



Minutes of Meeting of the GAW-CH Landesausschuss

Date / place: 16 May 2012, 10.30-16.30, MeteoSwiss Zürich

For: Meeting participants,
Members of the GAW-CH Landesausschuss

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Reference: GAW-CH /bue

Chair:
Seiz Gabriela (MeteoSwiss)

Participants:

Ballaman Richard (BAFU); Baltensperger Urs (PSI); Buchmann Brigitte (Empa); Bühlmann Eva (MeteoSwiss); Bukowiecki Nicolas (PSI); Calpini Bertrand (MeteoSwiss); Demoulin Philippe (Uni Liège); Jalkanen Liisa (WMO); Kämpfer Niklaus (Uni Bern); Kienast-Sjögren Erika (ETH Zürich); Klausen Jörg (MeteoSwiss); Peter Tom (ETH Zürich); Plüss Christian (MeteoSwiss); Rubli Alex (MeteoSwiss); Ruffieux Dominique (MeteoSwiss); Simeonov Valentin (EPFL); Stähelin Johannes (ETH Zürich); Steinbacher Martin (Empa); Stetzer Olaf (ETH Zürich); Stübi René (MeteoSwiss); Terblanche Deon (WMO); Vuilleumier Laurent (MeteoSwiss); Wacker Stefan (PMOD/WRC); Wehrli Christoph (PMOD/WRC); Willemse Saskia (MeteoSwiss)

Absentees:

Appenzeller Christof (MeteoSwiss); Asrar Ghassem (WMO); Braathen Geir (WMO); Engel Ines (ETH Zürich); Gröbner Julian (PMOD/WRC); Grüter Estelle (MeteoSwiss); Gysel Martin (PSI); Hocke Klemens (Uni Bern); Lohmann Ulrike (ETH Zürich); Schmutz Werner (PMOD/WRC); Steiner Philippe (MeteoSwiss); Tarasova Oksana (WMO); Weingartner Ernest (PSI); Zellweger Christoph (Empa)

1. WELCOME

Ch. Plüss

Ch. Plüss welcomes the participants to the meeting, in particular Liisa Jalkanen and Deon Terblanche representing WMO, and stresses the importance of international relations in the field of atmospheric observations. With regard to last year's announcement of changes in the corporate structure of MeteoSwiss, Ch. Plüss indicates adaptations in response to changing political settings that impact the reformation process. In any case MeteoSwiss will displace its headquarters to Zürich airport in 2013.

2. ADOPTION OF THE MINUTES OF 4 NOVEMBER 2011

G. Seiz

G. Seiz welcomes the participants on behalf of A. Rubli and herself. The agenda for this meeting is approved. The minutes of the GAW-CH Landesausschuss on 4 November 2011 are acknowledged and approved.

3. INFORMATION FROM WMO

D. Terblanche

Dr Deon Terblanche, Director of the Atmospheric Research and Environment Branch of WMO, thanks MeteoSwiss for the invitation to attend the 2012 Spring GAW-CH Landesausschuss, also on behalf of Dr Liisa Jalkanen, Chief of the GAW program at WMO and Dr Ghassem Asrar, Director of the World Climate Research Programme (WCRP). He conveys Dr Asrar's regards and indicates that he would join again in future.

Dr Terblanche highlights the importance of GAW-related observations and research as it is fundamental to improved understanding, modeling and prediction of the Earth system, specifically when it comes to greenhouse gases. The maintenance of long-term records and scientific progress has to be achieved against a background of significant global political and economic change. Furthermore, it has to be recognized that there are still gaps in the observation networks, in particular in tropical regions and high latitudes. There also remain a number of issues that require improved scientific understanding. To achieve sustainable progress will require National Meteorological Services to become even more involved in and supportive of GAW activities being carried out by other institutions within their countries. The cooperation amongst the numerous institutions involved in the GAW programme in Switzerland is an excellent example of how this could be done. The Swiss model, which is based on multi-institutional cooperation and support, could also be a valid benchmark for GFCS implementation on a national level.

He also highlights the importance of improved understanding of the role of aerosols in the Earth's radiation balance, cloud processes and precipitation formation but also how it links to human health and environmental services. He is of the opinion that stratospheric ozone remains a valid topic of study as the recovery process will be slow and could possibly have additional climate impacts that need to be considered on the decadal timescale.

He further reports that tropospheric ozone as a pollutant is already having a significant impact on agriculture production and food security: in 2000 the loss in crop production due to ozone was already estimated to be of the order of \$11 to \$18 billion and could reach as much as \$35 billion in 2035. Agricultural lands around the growing urban complexes could be significantly impacted. Improved links with the agricultural sector could be a good opportunity to highlight another example of the relevance of the GAW programme to concrete challenges faced by humankind.

4. INFORMATION FROM THE GAW-CH OFFICE

G. Seiz / D. Ruffieux

G. Seiz points out the achievements of G. Müller, the former Chair of GAW-CH Landesausschuss who decisively contributed to the establishment of the GAW-CH program at MeteoSwiss in 1994 and thereafter. Due to his commitment MeteoSwiss is looking back on a long-term legacy of involvements in national and international GAW activities. G. Seiz presents the new GAW-CH organizational structure as of 1 January 2012 and particularly mentions all partner institutions in Switzerland and divisions within MeteoSwiss kindly cooperating in and contributing to the GAW-CH program.

International. With the Quality Assurance / Science Activity Centre (QA/SAC Switzerland) and the World Calibration Centre for Surface Ozone, Carbon Monoxide, Methane and Carbon Dioxide (WCC-Empa), Empa is continuing to provide important technical services to GAW, complemented by training and twinning activities and contributions to the SAG documents.

The Physikalisches-Meteorologisches Observatorium Davos, World Radiation Center (PMOD/WRC) in Davos is in the process of expanding the Regional Calibration Centre

(RCC) for UV in Europe (EUVC) to a World UV Calibration Centre (WUVCC) in support of the GAW program. The Swiss Federation, the Canton Graubünden and the township of Davos are co-funding the World Calibration and Research Centre for UV at PMOD/WRC on the basis of four-yearly commitment periods. PMOD/WRC is promoting public relations by initiating an open house day on 27 October 2012.

The establishment of the Stratospheric Processes And their Role in Climate (SPARC) International Project Office at ETH was celebrated jointly with the 20 years anniversary of SPARC on the occasion of the SPARC SSG meeting in February 2012 at ETH Zürich. SPARC is co-funded by ETHZ, BAFU, MeteoSwiss, and WCRP for the period 2011-2015.

Swiss GCOS Activities. The 9th National GCOS Roundtable took place on 26 January 2012. The 10th Roundtable is scheduled for 31 January 2013 and will be celebrated by a special program. The English version of the report "Swiss GCOS Data in International Data Centres" will become available on the Swiss GCOS website by end of May 2012. Its purpose was to test the status and the availability of Swiss GCOS data from WDCs. Switzerland is participating in the ESA Climate Change Initiative with projects on soil moisture (ETHZ), aerosols (PSI), ozone (MeteoSwiss), greenhouse gases (Empa), glaciers (Univ. Zürich), and clouds (MeteoSwiss, ETHZ). The Expert Team on World Data Centres (ET-WDC), chaired by MeteoSwiss and meeting 22-24 May 2012, is coordinating metadata provision and exchange among WDCs, interacting with the WMO Information System (WIS) on data vocabularies. GAW-IDs have been assigned to all stations registered in GAW SIS and station information is being updated.

MeteoSwiss is coordinating the Capacity Building and Twinning for Climate Observing Systems (CATCOS) project, a project funded by SDC covering the period 2011 - 2013. Four Swiss partners (Empa, PSI, Univ. Zürich and Univ. Fribourg) are involved in establishing greenhouse gas, aerosol and glacier mass balance monitoring systems in seven countries worldwide. The MoUs with the international partners are to be signed during the WMO Executive Council in June 2012. Within the same time frame, a site evaluation is planned in Vietnam. The technical work by the Swiss project partners is progressing on schedule. In the context of CATCOS, a [GCOS South America Workshop](#) took place in Ecuador in March 2012 and was co-financed by Switzerland (through project CATCOS) and Spain.

National. D. Ruffieux highlights the good cooperation between the research community, laboratories, universities and MeteoSwiss within the GAW-CH ozone, radiation and aerosol monitoring program. In April and May 2012, MeteoSwiss was involved in celebration events at Jungfraujoch, including the 100 year anniversary of Jungfraubahnen and the 75th anniversary of the Sphinx scientific station, both resulting in significant media response. Furthermore, a summary and conclusion of the second GAW-CH conference 2011 has been published on the internet. MeteoSwiss is still involved in follow-up activities of the CLACE experiment relating to remote sensing instruments for cloud top/base detection. The call for GAW-CH science projects beginning in 2014 is scheduled for March 2013. Technical support and training activities for ozone soundings in Nairobi are ongoing, and a visit is scheduled for June 2012.

5. INFORMATION FROM NATIONAL GAW-CH ACTIVITIES

5a. Federal monitoring and reporting (NABEL and EMEP)

R. Ballaman

Mr. Richard Ballaman (Swiss Federal Office for the Environment FOEN/BAFU) reports on the success of the emission reductions according to the Gothenburg Protocol under the UNECE Convention on Long-range Transboundary Air Pollution with regard to the national emission ceilings set for 2010. The combination of monitoring activities at the stations of the joint NABEL/EMEP/GAW networks in Switzerland allowed to document the clear correlation between emission trends and ambient air concentrations decreases of SO₂, NO_x and NMVOC. In the future, according to the revision of Gothenburg Protocol new emission

reduction commitments for 2020 and beyond were adopted including also fine particulates and soot / Black Carbon to address stationary combustion installation and mobile sources.

5b. Ozone

5bi. Ozone measurements at Payerne and Arosa

R. Stübi

Ozone soundings (Payerne). The trend analysis updated to 2011 is presented. The analysis shows that the very exceptional years 2010 (high value ~330 DU) and 2011 (low value ~307 DU) respectively, are mostly accounted for by the dynamical proxies in the trend model, namely the “AO” (Atlantic Oscillation) and “EA-WR” (Eastern Asia-Western Russia) indices. The general trend profile is therefore mostly unaffected by the recent years and is still not significantly different from zero at the different levels. In 2012, the Quadrennial Ozone Symposium will take place in August at Toronto and various analyses of the Swiss ozone series from different instruments will be presented in regards to the long term homogeneity.

Total Ozone and Umkehr measurements (Arosa). The major event for year 2012 in Arosa will be the Brewer – Dobson Intercomparison organised in conjunction with the CEOS-ESA project. The regional references for WMO region VI, namely the Dobson 064 from Hohenpeissenberg and the Brewer B185 from Izaña will be collocated to MeteoSwiss instruments for 2 weeks. The world travelling standard Brewer B017 as well as the K&Z Brewer reference instrument will also attend the campaign. The second focal point in Arosa is the start of the AutoDob project with the goal of developing an automated Dobson instrument within this 3 years project. The first results have been presented.

5bii. Ozone at Upper Troposphere/Lower Stratosphere

J. Stähelin

Ozone at the upper troposphere and lower stratosphere is a strong greenhouse gas but the information on long-term changes is very limited. A long-term measurement strategy needs to include ozonesonde and ozone measurements of regular aircraft (project MOZAIC). Johannes Stauer developed in his thesis (Project: Ozone at Upper Troposphere/lower Stratosphere: Climatology and Changes based on ozone sonde and regular aircraft measurements) a method for best comparison of these data using trajectory analysis („trajectory hunting“) to identify same air mass. The deviation between Brewer Mast ozonesonde data and MOZAIC strongly decreased over time which needs further investigation. At present time the agreement between most ozonesonde stations and MOZAIC is (on average) within 10%, which is very satisfactory. The method is presently applied to many other ozonesonde stations.

5c. Aerosols

5ci. Aerosol Monitoring and Research at the Jungfrauoch

U. Baltensperger

(also representing N. Bukowiecki)

Both the GAW-CH Aerosol Monitoring and the GAW-CH+ Aerosol Programme are on schedule. The aerosol monitoring did not encounter major problems on the technical side beside minor data gaps due to regular instrument repairs etc. Although the construction activities for the new tunnel were terminated in winter 2011/2012, there is evidence that the steady increase in touristic activities is causing a critical level of local aerosol pollution. For the aerosol long-term measurements, the ongoing evaluation of alternative sampling locations (e.g. the VBS area Jungfrau-Ostgrat) is highly important and time-critical. Within the GAW-CH+ Aerosol Programme the data analysis of the CLACE 2010 and CLACE 2011 campaigns is on track as planned. First publications are now online ([Zieger et al. 2012, ACPD](#)). Currently, first laboratory tests are performed with the new Ice Selective Inlet (ISI) to be used at the Jungfrauoch in CLACE 2013.

5cii. Assessment of high altitude cloud characteristics

T. Peter

(also representing E. Kienast-Sjögren)

The series of COBALD-CFH or COBALD-SnowWhite tandem soundings (aerosol backscatter and frost point) from Payerne and Zürich has been continued and partly evaluated, including so-called Match flights, which investigate the same cirrus cloud twice. In addition, comparisons with the RaLMO lidar at Payerne have been started. The Leosphere cloud lidar has been relocated to JFJ. In brief, results are:

- COBALD-CFH case studies show that COSMO 7-based trajectory calculations largely reproduce the observations when small-scale temperature fluctuations are superimposed;
- a Payerne-Zürich Match flight on 6 Nov 2008 reveals deficits of COSMO-7 in the phasing of fronts, which affect the timing of cirrus cloudiness above both locations;
- comparison of a COBALD-sounding from Payerne on 5 July 2011 with the corresponding RaLMO lidar shows good agreement in RH at altitudes to 9 km;
- the Leosphere lidar has now been operated at JFJ since 28 Oct 2011 and has so far provided 70 days of cloud statistics, revealing a cirrus cloud coverage of 33 % and cirrus clouds with optical depths as thin as 0.003; comparison of the lidar data with COSMO-2 data of ice water content in the altitude band 5-13 km show an overall very good agreement.

5ciii. Atmospheric ice nuclei and properties of mixed phase clouds

O. Stetzer

(representing U. Lohmann)

In December 2011 the improved setup of HOLIMO II, which has been discussed in the last meeting, was finished and prepared for a field campaign. In January 2012, a campaign on the Jungfrauoch took place, where HOLIMO II was operated for about three weeks. In parallel, measurements with the DMT fog monitor and IN measurements with PINC were conducted. The HOLIMO II setup worked reliably most of the time and produced an impressive amount of hologram images (about 7 TB of image data). Both PINC and HOLIMO data are still being processed but first sample image reconstructions from HOLIMO already demonstrate that the campaign was successful. After some minor technical modifications, HOLIMO was deployed to the Jungfrauoch for a second campaign in April 2012.

For the PINC instrument, two improvements are being worked on: First, a virtual impactor aerosol concentrator has been ordered which will improve the sensitivity of ambient PINC measurements and lower the detection limit for ambient IN concentrations. Second, a new sliding valve is being constructed which will allow a further automation of the PINC instrument operations. Both are steps towards an instrument which can eventually be used as a monitoring instrument.

PINC got international attention in such that it served as the prototype for the development of a commercial instrument (Spectrometer for Ice Nuclei, SPIN) by droplet measurement technologies (DMT). The SPIN instrument is still under development but will be tested and compared with PINC soon. Secondly, a collaboration of scientist of the Nordic countries (Cryosphere-atmosphere interactions in a changing Arctic climate, CRAICC) has expressed their interest in building several instruments of an improved version of PINC to be installed at remote monitoring stations. A collaboration contract will soon be signed with these scientists to work on improvements of the instrument together. Eventually, the improved PINC instruments will be used by ETH Zürich and other groups for long-term monitoring purposes which will be highly beneficial for the GAW community.

5d. Trace gases and water vapor

5di In-situ measurements at Jungfrauoch

B. Buchmann

The global GAW site Jungfrauoch provides the most comprehensive measurement programme for gaseous compounds (more than 70 compounds) in Central Europe. Thus,

transnational access to Jungfraujoch is offered in two FP7 projects: for greenhouse gases in InGOS ([Integrated non-CO₂ Greenhouse gases Observation System](#)) and for reactive gases through ACTRIS ([Aerosols, Clouds, and Trace gases Research InfraStructure Network](#)).

Multi-decadal time series in combination with model approaches enable global emission estimation (1-BOX – Model) and open the opportunity for validating independently emission inventories down to the country level (incl. uncertainties), which are comparable across countries. Thus, emission estimations based on real-world observations offer an independent tool for the MRV (measurable, reportable and verifiable) approach for actual and future protocols. Three countries worldwide, among them Switzerland, support their national reporting with this independent approach, which was for the first time presented at the Science Dialog of the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) in Bonn (Mai 2012). The mole fractions of HFCs, often used as substitutes for compounds regulated in the Montreal Protocol, are potent greenhouse gases (GHGs) and have grown rapidly over the past years. This might be attenuated if a proposal is accepted by the Parties to include HFCs under the Montreal Protocol. For more detailed information:

Velders, G. J. M., Ravishankara, A. R., Miller, M. K., Molina, M. J., Alcamo, J., Daniel, J. S., Fahey, D. W., Montzka, S. A., Reimann, S. (2012). Preserving Montreal Protocol Climate Benefits by Limiting HFCs. *Science* 335(6071): 922-923.

Buchmann, B. (2012). Research at Jungfraujoch supports policy. *Public Service Review: European Science & Technology*, 14, 190-91. (available [here](#))

5dii. FTIR measurements at the Jungfraujoch

P. Demoulin

From January 2011 to April 2012, Liège observers spent 318 days at the Jungfraujoch. They recorded 3730 high-resolution FTIR solar spectra on 193 different days, including 49 days with spectra remotely recorded from Liège. All these observations have been analysed to consistently extend the total column time series of more than 20 gases.

The total columns of two new species can now be retrieved from the Jungfraujoch FTIR spectra: (i) carbon tetrafluoride CF₄, a very strong and very stable greenhouse gas; its increase has been evaluated to 2.3 ± 0.1 %/year (13.2 ± 0.4 Gg/yr) from 1990 to 2012; (ii) methanol CH₃OH, a key organic compound in the Earth's troposphere (the second most abundant after CH₄); preliminary investigations show a very strong seasonal modulation, with a factor of 10 between the minimum columns in December-February and the maximum columns in June-August; no significant trend emerges from the 2005-2012 time series.

The analysis of historical grating spectra recorded in the 1970's and 1980's allowed to extend the time series and to evaluate the temporal evolution of CH₄, HF, HCl and N₂O. This latter molecule increased at a rate of 0.39 ± 0.02 %/yr from 1983 to 1995, and 0.24 ± 0.01 %/yr from 1996 to 2011. The 1983-1995 higher trend is not well reproduced by the WACCM model and is not in agreement with in-situ measurements. The change in the tropopause altitude is not a sufficient explanation for these discrepancies.

5diii. Monitoring methane with open-path TDL at Jungfraujoch

V. Simeonov

During the reporting period, work on the following project tasks was carried on: finalizing a Labview automated data treatment software that performs concentration retrieval with user predefined parameters; intercomparison experiments between the TDL system and point monitors that gave a first estimate of the TDL instrument performance but did not allow defining its accuracy and precision because of the high temporal and spatial variability of the methane concentration; preparation of a calibration/validation experiment using a specially designed calibration cell that allows gravimetric production of gas mixtures at place to define the accuracy and precision of the system; design, building and testing of a system for automated /remotely controlled alignment to allow unattended operation; design and building of a protective housing for the installation at Jungfraujoch HARS.

Monitoring of middle atmospheric humidity is performed on a regular basis in the frame of NDACC (Network for the Detection of Atmospheric Composition Change) with the microwave radiometer MIAWARA located at Zimmerwald near Bern. Since fall 2012 a new instrument (called SWARA) built by the IAP and operated at Seoul in South Korea is also part of NDACC. This instrument is a copy of MIAWARA. A third instrument is operated on a campaign basis and since summer 2011 regularly measures water vapor from Sodankylä. It was shown that even a mini network consisting of a few instruments can provide information of the water vapor content over a large geographical region by the technique of trajectory mapping. In addition to the water vapor instruments also monitoring of ozone in the frame of NDACC from Bern continued uninterruptedly.

The variability of water vapor and its relation to ozone has continued as a research project. Of particular interest is the effect of sudden stratospheric warmings on these trace gases. A key research topic also is the diurnal variability particularly of ozone as this can have an effect on long term trend studies by satellites.

The retrieval of tropospheric humidity based on measured spectra from the MIAWARA instrument continued and it was shown that a constrained retrieval with information by a ceilometer can improve the retrieval process.

5e. Radiation

In 2011, an important upgrade of the Payerne BSRN station occurred which allowed integrating it in the general SwissMetNet infrastructure. This is the most complex SACRaM station, and the old infrastructure was renewed including the supporting benches. This was achieved from 15/08/2011 to 30/09/2011. During this period only very partial data was available at Payerne BSRN. The data flow was re-established at the beginning of October 2011. The Davos station should also be integrated into SMN when PMOD/WRC building remodeling will be completed (2012).

Beyond quality control, thorough verification (quality analysis) of the Payerne BSRN data accuracy was performed for short-wave (SW) global, short-wave direct and long-wave downward irradiance. This revealed that the level of accuracy and stability reached before the upgrade of the station was maintained in general. The extremely tight BSRN accuracy target for SW direct irradiance seems to be reached. For SW global irradiance, the BSRN accuracy target is reached as well. However, for LW downward irradiance, the results are just at the limit of the BSRN accuracy target, and the level of reproducibility achieved before the station upgrade seems not to have been fully maintained. This problem is still under investigation and the PMOD/WRC and MeteoSwiss will jointly perform a study of the calibration characteristics of the pyrgeometers operating at Payerne.

A MeteoSwiss contribution to a scientific exhibit in the framework of the 100th anniversary of the Jungfraubahn was set-up. The scientific exhibit was inaugurated in April 2012. A press conference was organized for the 75th anniversary of the establishment of the Sphinx GAW scientific station at Jungfrauoch. This press conference resulted in coverage in at least 7 media in Switzerland.

Results from the analysis of the cloud radiative effect (CRE) show a decrease in the total CRE at the lowland stations Payerne and Locarno-Monti over the past 15 years. On the other hand, the trends of the CRE at the two mountainous sites Davos and Jungfrauoch are not yet conclusive due to the large uncertainties in the short-wave cloud-free model. We explain

these larger uncertainties by the highly reflective environment caused by the snow cover. These discrepancies will be further investigated including the analysis of satellite data.

The cloud camera installed at Payerne has been reliably operating for more than one year. In combination with the system at Davos which was installed in 2010, a comprehensive set of sky images can be analyzed. The sky images are used to calculate fractional sky cover on a routine basis. Furthermore, an automatic cloud classification algorithm is currently implemented which distinguishes between up to seven different cloud classes and cloud heights. This algorithm is based on a set of mainly statistical features describing the color and the texture of an image.

Since the cloud cameras show operational deficiencies in cold weather conditions, a more robust system was successfully tested at Davos and will be deployed within the next months on Jungfrauoch.

6. INFORMATION FROM INTERNATIONAL GAW-CH ACTIVITIES

6a. Calibration centers at PMOD/WRC (IRC, EUVC, WORCC)

Ch. Wehrli

(also representing J. Gröbner)

WRC-IRS. The World Infrared Standard Group of pyrgeometers has remained very stable during 2011; nevertheless, the sensitivity of one of the instruments, CG4 010535, has shown a slight drift over the past years which was corrected by 0.5% at the beginning of 2012. The agreement between the four instruments is of the order of $\pm 1 \text{ Wm}^{-2}$. Measurements with the IRIS Radiometers have revealed a systematic seasonal dependence of the WISG of the order of 5 Wm^{-2} , the WISG measuring higher in winter and lower during the summer and Fall seasons. This systematic behavior is likely due to the spectral transmission of the WISG pyrgeometer domes. This behavior will be investigated during a fall intercomparison of IRIS radiometers, as well as a winter intercomparison between the IRIS radiometers and the newly developed NREL absolute IR radiometer. Furthermore, Modtran model calculations using temperature and humidity profiles from sondes and Lidar at Payerne will be assimilated with longwave irradiance measurements in view of assessing the level agreement between absolutely calibrated pyrgeometers traceable to the IRIS radiometers.

EUVC. The European UV Calibration Center has become a WMO World Calibration Center for UV through financial support by the Canton Graubünden for the period 2012-2015. Furthermore, the EUVC has been included in the Quality Management System ISO 17025 and a CMC for global solar irradiance weighted responsivity of UV broadband radiometers (Calibration and Measurement Capability) has been submitted to the EURAMET, which created a new service category for this particular parameter. Most of the activities in 2012 will be concentrated on the EMRP Project "Traceability for surface spectral solar UV radiation" which is coordinated by PMOD/WRC and which involves 10 partners from European Metrology Institutes as well as three partners from Universities. The project will lead to a large intercomparison of spectroradiometers in June 2014 at PMOD/WRC to provide traceability of spectral solar irradiance measurements with significantly reduced uncertainties.

WORCC. The internal consistency of the PFR reference Triad was verified by mutual cross-calibrations and found to be well within the expected uncertainty of 1%. An external validation through comparison with an Aeronet instrument located at Davos has confirmed this uncertainty. A survey of global AOD networks has identified a significant increase of stations (793) operational in 2011 with respect to 2004 (413). Out of 69 stations with a long-term record (10 years with a coverage of >9 months), 40 are affiliated with WMO, and 29 are operated under Aeronet protocol. An AOD intercomparison was held in February 2012 at Davos between 7 instruments from the PolarAOD network and 2 WORCC filter radiometers.

Activities of WORCC in 2012 will cover the installation of a redundant PFR at Izaña for routine Langley calibration of the reference Triad, a station audit at Cape Point, quality

assurance and submission to WDCA of GAWPFR AOD results, as well as the preparation of documentation required for the certification according to ISO 17025.

6b. Calibration center WCC-Empa

M. Steinbacher

(representing Ch. Zellweger)

WCC-Empa presented the results of a first on-site comparison of CO, CO₂ and CH₄ during the audit at Cape Point in 2011 at the 16th WMO/IAEA Meeting on Carbon Dioxide, Other Greenhouse Gases, and Related Measurement Techniques in Wellington in October 2011. Due to the important findings of this comparison, the following recommendations were made: *'WCC-Empa has demonstrated the benefits of using a travelling instrument for GAW station audits. It is very desirable that the air intake is included in the testing process. This practice is encouraged whenever possible'*.

The travelling instrument has also been used during the WCC-Empa audit at the GAW station Pallas, and the measurements are currently ongoing. First results of this campaign were presented at the NOAA GMD Global Monitoring Annual Conference (15-17 May, Boulder). Excellent agreement was found for 1-min data for CO₂ (average bias -0.02 ± 0.03 ppm) and CH₄ (average bias -0.08 ± 0.36 ppb), and slightly larger deviations were observed for CO (bias 4.5 ± 1.4 ppb). The reason of the larger bias for CO might be due to imperfect compensation of the water vapor interference; however, this issue has been addressed in collaboration with Picarro Inc., and improvements were made. A full instrument characterization and comparison with other measurement techniques for CO will be shortly submitted to the journal Atmospheric Measurement Techniques (AMT).

6c. QA/SAC Switzerland

M. Steinbacher

(also representing B. Buchmann, Ch. Zellweger)

In November 2011, QA/SAC Switzerland visited the GAW station Bukit Koto Tabang (BKT) on Sumatra Island, Indonesia and the Indonesian Meteorological Climatological and Geophysical Agency (BMKG) headquarter in Jakarta jointly with WCC-Empa that conducted a site evaluation and audit. Comprehensive support was provided during the stay. A steady progress made by BMKG in terms of organization, documentation, skills and infrastructure was recognized. However, various problems were identified and partly solved.

A short report was given on discussions / outcomes of the 16th WMO/IAEA Meeting on Carbon Dioxide, Other Greenhouse Gases, and Related Measurement Techniques in Wellington in October 2011. Data users criticized the varying data format in the various datasets available at the World Data Centre for Greenhouse Gases (WDCGG) such as inconsistencies in flags and strings for missing data. Thus, a data user group was established to provide guidance on ways to improve the usability of data distributed by the WDCGG. Data providers complained about the poor acknowledgement by data users. A required registration of data users along with automated e-mail notifications to data provider when downloading data from WDCGG is under discussion.

Various approaches to improve and ensure data quality of air quality monitoring time series were presented. Long-term side-by-side comparisons of carbon dioxide and carbon monoxide observations at Jungfraujoch and their benefits were shown. Several projects were presented that focus on quality assurance issues, such as AirMonTech (<http://www.airmontech.eu/>) that compiles information to harmonize current air pollution monitoring techniques, ACTRIS (Aerosols, Clouds, and Trace gases Research Infrastructure Network; <http://www.actris.net/>) that prepares standard operation procedures for nitrogen oxides and volatile organic compounds, and InGOS ([Integrated non-CO₂ Greenhouse gas Observing System](#)) that aims at harmonizing past and future data by standardizing data analysis procedures.

6d. SPARC Office

J. Stähelin

The SPARC Office was moved from Toronto (Canada) to Zürich (Switzerland) in 2011. During 2011 the new SPARC website was developed (Carolin Arndt). The main tasks of the SPARC Office in 2012 include: Organization of the SPARC SSG meeting that took place in February 2012 in which the 20th anniversary of SPARC and the move of the SPARC Office to Zürich was celebrated, construction of a common SPARC data base, support to organize SPARC meetings including financial travel support and contribution to scientific activities.

7. VARIA

The next meeting of the GAW-CH Landesausschuss at MeteoSwiss in Zürich is scheduled for Friday, 9 November 2012, 10:30 – 16:30.

Presentations of this meeting have been made available at <ftp://ftp.meteoswiss.ch/outgoing/GAW/Landesausschuss/2012/Spring/> (case-sensitive).

28 August 2012
Eva Bühlmann

Federal Office of Meteorology and Climatology MeteoSwiss
GAW-CH Office