



Alexander Gerst @Astro_Alex · 25. Sep. 2018
As if somebody pulled the planet's gigantic plug. Staring down the eye of yet another fierce storm. Category 5 Super Typhoon Trami is unstoppable and heading for Japan and Taiwan. Be safe down there! #TyphoonTrami

Typhoon Trami photographed from the International Space Station. It caused a full stop on air traffic and train connections on the Sunday before the opening of the 6th SPARC General Assembly in Kyoto, Japan, which was attended by well over 350 scientists from all over the world and offered the opportunity to take stock of what has been achieved, where gaps in the portfolio of research undertaken by SPARC need to be filled, and to define where SPARC needs to be moving to remain responsive to the needs of both its members and the users of SPARC research products. Also, a number of side-meetings of various SPARC activities took place (see reports in this newsletter).

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26th SPARC Scientific Steering Group meeting

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The 26th SPARC Scientific Steering Group (SSG) meeting took place at International Community House in Kyoto, Japan, from 6 to 8 October 2018, organised by the Japanese SSG member, Kaoru Sato (Tokyo university) with significant assistance by Shigeo Yoden and Masato Shiotani (both from Kyoto university). It immediately followed the 6th SPARC General Assembly (see separate report on page 8). Neil Harris guided through the agenda and Judith Perlwitz joined via a live weblink from Boulder.

WCRP update

The SSG received a brief update on the overall coordination of the World Climate Research Programme (**Boram Lee**). The WCRP Joint Scientific Committee (JSC) has been developing a new Strategic Plan (SP) 2019-2028, taking into account the review of WCRP Co-sponsors that took place in 2017. Further input from the WCRP core projects, e.g. SPARC, the Grand Challenges and various Working Groups will be sought to develop the Implementation Plan for the SP. Besides the regular reporting on the work of the JSC (including the results of the 39th JSC session in Nanjing, China, in April 2018) and other WCRP groups, the new WCRP Coordination Office for Regional Activities (CORA) was newly launched, with the purpose of assisting in integration and synergising of regional activities within WCRP.

The SSG noted ongoing changes in the international framework of WCRP and its co-sponsors; a major rotation of the JSC membership at the end of 2018 including the current chairperson, Guy Brasseur (www.wcrp-climate.org/about-wcrp/about-governance), a new arrangement of the JPS leadership by the new WMO Chief Scientist / Research Director Pavel Kabat in his capacity of overseeing all the WMO research programmes (GAW, WWRP and WCRP), and the merger and creation of the International Science Council (ISC) from the former ICSU.

The subsequent discussion centred on the future contribution and role of the WCRP core projects, like SPARC, within the broader WCRP and WMO

context. The necessity of maintaining and growing a strong research community was strongly emphasised by the SSG members, in order to ensure continuous science development, to provide a trusted route for the voluntary engagement of scientists, and to integrate and engage Early Career Scientists for future science leadership. There was considerable frustration with the speed at which the plans were being developed and with the wide number of options still being discussed. This frustration was heightened by the publication of the IPCC Special Report on Global Warming of 1.5°C with its call for an urgent response during the SSG meeting.

In the light of the uncertainty, the SSG agreed that SPARC needs to maintain its focus to address key scientific questions that will contribute to the short- and long-term science goals, especially for challenges that are really ‘grand’. In parallel, it would contribute fully to the discussions about the future structure of WMO and WCRP, and would stress the need for continuity and the need to evolve gradually in order to keep the international research community engaged. The importance of the SPARC International Project Office is again underlined, with acknowledgement to the host (DLR, Oberpfaffenhofen, Germany), as the key infrastructure to support the research community for atmospheric dynamics and chemistry.

SPARC activity reports

Each year the SSG review the progress in SPARC’s activities and assess which are progressing well, which need revitalising and which are coming to their natural conclusion. Due to it being held in conjunction with the General Assembly, the meeting was shorter than usual as many results had already been presented.

The Long-term Ozone Trend and Uncertainties in the Stratosphere (LOTUS) activity successfully contributed to the 2018 WMO/UNEP ozone assessment (**Sophie Godin-Beekmann, Irina Petropavlovskikh**). An extended LOTUS-report was accepted in July by its review board and is being published as SPARC-report no. 9, a joint effort sponsored by

SPARC, the International Ozone Commission (IO₃C) of the International Association of Meteorology and Atmospheric Sciences (IAMAS), and WMO's Global Atmospheric Watch (GAW). Sample results were presented, among them multiple regression trend analyses involving eight combined records derived from satellite data and model data from simulations undertaken within the chemistry-climate model initiative (CCMi). In the upper stratosphere ozone is found to increase again ("recovery"), while in the lower stratosphere variability, uncertainty and discrepancies between observation and simulation can be considerable.

The second Water Vapour Assessment activity (WAVAS-II) presented an overview of relevant satellite retrievals since 1985, augmented by balloon measurements in the lower stratosphere and surface-based moisture observations at upper stratospheric and mesospheric levels (**Kaley Walker**). The "golden age" decade after 2000 witnessed a maximum of simultaneous humidity measurements from space platforms. Reference was made to Walker's presentation at the General Assembly and a special journal issue (cf. www.atmos-chem-phys.net/special_issue830.html).

The Atmospheric Composition and Asian Monsoon (ACAM) activity, a joint effort with the International Global Atmospheric Chemistry (IGAC) project, announced a change in leadership: **Hans Schlager** and Mian Chin taking over from Laura Pan and James Crawford. During the past years the scientific community for Asian Monsoon studies was strengthened, in particular through annual meetings with numerous early career scientists from the Asian countries. For 2019, a combined international workshop and training school is scheduled in Kuala Lumpur, Malaysia. New and existing aircraft and balloon data will continue to be scrutinised with regard to aerosols, acids and nitric acid trihydrate (NAT). Data analyses and modelling studies concentrate on the topics "aerosol-monsoon interactions", "impacts on PBL processes", and "impacts on UTLS processes".

For the Polar Stratospheric Clouds initiative (PSCi) **Michael Pitts** presented a seven-section-outline of a broad review entitled "Recent advances in our understanding of PSCs" to be submitted to Reviews of Geophysics. Daily reference data sets were highlighted from the MIPAS (cf. <https://datapub.fz-juelich.de/slcs/mipas/psc/>) and CALIPSO (https://eosweb.larc.nasa.gov/project/calipso/calipso_table)

instruments that are publicly available. As in the past, PSCi receives core support from the NASA CALIPSO/Cloudsat science team in the US and German funding agencies DFG and HGF.

The Data Assimilation Working Group (DAWG; **Quentin Errera**) proposed its new four-themed structure, to be active during the next quadrennium: 1) limb sounding observations in support of SPARC; 2) chemical re-analyses; 3) data assimilation for upper stratosphere and mesosphere; and 4) new data assimilation techniques in the stratosphere. Interested institutions and persons were identified. The envisaged overview publications should pave the way to a "next generation" S-RIP exercise.

As ACAM, the Chemistry-Climate Modelling Initiative (CCMi; **Michaela Hegglin, David Plummer**) is jointly undertaken with IGAC. With the first phase of CCMi winding down, a new mission statement defines the activity as the international forum for coordinated inter-model chemistry-climate comparisons. A timeline was presented including a science workshop in 2019 (Hongkong) and the next assessment reports for IPCC in 2021 and for ozone in 2022.

The activity dealing with the Dynamical Variability of the atmosphere (DynVar; **Edwin Gerber**) is redefining its research foci and leadership. During the past eleven years it has been instrumental in sparking off specific activities like SNAP and QBOi as well as the diagnostic model intercomparison project DynVarMIP, comprising output from 13 modelling centres as part of CMIP6. A four-day international workshop is scheduled for October 2019 in Madrid, Spain (www.sparcdynvar.org/dynvar-workshop) in order to take stock and develop the new directions.

In its second phase, the Network for Atmospheric Predictability (SNAP; **Amy Butler**) continued the cooperation with the joint WCRP/WWRP's Sub-seasonal to Seasonal prediction project (S2S). The recently created S2S database is used to determine the role of the stratosphere for the climate predictability near the surface. Currently the SNAP team involves 16 institutions in eight countries.

For the Fine Scale Atmospheric Processes and Structures (FISAPS) activity, the SPARC co-founding chair **Marvin Geller** (via remote link) officially announced a change in leadership, with Thomas Birner (now Univ. Munich, Germany) co-chairing together with Hye-Yeaong Chun (Yonsei Univ., Korea).

A three-day workshop was scheduled for early November 2018 in Kühlungsborn, Germany with stratospheric turbulence as a special focus (<https://www.iap-kborn.de/en/current-issues/events/fisaps2018>).

Ongoing work of the Gravity Waves activity was presented by **Kaoru Sato** (local co-chair for the General Assembly). She introduced three new directions, 1) high latitude and global observations by radar, 2) estimation of the gravity wave contribution to the Brewer-Dobson-circulation using reanalysis data, and somewhat related 3) inferring the gravity wave drag though data assimilation methods. All approaches were underpinned with sample results and publications. For direction 3) the International Space Science Institute (ISSI) is to support an international, 5-day workshop in April 2019 in Berne, Switzerland. A gravity wave symposium is being planned for 2021 in Germany.

The Quasi-Biennial Oscillation initiative (QBOi; **Scott Osprey**) completed its first phase, during which 12 modelling centres contributed coordinated simulation output from 17 different models to a common data archive. The technical description was published and results regarding topics as QBO in present-day climate versus future scenarios with two- and four-fold CO₂ content, equatorial waves and teleconnections are scheduled for submission to a special collection in the Quarterly Journal of the Roy. Met. Soc.

The SPARC Reanalysis Intercomparison Project (S-RIP; **Masatomo Fujiwara**) is preparing the 2019 publication of a complete SPARC report as final outcome of five years of coordinated work. The S-RIP inter-journal special issue in Atmospheric Chemistry and Physics / Earth System Science Data (ESSD; www.atmos-chem-phys.net/special_issue829.html) contains 24 articles in Oct. 2018, with 5 more anticipated. It includes the 4 chapters constituting the interim report (see also report on page 19).

Atmospheric Temperature Changes (ATC; **Andrea Steiner**) held its second workshop during two days by the end of June in Paris, France (cf. report on page 21). Updated findings of the activity on stratospheric temperature trends appeared as a frontier article in Geophysical Research Letters (doi: 10.1029/2018GL078035). For 2019 a review article is planned addressing the challenge of keeping the average global temperature increase below 1.5 or 2 K, as formulated in 2015 at COP-21 in Paris.

In 2018, the Stratospheric Sulfur and its Role in Climate activity (SSIRC; **Jean-Paul Vernier**) organised a 6-day international conference on stratospheric aerosol in the post-Pinatubo era on Tenerife island, Spain for 90 participants from more than 10 countries. Afterwards the steering group met at ISSI in Berne and identified science links to the majority of the other SPARC activities and related experimental campaigns.

The Solar Influences on climate / High Energy Particle Precipitation in the Atmosphere) activity (SOLARIS-HEPPA; **Bernd Funke**, via remote link) structures its work in five working groups (WG), with coordinated CCMI analyses as a common aim. The WG-leads had a meeting in April in Karlsruhe, Germany. A science workshop took place in Roanoke, USA (see report on page 16). Strong links to activities SSIRC, LOTUS and ATC were stressed.

Emerging activities

The emerging activity Stratospheric And Tropospheric Influences On Tropical Convective Systems (SATIO-TCS; **Shigeo Yoden**, local co-chair for General Assembly) focusses on the tropics as geographical region and moist convection as chief physical mechanism for time-scale of a day or shorter. Reference was made to a broad presentation at the General Assembly stressing links to QBOi and FISAPS which were further built during a common workshop in 2017 and a side meeting during the GA (see report on page 24). A review article about the stratosphere-troposphere coupling in the tropics is about to be submitted.

Observed Composition Trends And Variability in the Upper Troposphere and Lower Stratosphere (OCTAV-UTLS; **Peter Hoor** and **Irina Petropavlovskikh**) aims to disentangle the chemical and dynamical influences on composition trends in the UTLS. Science questions are formulated taking into account a comprehensive suite of datasets from different platforms and applying standardised metrics. A workshop was scheduled for early November 2018 in Mainz, Germany.

Towards Unified Error Reporting (TUNER; **Nathaniel Livesey**) is the third emerging activity. Following a successful application, the TUNER team held a first four-day workshop at ISSI in December 2017. For TUNER publications, a special issue was set-up with the journal Atmospheric Measurement Techniques (https://www.atmos-meas-tech.net/special_issue921.html)



Figure 1: Around a long table: SSG members, activity leads and guests listening to Makato Suzuki's presentation.

with so far three accepted articles. The next workshop in Berne is scheduled for April 2019.

Given the progress made in these emerging activities, the SSG declared in its final session that all three are fully emerged and from now on are ordinary SPARC activities. The short-lived climate forcers (SLCFs) activity will be resumed as emerging activity after the completion of the model runs for the current CMIP phase.

Partner Projects

Michel Gutter, member of the IGAC scientific steering group, explained the IGAC perspective of the links of this Future Earth project to SPARC, mainly through activities ACAM and CCMi, and reported on the joint 14th iCACGP / 15th IGAC conference (<http://icacgp-igac2018.org/>), which had taken place in Takamatsu, Japan during the week prior to the SPARC General Assembly. Some 700 participants, including numerous early career scientists, from the worldwide atmospheric chemistry community with a focus in air quality and dispersion at tropospheric levels discussed latest research results and celebrated 60 years of the international Commission of Atmospheric Chemistry and Global Pollution (iCACGP within IAMAS).

Oksana Tarasova (remote) gave a presentation on the activities in GAW and their interaction with SPARC. Neil Harris then updated the SSG on the state of on-going discussion between SPARC, GAW and IGAC about stronger collaboration on a few focussed topics. Progress is being slowed down by the lack of clarity about how WMO wants to restructure its research programmes. There is clear value in working closer together if conditions allow. A workshop on this topic was held at WMO in early November 2018.

Proposed joint activities of the CLIVAR/GEWEX monsoon panel and SPARC envisage different areas of common interest and expertise (**Tianjou Zhou**). Teleconnection pathways towards monsoon dynamics were found to take in parts stratospheric routes, especially from the North-Atlantic sector and polar regions; monsoon circulations tend to actively modulate conditions over the Pacific region, where El Niño anomalies originate; monsoon variability tends to control the transport of trace gases and aerosols into the stratosphere. Regarding decadal climate predictions the role of volcanic aerosols should be better quantified and their dynamical impacts investigated, as it is proposed for the numerical experiments under the heading VolMIP in CMIP6.

The SSG welcomed this initiative and agreed to set up a task force to identify how SPARC could best contribute. Additionally, the Chinese initiative “Third Pole Environment” (TPE), aiming *inter alia* at improved observations from the Himalayas, could be involved.

Space observations

Due to the compact nature of SSG-26, the regular space observation section only featured two Japanese presentations. **Makoto Suzuki** (Japanese Aerospace Exploration Agency [JAXA], Earth Observation Research Center) gave an update about the broad meteorological satellite programme undertaken in Japan and its definite plans until 2021. The “global change observation mission – water” spacecraft (GCOM-W or Shizuku, launched in 2012) is still in operation, while the follow-on satellite for “mission – climate” (GCOM-C or Shikisai) was successfully launched in 2017. Sample results of both low orbit systems were presented. The new generation Himawari-8 (launched 2014) and -9 (launched 2016) missions in geostationary orbits provide a large number of products, which can be accessed via a web-interface at www.eorc.jaxa.jp/ptree, including aerosol information and wildfire detection outside the scope of the standard observations for numerical weather forecasting.

Masato Shiotani, who also had acted as a local co-chair for the 6th General Assembly, described the ambitious plan of a revised superconducting submillimetre-wave limb-emission sounder (SMILES-2) after the 9-month exploratory SMILES mission, which ended in April 2010 and had provided *inter alia* ozone distribu-

tions in the 28 km-level. The new plan encompasses a proof of technology, but also targets at daily variations in stratospheric ozone in the 20-to-60-km-range.

Other SPARC news

Since January 2018, the SPARC office has been working at and staffed by the Institut für Physik der Atmosphäre (IPA) situated at the Oberpfaffenhofen campus of Deutsches Zentrum für Luft- und Raumfahrt (DLR; **Hans Volkert**) near Munich in southern Germany. Contributions to the planning and preparation of the 6th General Assembly and the following SSG-meeting were made in close cooperation with the LOC in Japan. Support for several SPARC workshops was organised and the administration of financial assistance gradually taken over from WCRP (as formally arranged in a Letter of Agreement). The coordinating scientist, Mareike Kenntner, received a symbolic token of gratitude for her sustained efforts during the past year.

SSG-member Olivia Martius (retiring from the group at the end of 2018) was thanked for her dedication during the past three years and for her help in linking SPARC to research on atmospheric predictability, not least through her role as co-lead of the WCRP Grand Challenge on Extremes. The next call for membership from 2020 onwards is scheduled to appear in late summer 2019.

Four locations for the 27th SSG-meeting are being considered: Pune, India; Melbourne, Australia; Boulder, USA; and Madrid, Spain. A final decision will be made early in 2019.

Discussion on: The future of SPARC

DON'T JUST READ ABOUT IT - CONTRIBUTE!

What do you (not) like about the current SPARC?
How could we improve SPARC? What do you miss?
What are your ideas / your vision for the future of SPARC?

→ **What is 'THE BIG QUESTION' (climate) science needs to answer?**
 → **Why is SPARC the right project to help answering this question?**
 → **What could SPARC do to help?**

We value all input - especially from those who truly are the future of SPARC:
Early career scientists, this is your chance to have a say!

Send your thoughts to: office@sparc-climate.org