



SPARC
Stratosphere-troposphere
Processes And their Role in Climate

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Lenticular clouds over the tropical ocean. In a joint workshop, three SPARC activities defined common interests, and investigated the benefit from combining the knowledge about the Quasi Biennial Oscillation (a semi-annual reversal of the mean wind direction in the tropics), as well as about stratospheric and tropospheric influences on tropical convective systems and on fine scale processes in the atmosphere (see report on page 19). Joining forces will lead to enhanced understanding of the complex dynamics of the tropical atmosphere.

Photo credit: Katja Riedel Photography

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Report on the 25th SPARC Scientific Steering Group Meeting 16-18 October 2017, Incheon, South Korea

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The 25th SPARC Scientific Steering Group (SSG) meeting was jointly hosted by colleagues affiliated at the Seoul National University (SNU) and the Korean Polar Research Institute (KOPRI). It took place at the Orakai Songdo Park Hotel in Incheon, South Korea, from 16 - 18 October 2017. The Korean SSG member (Seok-Woo Son) provided most valuable assistance with the technical arrangements. The meeting was followed by an Early Career Researchers (ECR) symposium during the afternoon of 18 October and a WCRP/SPARC local workshop on 19-20 October, both at the conference facilities of the nearby KOPRI (see page 7, this issue). Representatives of the National Institute of Meteorological Sciences (NIMS), which hosts the International Coordination Office of the WWRP Sub-seasonal to Seasonal (S2S) prediction project (**Yu-Kyung Kim**), and of the Korean Polar Research Institute (**Baek-Min Kim**) briefly introduced their institutions and underscored the high relevance of SPARC activities for their research tasks.

WCRP update

As already indicated in the previous SSG24-report, the World Climate Research Programme (WCRP) currently undergoes a review, organized by its co-sponsors WMO, IOC and ICSU, of which the report would be submitted to the executive bodies of co-sponsors before the end of 2017 (**Boram Lee**, WCRP Joint Planning Staff [JPS]/ SPARC liaison). The review would include assessments and recommendations on not only the scientific achievement of WCRP groups and activities, but also of the adequacy and effectiveness of WCRP operational structures. In addition, the WCRP Joint Steering Committee (JSC) has been leading the process of refreshing strategic planning for WCRP, and all Core Projects including SPARC and main WCRP activities have been actively participating. In both major processes, it has been reaffirmed that WCRP should not be diluted by moving away from underpinning,

fundamental climate science into the applied science required for climate services. Meanwhile WCRP needs to be cognizant of what the users and stakeholders require from climate science, and should therefore maintain an active dialogue with them, either directly or through its co-sponsors. Further integrated community efforts have emerged as the main direction of WCRP's scientific strategy, such as integrated atmosphere-chemistry-climate research and seamless prediction by bringing together the expertise and experience of the weather prediction community and that of the climate modelling groups.

The SSG noted with concern on the still tight financial climate and reduced staffing at the JPS, which necessitates rationalization of overall administrative support and coordination across JPS and the international project offices. At the same time efforts are undertaken to restore support from the co-sponsoring organizations, especially for the core projects and to main WCRP activities.

SPARC activity reports

The Long-term Ozone Trends and Uncertainties in the Stratosphere (LOTUS) activity formed two working groups addressing "Multi-Instrument Data Integration" (MIDI) and "Regressions of Ozone Analyzed for Stratospheric Trends" (ROAST), respectively (**Irina Petropavloskikh**). Thirty participants attended the first LOTUS workshop on 13-15 March 2017, hosted by Laboratoire ATmosphères, Milieux, Observations Spatiales (LATMOS) at the Université Pierre et Marie Curie in Paris, France (more information at <https://events.oma.be/indico/event/23/overview>). The bulk of information about LOTUS is being collected and presented on the dedicated website <http://igaco-o3.fmi.fi/LOTUS>. A collaborative effort was initiated to prepare a Final Report that will be reviewed by SPARC and which will contain critical results to support the 2018 WMO/UNEP Scientific Assessment of Ozone Depletion.

Within the Polar Stratospheric Cloud initiative (PSCi) a focus was put on comprehensive PSC-climatology papers based on long-term satellite data records obtained by the MIPAS and CALIOP instruments (**Larry Thomason** for **Michael Pitts**). These efforts are considered as a foundation for an intended broad review publication on topics as the spatial/temporal distribution, composition, and microphysical properties of PSCs as well as their improved representation in satellite retrievals and transport modelling studies.

The Stratospheric Sulfur and its Role in Climate activity (SSiRC) organized a three-day workshop with the aim of bringing together in-situ and space-based measurement teams, attended by 35 scientists from the US, Germany, Belgium and the UK (**Stefanie Kremser**). A proposal to the American Geophysical Union regarding a “Chapman Conference on Stratospheric Aerosol in the Post-Pinatubo Era: Processes, Interactions, and Importance” was accepted. The event is scheduled for 18-23 March 2018 in Santa Cruz de Tenerife, Spain. Under the umbrella of SSiRC, ETH Zurich and NASA compiled a new stratospheric aerosol forcing dataset for CMIP6-simulations. Field activities included contributions to a Balloon campaign of the Asian Tropopause Aerosol Layer (BATALL) during August and the StratoClim aircraft campaign out of Kathmandu, Nepal, from mid-July to mid-August.

The SPARC Reanalysis Intercomparison Project (S-RIP) constitutes a valuable communication platform between SPARC-related researchers and large reanalysis centres (**Michelle Santee**). Contributions to an inter-journal special issue appeared in *Atmospheric Chemistry and Physics* and in *Earth Systems Science Data* or are still under review. The entire collection consists of 18 articles. The revised version of the S-RIP interim report is about to be submitted to the team of external editors. The annual S-RIP workshop was scheduled for 23-27 October at ECMWF, as usual in junction with the SPARC Data Assimilation Working Group (DAWG; see report on page 26, this issue).

DAWG was presented remotely (**Quentin Errera**), with reference to the joint workshop at ECMWF and previous technical tasks that had evolved into separate SPARC activities, e.g. SNAP and S-RIP. A review of the activity will be prepared until the SPARC General Assembly in 2018. In August, one of the co-chairs took part at the US-CLIVAR summit, where a

strengthening of the links to SPARC was advocated. The Stratospheric Network for Atmospheric Predictability (SNAP) started its second phase with emphasis shifting towards analysis of data from the World Weather Research Programme (WWRP) project “Sub-seasonal to seasonal prediction” (S2S; **Andrew Charlton-Perez**). A review article was initiated about the stratosphere’s impact on predictability within the S2S-models, which will provide a broad overview of S2S-relevant research being done within the SPARC community. Close links were maintained with SPARC activities QBOi and Data Assimilation.

The activity Atmospheric Temperature Changes and their drivers (ATC; **Andrea Steiner**) defined i) the temperature variability throughout the atmosphere including uncertainty in climate data records and ii) the attribution of atmospheric temperature changes as its two new foci. The co-chairs organized a dedicated session at EGU-2017. In cooperation with the S-RIP activity measured and re-analysed temperature trends were compared. Combined observational and model studies hinted at subtle connections, as e.g. from ozone extremes in the Arctic stratosphere to northern hemisphere surface climate.

The Atmospheric Composition and Asian Monsoon (ACAM) activity, a joint undertaking with the International Global Atmospheric Chemistry (IGAC) project, continued its series of regional workshops and associated training schools with a combined event in June 2017 in Guangzhou, China, which was attended by some 160 scientists and more than 40 students, respectively (**Laura Pan**). Eight missions of the high-flying research aircraft Geophysika out of Kathmandu, Nepal, during the EU-funded StratoClim campaign directly addressed core science issues of ACAM and managed to probe in-situ outflow regions of monsoon events up to heights of 20 kilometres.

The Chemistry-Climate Modelling Initiative (CCMI) constitutes another activity jointly undertaken with IGAC. It held its science workshop in June with around 100 participants, hosted by Météo-France in Toulouse (**Seok-Woo Son** for **Michaela Hegglin**). Internal communication was strengthened through the broad distribution of CCMI e-news. External visibility is being enhanced by formal publication endeavours as, e.g., an overview paper regarding the entire suite of global models participating in the first phase of CCMI, a review article about the Aerosol Chem-

istry Model Intercomparison Project, and an inter-journal special collection of 12 research articles which had been opened at Copernicus Publications (www.atmos-chem-phys.net/special_issue812.html).

The SOLARIS-HEPPA activity deals with solar and high energy particle precipitation influences on stratospheric and higher atmospheric levels; it consists of five working groups. These scheduled their annual workshop meeting for November in Paris, France (**Bernd Funke**, presenting remotely via web-interface). Various external forcing datasets were prepared for the global modelling studies in the CMIP6-exercise. A comparative study, juxtaposing output from eight atmospheric models with observations from seven satellite instruments, was undertaken for the perturbed northern-hemisphere winter of 2008/09 and the results were published.

The second Water Vapour Assessment activity (WAVAS-II) further contributed to the inter-journal special collection, which had been opened at Copernicus Publications (www.atmos-chem-phys.net/special_issue830.html; **Gabi Stiller** remotely). These include an intercomparison of satellite and ground-based microwave measurements. Results of coordinated studies were presented at international conferences in South Africa and Canada. A dedicated session was proposed for the EGU Assembly 2018. For the future, it was decided to concentrate on articles in research journals rather than producing a SPARC-report.

Marvin Geller, SPARC-founding co-chair back in 1992 and active contributor over the past 25 years, presented the Fine Scale Atmospheric Processes and Structures (FISAPS) activity. It had an international workshop during the previous week in Kyoto, Japan, jointly organized with activities QBOi and SATIO-TCS (see report on page 19, this issue). The collection and storage of full resolution datasets, such as high vertical resolution radiosonde data, was addressed. The next workshop is planned to take place in Europe.

The Quasi-Biennial Oscillation initiative (QBOi) produced several publications on experimental QBO-simulations for the present day and future climates (**Scott Osprey**). The initiative was integrated in the 19th Middle Atmosphere conference of the American Meteorological Society in June and co-organized the workshop in Kyoto in October. Follow-on sessions and side meetings will be planned for the General Assembly 2018, where also a closer link is to be

established to the Belmont Forum, a grouping of the world's major funders of global environmental change research.

The Gravity Waves activity extended its focus from climate to also weather regimes, underscoring a seamless prediction approach (**Kaoru Sato**). Vertical profiles of momentum fluxes in general circulation models are considered as important diagnostics together with spectra of inertia-gravity waves in global analyses. The SPARC General Assembly 2018 is co-organized by one of the activity leaders and, thus, will be a natural focal point for scientific exchange across the activity.

The Dynamical Variability activity (DynVar) is having an internal discussion on how to redirect its focus after a decade of successful initiatives, e.g. DynVarMIP endorsed by the modelling intercomparison under CMIP6 (**Alexey Karpechko** for **Elisa Manzini**). “Variability and predictability of surface impacts and extremes” has been suggested as a new focus with close links to the WWRP projects “Sub-seasonal to seasonal prediction” (S2S) and “High Impact Weather” (HIWeather). A second focus could be to promote research based on the huge amount of model data available through CMIP-6 (cf. Eyring and Carlson 2017, SPARC-newsletter #48, pp. 11-17). The scope, membership, and leaders will be decided upon during the coming year.

SPARC emerging activities

Reports were also presented on the four emerging activities of SPARC. A structure for numerical experiments equivalent to the double CO₂ scenarios within CMIP, but for ozone and aerosols was sketched within Climate Response to Short-Lived Climate Forcers (SLCFs; **Neil Harris** for **William Collins**). Systematic scenario calculation at various modelling groups will only be possible onwards after completion of CMIP6. The possibility of a joint activity on SLCFs with the WMO Global Atmospheric Watch and with IGAC will be investigated.

The activity Towards Unified Error Reporting (TUNER) for space-borne temperature and composition sounders had its first workshop in Saskatoon, Canada, in June (**Nathaniel Livesey**). The International Space Science Institute in Berne, Switzerland, approved a proposal for a TUNER International Team, which scheduled its first meeting for December 2017. In August, the activity was presented at the IAMAS-assembly in Cape Town, South Africa.



Figure 1: Group photograph of the SPARC SSG meeting participants on 16 October 2017.

In July 2017, the activity Observed Composition Trends And Variability in the Upper Troposphere and Lower Stratosphere (OCTAV-UTLS) held its first workshop in Boulder, USA (**Irina Petropavlo-skih**), where expert groups were formed for categories of observing platforms and datasets got identified that are suited to determine the composition in the UTLS and its long-term changes. The years 2011 to 2013 were declared as initial test period. In June, the activity was presented at the Middle Atmosphere Conference of the American Meteorological Society.

During the week preceding the SSG meeting, the dynamics oriented activity Stratospheric And Tropospheric Influences On Tropical Convective Systems (SATIO-TCS) participated in the joint workshop with FISAPS and QBOi in Kyoto, Japan (**Shigeo Yoden**), where its scientific objectives were refined. An overview paper is planned for publication in the Bulletin of American Meteorological Society. Possible links with the Year of the Maritime Continent initiative (2017-2019) are being investigated.

General Assembly 2018

The state of preparation for the next quadrennial General Assembly of SPARC, scheduled for 1-5 October 2018 in Kyoto, Japan, was presented in some detail regarding venue, intended timetable, the desire to give poster presentations a prominent position, and the links to the IGAC conference (**Kaoru Sato**). The Scientific Organizing Committee has two co-chairs (Harry Hendon and Amanda Maycock) and seven

members. Contributions from the Belmont Forum of funding agencies combined with the EU joint initiative on Climate Knowledge (JPI Climate) will be an integral part of the programme. A large number of poster presentations is expected. Each poster will be on display for 2.5 days with the potential to attract numerous poster viewers and to ignite vivid discussions during several sessions accompanied with refreshments.

Partner projects

A report on the International Global Atmospheric Chemistry project (IGAC) was presented by **Hiroshi Tanimoto**. IGAC is a close partner of SPARC on chemistry-oriented activities, e.g. ACAM and CCMI. During the previous year the IGAC community sharpened its profile within the new Future Earth framework with strong foci on basic research, fostering the science community, providing leadership and building new capacity through early career support. IGAC will hold its 15th science conference in Takamatsu, Japan, in 2018 in the week prior to the SPARC General Assembly. The local organizing committees are in close communication in order to facilitate visits of both events, only 250 km apart, around the intermediate weekend at reasonable costs.

The Climate and Ocean: variability, predictability and change project (CLIVAR; **Jose Santos**), also a WCRP core project, concentrates on the marine component of the coupled ocean-atmosphere system, in particular with regard of systematic and multi-national observations. Its open science conference 2016 in

Qingdao, China, attracted more than 600 participants from 47 countries. Training of the next generation of researchers is regarded as essential for the continuing success of WCRP as the maintenance of a strong grounding in fundamental research. Recently a new Northern Oceans Region Panel (NORP) was approved jointly with the cryospheric core project CliC.

The Korean National Institute of Meteorological Sciences (NIMS) hosts the international coordination office of WWRP's Subseasonal to Seasonal prediction project (S2S; **Yu-Kyung Hyun**), a legacy project of the THORPEX initiative (2005-2015). With the aim of "bridging the gap between weather and climate" about a dozen of global modelling centres undertake coordinated ensemble forecasts up to two months ahead. The efforts of S2S prediction programme in the United States supported by NOAA were reported (**Judith Perlwitz**). It addresses a number of key questions in areas "processes and physics", "prediction approaches", and "prediction evaluation".

Space observations

Representatives from four space agencies provided updates of current activities and plans, which are of relevance for SPARC research. **Kenneth Jucks** (NASA; remotely) provided an overview of Earth science missions in categories "extended operations", "primary operations", "under implementation", and "being formulated", with a special focus on ozone research. The SAGE instrument has reached its third generation. A version is being commissioned for use aboard the International Space Station (ISS). The multi-decadal SAGE ozone and aerosol datasets from 1979 onwards are regarded as an international standard for accuracy and stability. The Tropospheric Emissions: Monitoring Pollution (TEMPO) mission is scheduled for launch to a geostationary orbit in 2019. The release of the current decadal survey document is due by the end of 2017.

Lin Chen (Chinese Meteorological Administration [CMA], National Meteorological Satellite Center) gave a detailed summary regarding the current status and future programme of the Chinese meteorological satellite series FengYun, (FY) with currently eight platforms in orbit, six of them operational, partly in low earth and partly in geostationary orbits. The FY satellite data and application service provides near real time access and has more than 45 direct broadcasting users. Monitoring capacities for greenhouse gases are scheduled for mission FY-3D.

Hyo-Suk Lim (Korean Aerospace Research Institute) described the satellite application activities of the Republic of Korea with currently five platforms operational in low earth and one in geostationary orbit. Four launches are scheduled within the coming four years. Besides land and ocean surface observations as well as monitoring during disaster episodes global environmental monitoring is to begin after the launch start of KOMPSAT-2B to a geostationary orbit (scheduled for 2018).

Makoto Suzuki (Japan Aerospace Exploration Agency [JAXA], Earth Observation Research Center) presented the status of the Japanese meteorological satellite programme, highlighting monitoring missions such as GOSAT (since 2009), GCOM-C (launch early 2018), GOSAT-2 (launch 2018) and EarthCARE (launch ~2019). Experiences from the exploratory, limb sounding SMILES project are being fed into a new joint proposal for chemistry and dynamics of stratospheric and mesospheric levels. The need for scientific support from the SPARC, IGAC or SCOSTEP communities was emphasized.

Other SPARC news

Fiona Tummon (outgoing SPARC Office director) remotely reported about the SPARC capacity development. The office continued to actively support the Young Earth System Scientists (YESS) community, which has representatives in numerous countries around the planet. Specific workshops and training schools were held on Atmospheric composition and dynamics (in Réunion Island; 28 Nov. - 3 Dec. 2016), on Monsoon variability in a changing climate (in Jeju, Korea; 16 - 21 Jan. 2017), as 2nd ACAM training school (in Guangzhou, China; 5-9 June 2017), as 3rd South-East Asian school on tropical atmospheric science (SEASTAS; in Singapore; 24-27 July 2017), and as Stratosphere-troposphere interactions training school (at university of Cape Town, South Africa; 2-5 September. 2017).

During the afternoon of the 18 October a dedicated Early Career Researcher symposium took place in parallel to the SSG meeting with keynote lectures given by SSG-members (Harry Hendon, Laura Pan) and selected presentations by some of the SPARC-supported participants from Asian countries. Everybody joined the regional (Korea-China-Japan) scientific workshop during the next two days, when 32 oral presentations and 33 poster presentations served as crystallization points for vivid scientific exchange between some 80 scientists from 12 countries on four continents.

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SPARC Office: move from Zurich to Oberpfaffenhofen

SPARC science relies on voluntary cooperation on a global scale. In this respect, the SPARC Office has been providing an organizational and scientific backbone for no less than a quarter of a century (see article on page 30, this issue). During the years 2012 to 2017 colleagues from the Institute for Atmospheric and Climate Science of ETH Zurich acted most efficiently at the interface of science and management on behalf of the World Climate Research Programme.

After a six-monthly transition period, the Institut für Physik der Atmosphäre of DLR in Oberpfaffenhofen (www.dlr.de/pa/en) is now acting as the fourth host-institution for the SPARC Office ([www.sparc-climate.org/about/SPARC Office](http://www.sparc-climate.org/about/SPARC%20Office)). We will try hard to keep the high standard set by **Johannes Stachelin, Fiona Tummon, Carolin Arndt** and **Petra Bratfisch**. And we are looking forward to interacting with many members of the broad SPARC community.

Hans Volkert, Mareike Kenntner, and Brigitte Ziegele



SPARC celebrates 25 years and the move of its International Project Office

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DATE:

1 December 2017

ORGANISERS:

Thomas Peter (ETH Zurich), Johannes Staehelin (ETH Zurich), Carolin Arndt (SPARC Office, ETH Zurich), Fiona Tummon (SPARC Office, ETH Zurich; now University of Tromsø), Petra Bratfisch (SPARC Office, ETH Zurich)

HOST INSTITUTION:

ETH Zürich

NUMBER OF PARTICIPANTS: ~60

SPONSORS:

ETH zürich



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Federal Office for the Environment FOEN



WEBSITE:

<http://www.sparc-climate.org/meetings/25-years-of-international-sparc-research/>

Founded in 1992 largely in response to concerns about the consequences of stratospheric ozone depletion, the World Climate Research Programme's core project SPARC has evolved into a major international hub for facilitating atmospheric science. Over the years, SPARC's focus has expanded to go well beyond just the stratosphere to look at the troposphere-stratosphere system and impacts closer to the surface. The primary goal, however, has remained the same: to facilitate cutting-edge research to improve our understanding and prediction of atmospheric processes. Counting over 3000 researchers from around the world, over the past 25 years the SPARC community has become an internationally-recognised and lively scientific community. Over the past two and a half decades, eight comprehensive SPARC Science Reports as well as numerous well-cited scientific papers and newsletters have been published. SPARC's renowned expertise in data handling and modelling have contributed significantly to international assessments, such as the WMO/UNEP assessments of ozone depletion and the IPCC climate assessments.

A celebration was held on the afternoon of 1 December to recognise SPARC's 25th anniversary and the move of the SPARC Office, after six years in Zurich, to the German Aerospace Centre (DLR) in Oberpfaffenhofen. Located in the historical Semper Aula at the ETH Zurich, the event attracted just over 60 participants from the SPARC community in the region. After a warm welcome from **Thomas Peter**, previous SPARC co-chair, representatives from all of the Zurich SPARC Office's sponsors gave brief presentations. Understanding climate change and dealing with its impacts is a major focus of all the sponsors and thus supporting the SPARC Office was directly in line with the core priorities of the ETH Zurich (**Detlef Günther**), the World Climate Research Programme (**Deon Terblanche**), as well as the Swiss Federal Offices for the Environment (**José Romero**) and Meteorology and Climatology, Meteoswiss (**Bertrand Calpini**).

This was followed up by a look into the past, with **Thomas Peter** and **Johannes Staehelin** providing an overview of SPARC's achievements over the past 25 years. Stefan Reimann then highlighted the significant contribution of SPARC science to the WMO/UNEP Ozone assessments, all the way from the very first report (with yellow cover) to the upcoming 2018 report (with unknown cover colour!). Several SPARC activities have produced results that underpin these assessments, providing policy-



Figure 12: Impressions from the 25 years celebration: Neil Harris, SPARC Co-Chair, Cranfield University, UK - Lamont Poole, NASA Langley Research Center - Stefan Reimann, Empa, ETH Zurich - Guests listening to Thomas Stocker, University of Berne - Thomas Peter, former SPARC Co-chair, ETH Zurich, and Fiona Tummon, former SPARC Office director, now at the University of Tromsø - Deon Terblanche, WMO - Group photograph of former and future SPARC Office staff with supporters and sponsors. These and more photos can be found at: www.sparc-climate.org/meetings/25-years-of-international-sparc-research/.

relevant information to decision-makers around the globe. These include various incarnations of the stratospheric ozone trends activity, the temperature trends activity, CCMVal-1 and -2, the ozone-depleting lifetimes activity, and the carbon tetrachloride activity. Thereafter **Thomas Stocker** focused on the variety of ways in which SPARC-related research has fed into the IPCC reports. He emphasised the improvements to our understanding of natural climate forcings such as volcanic eruptions and solar radiation, as well as several SPARC activities which have helped reduce uncertainty related to stratospheric temperatures as well as various greenhouse gases such as water vapour. SPARC will continue to contribute both directly and indirectly to the upcoming IPCC assessment, through the various activities related to the coupled model intercomparison project (CMIP-6) and through fundamental research improving our understanding of the climate system, respectively.

The final session of the afternoon focused on the future. **Neil Harris**, current SPARC co-chair, gave a brief overview of current SPARC activities and then emphasised where SPARC could build on traditional strengths, including its international community and agenda-setting science, to continue effectively in the coming years. Two up-and-coming SPARC scientists detailed some fascinating new results related

to evidence for continued decreases in lower stratospheric ozone (**William Ball**) and changing transport pathways through the stratosphere (**Hella Garny**). **Markus Rapp**, director of the Institute for Atmospheric Physics at the DLR in Oberpfaffenhofen, then introduced the new home for the SPARC Office as well as the new team: *Hans Volkert* (director), *Mareike Kenntner* (project scientist), *Brigitte Ziegele* (office manager), and *Winfried Beer* (IT). A surprise sing-along to a 1989 song about polar stratospheric clouds written and performed by **Lamont Poole** brought the afternoon presentations to a wonderful end. The event was rounded off by an excellent Apéro and time for new and old friends to continue the celebrations for a little while longer.

SPARC's success would never have been possible without the long-term commitment and support of the World Climate Research Programme and WMO, as well as the numerous SPARC Office hosts and sponsors, including the most recent SPARC Office sponsors in Switzerland: ETH Zurich, the Federal Office of Meteorology and Climatology (MeteoSwiss) and the Swiss Federal Office for the Environment. We warmly thank these sponsors for their very generous support over the past years! We wish the new SPARC Office every success in its new home at the DLR in Oberpfaffenhofen!

SPARC meetings

5 - 8 February 2018

The UTLS: Current status and emerging challenges
Mainz, Germany

23 - 24 April 2018

SOLARIS-HEPPA working group meeting
Karlsruhe, Germany

14 - 18 May 2018

SSiRC Steering Group meeting

11 - 15 June 2018

7th HEPPA-SOLARIS Workshop
Roanoke, Virginia, USA

June 2018

OCTAV-UTLS workshop
Mainz, Germany

27 - 28 June 2018

ATC workshop
Paris, France

1 - 5 October 2018

6th SPARC General Assembly
Kyoto, Japan

www.mete.kugi.kyoto-u.ac.jp/SPARC_GA2018/index.html

7 - 9 October 2018

SPARC Scientific Steering Group meeting
Kyoto, Japan



SPARC related meetings

5 - 9 February 2018

AMOS-ICSHMO 2018
Sydney, Australia

18 - 23 March 2018

AGU Chapman Conference on Stratospheric Aerosol in the Post-Pinatubo Era: Processes, Interactions, and Importance
Puerto de la Cruz, Santa Cruz de Tenerife, Spain

6 - 11 May 2018

GEWEX Science Conference
Canmore, Alberta, Canada

14 - 22 July 2018

42nd COSPAR Scientific Assembly and Associated Events: "COSPAR 2018"
Pasadena, CA, USA

25 - 29 September 2018

Joint 14th Quadrennial iCACGP Symposium/15th IGAC Science Conference 2018
Takamatsu, Japan

Find more meetings at: www.sparc-climate.org/meetings

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