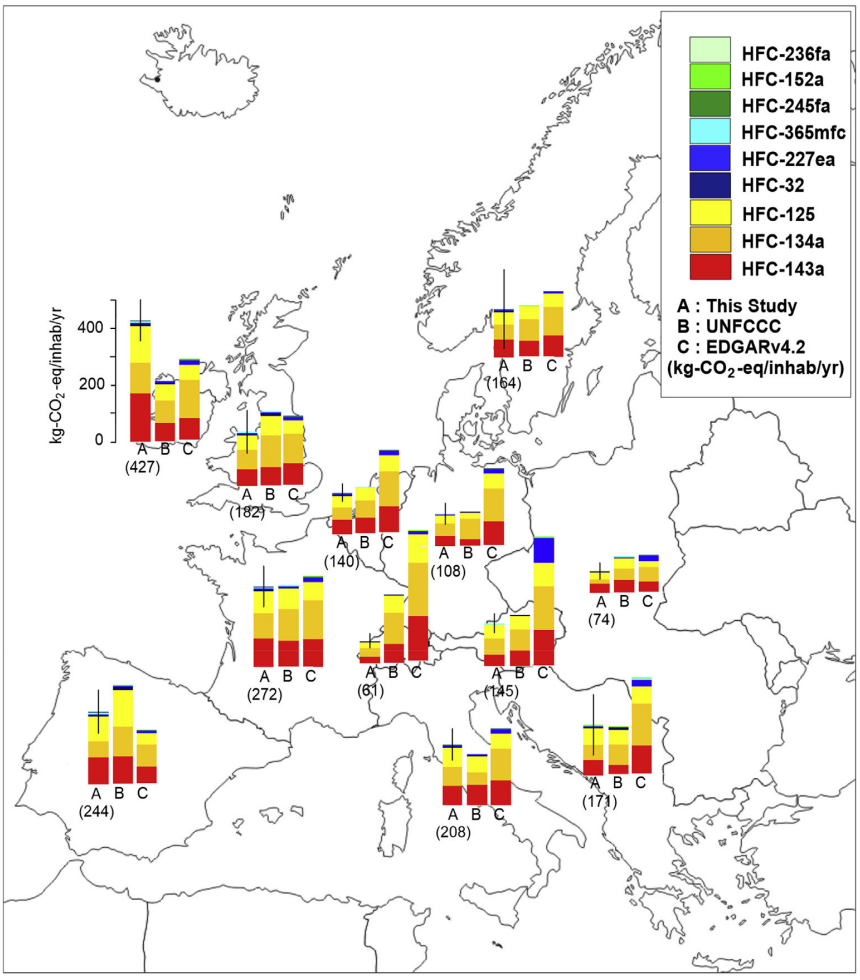

Figure 10. Per-capita emissions from twelve macro-areas in the European Geographic Domain. Emissions, given in kg-CO_2-eq y^{-1} inhabitants^{-1}, are averaged over 2008-2014 for the inversion results (columns A) and the IPCCC country reports (columns B). EDGAR data (columns C) are averaged over 2008-2010.

Graziosi, F. et al., European emissions of the powerful greenhouse gases hydrofluorocarbons inferred from atmospheric measurements and their comparison with annual national reports to UNFCCC, Atmos. Environ., 158, 85–97, doi: 10.1016/j.atmosenv.2017.03.029, 2017. http://doi.org/10.1016/j.atmosenv.2017.03.029.

(iii) Ozone profile trends over the period 2000 to 2016 from several merged satellite ozone data sets and from ground-based data measured by four techniques at stations of the Network for the Detection of Atmospheric Composition Change indicate significant ozone increases in the upper stratosphere, between 35 and 48 km altitude (5 and 1 hPa). The observed trend profiles are consistent with expectations from chemistry climate model simulations. Ongoing quality observations from multiple independent platforms are key for verifying that recovery of the ozone layer continues as expected.

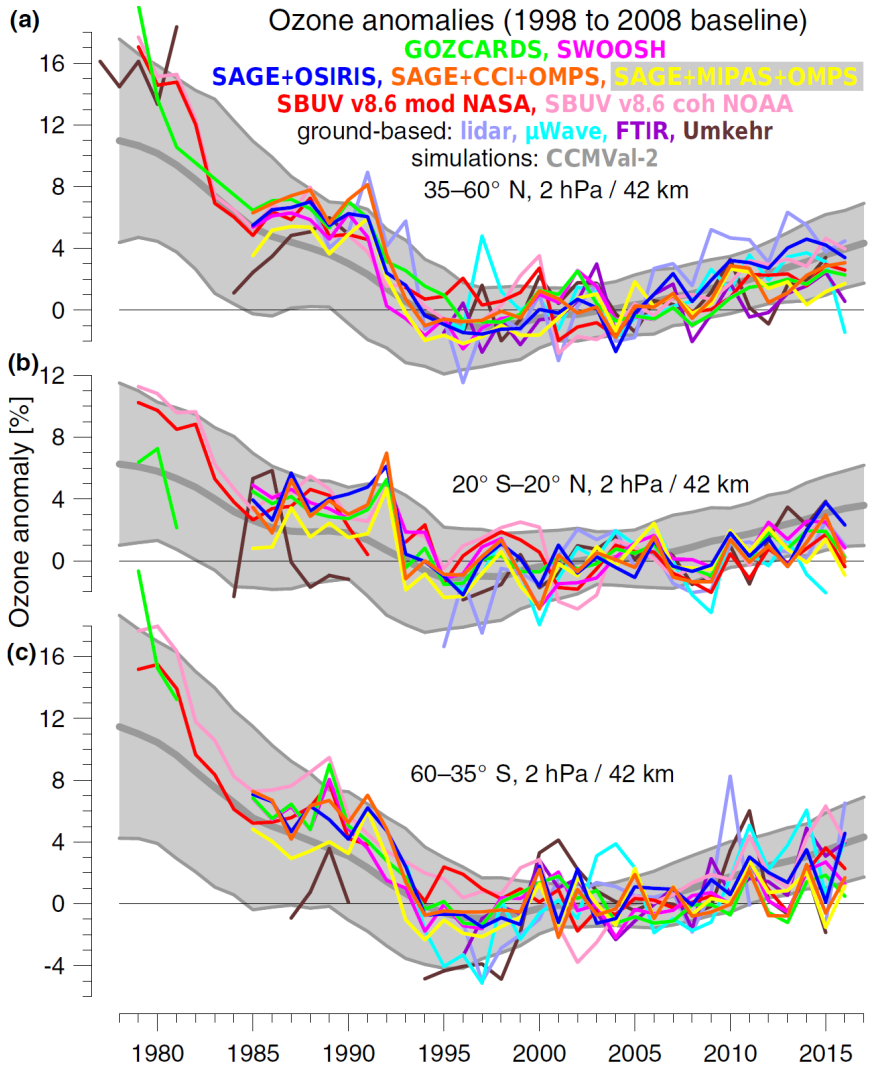

Figure 11. Annual mean ozone anomalies near 2 hPa or 42 km, as recorded by merged satellite data sets and ground-based stations. Anomalies are referenced to the 1998 to 2008 climatological annual cycle of each individual data set, and are averaged over the indicated zonal bands.

Steinbrecht, W. et al., An update on ozone profile trends for the period 2000 to 2016, Atmos. Chem. Phys., 17, 17, 10675–10690, doi: 10.5194/acp-17-10675-2017, 2017. http://orbi.ulg.ac.be/handle/2268/214214.

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- Harris, E. et al., Using Isotopic Fingerprints to Trace Nitrous Oxide in the Atmosphere, Highlights of Analytical Sciences in Switzerland, Chimia, 71, 46, doi:10.2533/chimia.2017.46, 2017.
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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.ndsc.ncep.noaa.gov/)
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/forschung-und-zusammenarbeit/internationale-zusammenarbeit/gcos.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 (https://www.bag.admin.ch/bag/de/home/themen/mensch-gesundheit/strahlung-radioaktivitaet-schall/radioaktivitaet-in-der-umwelt/alarmsysteme-radioaktivitaet.html)
ICOS	Integrated Carbon Observation System (https://www.icos-ri.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.bafu.admin.ch/luft/00612/00625/index.html?lang=de)
AGNES	Automated GPS Network for Switzerland (http://www.swisstopo.ch/pnac)
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://eumetnet.eu/)
ACTRIS	ACTRIS is the European Research Infrastructure for the observation of Aerosol, Clouds, and Trace gases (http://www.actris.eu/)
Swiss Glacier Monitoring Network	Federal Office for the Environment (BAFU) (http://glaciology.ethz.ch/messnetz/?locale=en)
EARLINET-ASOS	European Aerosol Research Lidar Network – Advanced Sustainable Observation System (http://www.earlinetasos.org)
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)
GAIA-CLIM	Gap Analysis for Integrated Atmospheric ECV CLImate Monitoring (http://www.gaia-clim.eu/)
QA4ECV	Quality Assurance for Essential Climate Variables (http://www.qa4ecv.eu/)
Ringo	Readiness of ICOS for Necessities of integrated Global Observations (https://www.icos-ri.eu/ringo)

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.

Figure 12. H.E. Mr. Ban Ki-moon (UN Secretary-General 2007-2016) with his wife (left) and together with former Swiss Federal Council Mr. Adolf Ogi and the CEO of the Jungfrau Railway Mr. Urs Kessler (right). They all followed intently the explanations of the directory of the research station Jungfraujoch (Prof. Markus Leuenberger).

Visits to our research infrastructures have remained high and we are happy and thankful to welcome groups that are interested to see what our research partners have to offer at Jungfraujoch and Gornergrat. In 2017, we were particularly honoured to welcome H.E. Mr. Ban Ki-moon (UN Secretary-General 2007-2016) with his wife as guests of a delegation of the Swiss Economic Forum at Jungfraujoch.

A selection of additional individual and group visitors in 2017 is given in the following:

- Klima- und Umweltphysik, Universität Bern, Glaziologie, Prof. Hubertus Fischer with students, 14.03.2017
- NASA Jet Propulsion Laboratory, 18.04.2017
- Schule Schlössli Kehrsatz, Fr. Gerber mit SchülerInnen, 09.05.2017
- Berner Fachhochschule, Architektur, Holz und Bau, 17.05.2017
- Servei Meteorologic de Catalunya, 14.06.2017
- Schweizer Armee mit Delegation der deutschen Bundeswehr, 19.06.2017
- Sonnblick Observatorium, Österreich, 22.06.2017
- Universität Bern / Prof. Harald Krug mit Studenten, 28.06.2017
- UNESCO Weltkulturerbe Jungfrau-Aletsch, Managementzentrum Naters, 06.07.2017
- New York Times Student Journeys, 07.07.2017
- Paul Scherrer Institut, Labor für Atmosphärenchemie, 15.07.2017
- Prof. Urs Baltensperger, Paul Scherrer Institut with guests, 12.08.2017
- Participants of the ICDC10 conference in Interlaken, 23.+26.08.2017
- Firma Phillips, 25.08.2017
- Umwelt- und Gesundheitsschutz der Stadt Winterthur, 29.08.2017
- Hokkaido University, Japan / Shin Sugiyama with students, 29.08.2017
- Teilnehmer GGMT (Greenhouse Gases & Measurement Techniques) Meeting 2017, 01.09.2017
- Teilnehmer EAC (European Aerosol Conference) 2017, 02.09.2017
- Gewinner Schweizer Jugend forscht Wettbewerb, 04.09.2017
- University of Colorado, USA and CSIRO Oceans & Atmosphere, Australia, 05.09.2017
- Empa, Abteilung Hochleistungskeramik, 07.09.2017
- Prof. Alexey Gunya, Russische Akademie der Wissenschaften, 11.09.2017
- Stab des ETH-Rats, 20.09.2017

Figure 13. Visit of the ETHZ-Rat and guests, September 20, 2017.

- Gymnasium Neufeld, Bern, Erich Wenger mit SchülerInnen, 21.09.2017
- Teilnehmer des Swiss Economic Forums (u.a. S.E. Herr Ban Ki-moon), 22.09.2017
- Kantonsschule Wil, Stefanie Hertfelder und SchülerInnen, 27.09.2017
- Teilnehmer der Stiftungsratssitzung HFSJG, 21.10.2017
- Team SBB Zofingen, 23.10.2017
- Royal Grammar School, UK, Mark Burbidge mit SchülerInnen, 25.10.2017
- XWare GmbH, 28.10.2017
- ETH Zürich, VAW-Glaziologie, Dr. Andreas Bauder mit Studenten, 22.11.2017
- Netzwerk von Ärzten, 25.11.2017
- ETH Zürich, VAW-Glaziologie, Dr. Andreas Bauder mit Studenten, 06.12.2017

The media interest in research activities around and in our infrastructure varies from year to year. We could host several television and radio broadcasting journalist groups as well as delegations from printed media that resulted in 34 contributions in 2017 (2016: 47).

Figure 14. Installations at the entrance of the research station for the fixation of the protection net above it.

The focus regarding infrastructure was clearly on extending the protection net above the research station (Figure 14). Due to a bad weather during summer the work could only be finalised with a special effort by the staff of the company that installed the net, which is very much appreciated. Furthermore, the work on the renewal of the fresh and waste water linings has been brought to an end in spring 2017. The planning of the renovation of the researcher's kitchen has been finalised and presently quotes are expected from two local carpenters.

Measurements on the East Ridge are on-going, except the greenhouse gas analyses done by Empa were stopped due to an unavailability of an instrument. As mentioned above, the information boards on the tourist terrace at the Sphinx location brought a significant reduction of the local aerosol emission (from smoke) and resulted in a significantly improved agreement between the records measured at the East Ridge and the Sphinx Observatory. The comparison results are close to submission and already have been presented at conferences, i.e. 10th International Carbon Dioxide Conference held at Interlaken, Switzerland in 2017.
The annual coordination meeting for all institutions working at Jungfraujoch took place on October 17, 2017 at Jungfraujoch. It was attended by the director of the Research Station and the custodian Mr. Martin Fischer. The following items related to HFSJG were mentioned (i) CO_2 emissions from tourists that were mentioned already last year have been further backed through parallel measurements at the Sphinx Observatory and the East Ridge Station; (ii) mobile phone signal strength is still an issue in the Research Station but has been improved since the last year at the Sphinx Observatory. Andreas Wyss, Head of the technical unit at Jungfraujoch, mentioned that climate change is an increasing concern for many aspects for instance to run the fun park and the commute with the snowcat.

The High Altitude Research Station Gornergrat
At Gornergrat only two projects were conducted in 2017, i.e. "Stellarium Gornergrat" and SONTEL (Solar Neutron Telescope). The SONTEL of the cosmic ray research group of the University of Bern however, was dismantled in spring 2017 after nearly 20 years of smooth operation. We would like to thank the two involved institutions, i.e. Solar-Terrestrial Environment Laboratory, University of Nagoya, Japan and the Physics Institute of the University of Bern. A total of 111 working days was spent at Gornergrat (Figure 15). An incredible high number of 1144 visitors could be welcomed at the Gornergrat Observatory and were professionally guided by Dr. Timm Riesen. Stellarium Gornergrat –initiated as a public outreach project – is really flying, congratulations to everybody involved.

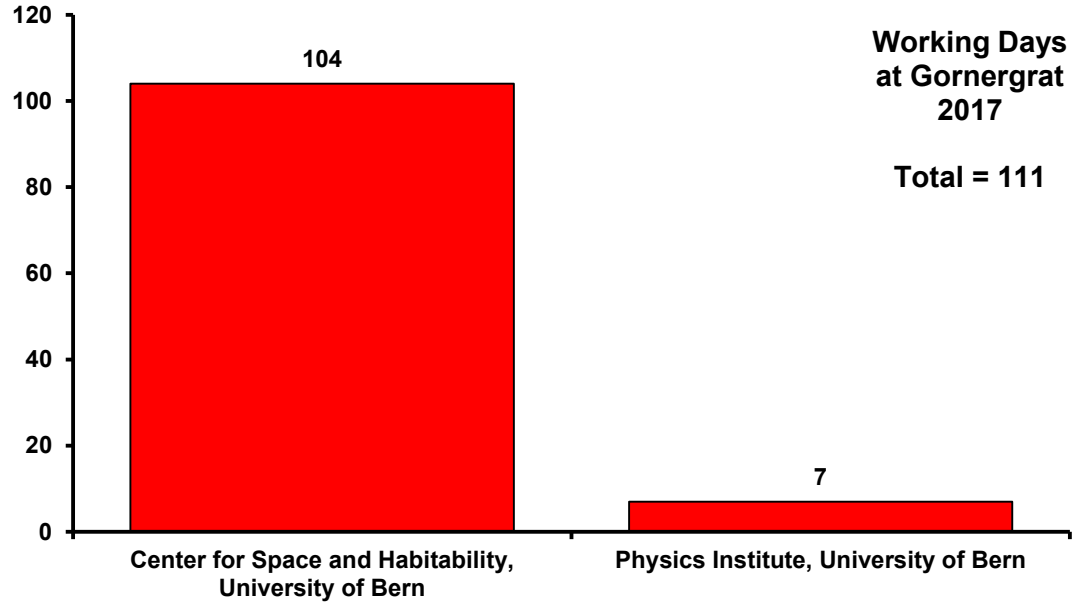

Figure 15. Number of working days at the High Altitude Research Station Gornergrat in 2017 by research groups.

Summary and Acknowledgements

The year 2017 was a highlight year again. Stellarium Gornergrat took off and Jungfraujoch's local contamination issues due to smoking have drastically been reduced through the information boards designed collaboratively by the HFSJG and Jungfrau Railway. The convincing slogan **"our instruments breathe in what you breathe out"** comes from our former secretary Louise Wilson. Thank you so much, you helped us out. Of course without the action of reading the board's information and of not smoking, nothing would have changed. So a very big, big thank you goes to the visitors at Jungfraujoch. I highly appreciate your behaviour.

The visit of H.E. Mr. Ban Ki-moon (UN Secretary-General 2007-2016) with his wife honoured us. They were very interested in what all the researchers do at Jungfraujoch and I felt proud to be the person to explain this to them.

HFSJG was given a window of opportunity to show that Jungfraujoch is a key research station in climate and environmental science in the feature-length TV broadcast "+3 °C" to a wider Swiss public. I would like to express my sincere thanks to the Swiss Radio and Television, SRF. The collaboration was professional and friendly.

Nowadays, it sometimes becomes dangerous in high mountain regions due to thawing permafrost that destabilizes rock formations. In order to keep our infrastructures safe we extended the protection net above the Research Station. This hard, exhausting and difficult work has been done by the staff of the Gasser Felstechnik AG, Lungern. They even boosted their performance in late autumn in order to finalise the installation. I sincerely thank the entire team under the excellent lead of Nils Trauffer.

Year by year I am happy to present you the impressive outcome from the two Research Stations Jungfraujoch and Gornergrat. A significant number of peer-reviewed publications have been placed. Congratulations to all science partners that have so efficiently used our infrastructure. The HFSJG staff is proud to work for such a lively science community and tries to help and facilitate the administrative and management work when you plan a project at one of our two stations.

Internationality has been important since the beginning. We are very happy that the Board is again complete with the new representative of the Royal Society, Prof. Dr. John Pyle, United Kingdom. We additionally could welcome two new faces, our new delegate of the Austrian Academy of Sciences, Dr. Elke Ludewig and Dr. Emmanuel Mahieu, delegate of the Fonds National de la Recherche Scientifique from Belgium. I would like to thank all members of the Foundation for their financial as well as inspirational support, the Swiss National Science Foundation for its continued support to run our infrastructure, our custodians Mrs. and Mr. Fischer, Mrs. and Mr. Otz and Mrs. and Mr. Käser for their important and always excellent work. Mrs. and Mr. Seiler helped again to bridge time periods in which our permanent personnel couldn't work.

The number of tourist visits at Jungfraujoch surpassed one million again in 2017. Once again, I congratulate the Jungfraubahn Holding AG (Prof. Thomas Bieger, president of the Board and Mr. Urs Kessler, Chief Executive Officer) for this economic success. I appreciated the presence of Prof. Bieger at the social event along our Board meeting at Interlaken. I particularly would like to thank the Jungfrau Railway for its openness to place information boards on the Sphinx tourist terrace to inform visitors about our high sensitive instrumentations. Last year, I wrote that "these boards should help to prevent some – hopefully many – people from smoking". Indeed it worked, local contamination decreased. In this regard, I sincerely thank Jürg Lauper, the former delegate of the Jungfrau Railway in the Jungfraujoch Commission and deputy delegate in the HFSJG Board for his tremendous and continued positive engagement in this delicate matter. Thank you, Jürg.

All of us, who visited Jungfraujoch recently, noticed the shorter access times. We know that many divisions of the Jungfrau Railway were involved in making it possible to travel in such a comfortable and enjoyable manner to the Jungfraujoch. Support from many different

sections at Jungfraujoch helps us to run our infrastructures, namely the Jungfrau Railway infrastructure (Mr. Jürg Lauper, Mr. Markus Balmer and Mr. Heinz Schindler), the Zugförderung und Werkstätte (ZfW/JB, Mr. Gabriel Roth), the Jungfraubahn Holding AG, the technical services (Mr. Andreas Wyss and his team). Thank you very much. HFSJG experienced once again the friendly and professional 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.

Stellarium Gornergrat is definitively established and attracts with its diverse events such as the "Dining with the stars" many visitors. But most importantly it has been very successful in the transfer of knowledge. Forty schools registered to Stellarium Gornergrat, from which seven Matura theses resulted. Congratulations to the staff of the project led by Dr. Timm Riesen of the University of Bern. Also, in this case the success is based on collaborations for which I express my sincere thanks: to 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 for their support regarding person and material transport.

The engagement of the Burgergemeinde Zermatt right from the start resulted now– at least in my view – in a win-win situation. I cordially thank Mr. Andreas Biner, president and Mr. Fernando Clemenz of the Burgergemeinde Zermatt. I am very glad that we could fulfil a long-lasting wish of the Burgergemeinde to remove the container on the plateau. The success of the "Dining with the stars" and previous events would not have been possible without the dedicated promotion by Mrs. Nicole Marbach and Mr. Thomas Marbach at the Kulmhotel Gornergrat. Their hospitality makes a visit at Gornergrat any time likeable.

My work was once again strongly supported by our administrative staff at Bern. Claudine Frieden (secretary), Dr. Rolf Bütikofer (IT responsible person) and Dr. Stéphane Affolter (responsible person for East Ridge Station) did again excellent work which I very much appreciate. A particular note deserves the planning and organisation of the dismantling of the SONTEL experiment at Gornergrat by Rolf Bütikofer. Thank you, Rolf. I also would like to thank 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. Mr. Lüdi stepped back as responsible person for the auditing as he reached the retirement age. He recently introduced Mr. Roger Nietlispach from the CORE Treuhand Cotting AG, Bern as his successor. I wish Mr. Lüdi all the best and significantly more time to drive his old BSA bike.

The bonds between our Foundation and the University of Bern are manifold. I express my sincere thanks to its Rector Prof. Dr. Christian Leumann and the Administrative Director Dr. Daniel Odermatt, for the continued support of our Foundation, for being a member of our organization, for the hospitality and for the support of our administration. I like to thank the Physics Institute for hosting the office of Stellarium Gornergrat within their Centre for Space and Habitability, Proff. em. Erwin Flückiger and Hans Balsiger for their interest and advice regarding this public outreach project. Finally, I would particularly like to thank Prof. Silvio Decurtins for his tremendous involvement and support in many different aspects.

I conclude by saying it would be nice to welcome you either at Jungfraujoch or Gornergrat. On behalf of the Directorate HFSJG, best regards to all of you.

Bern, February 10, 2018 Markus Leuenberger