

# Report on the 23<sup>rd</sup> SPARC Scientific Steering Group Meeting

## 10-13 November 2015, Boulder, Colorado, USA

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The 23<sup>rd</sup> session of the SPARC Scientific Steering Group (SSG) was held at the National Center for Atmospheric Research (NCAR) in Boulder, USA, from 10-13 November 2015. The meeting was opened by Joan Alexander, SSG co-chair, who read out a message from Guy Brasseur, chair of the WCRP Joint Steering Committee (JSC), who was unable to attend the meeting.

### WCRP news and Grand Challenges

The WCRP (**Boram Lee**, SPARC liaison) remains committed to supporting innovative research, which is vital to ensuring that climate information produced for society is credible. WCRP is working ever more closely with the World Weather Research Programme (WWRP), as weather and climate science overlap to an ever greater extent. There is a critical need for these sorts of partnerships to ensure that limited resources are used in a synergistic way to make a larger impact. WCRP's regional presence has been most strongly advocated by the CORDEX project, which has recently launched a call for "Flagship Pilot Studies". In tandem with this, the Working Group on Regional Climate (WGRC) will be launching their first "Frontier Projects" in 2016. These projects will serve as an initial proof-of-concept and are aimed at proving how regional climate information

is useful in particular contexts. On a broader scale, WCRP capacity development efforts are aimed at empowering long-term achievements in climate research by continuously advocating for data and knowledge sharing, investing in early career researchers, and supporting sustainable bottom-up organised global and regional research activities.

Two new WCRP Grand Challenges have been proposed (**Yochanan Kushnir**, **Neil Harris**). The first, focused on "Near-term Climate Prediction", aims to issue real-time global five- to ten-year climate outlooks based on initialized model predictions, thereby improving the products provided by climate services globally. Three main topics have been identified that will leverage on-going research: Understanding uncertainty in decadal predictions, validating model predictions, and communicating these predictions along with their associated uncertainties. There will also be focus on particular scientific issues, such as solar forcing, volcanoes, anthropogenic aerosols, and ozone, among others, to which SPARC could contribute significantly. The second Grand Challenge will concentrate on "Biogeochemical cycles and climate change", with a main focus on the carbon cycle. This Grand Challenge is not intending to consider short-lived climate forcers (SLCFs) such as aerosols, and

thus it was proposed that SPARC consider a new activity focusing on these species as a complement to this Grand Challenge. Both Grand Challenges will be presented at the next WCRP JSC Meeting scheduled for April 2016.

### SPARC activity updates

The joint SPARC-IGAC Atmospheric Composition in the Asian Monsoon (ACAM) activity has continued to build a regional community around their main research topics: emissions and air quality in the Asian monsoon region; aerosols, clouds, and their interactions; the impact of monsoon convection on chemistry; and the upper troposphere/lower stratosphere (UTLS) response to the Asian monsoon (**Laura Pan**). A highlight of 2015 was the 2<sup>nd</sup> ACAM workshop held in Bangkok, Thailand, in June, which had a much broader representation of countries from the region than the 1<sup>st</sup> workshop held in 2013. In conjunction with this workshop, the first ACAM training school on 'Satellite and model data use for aerosols and air quality' was held for a group of early career researchers participating in the main workshop. An upcoming workshop on the UTLS and the Asian Monsoon is being organised in Boulder, USA, from 7-11 March 2016.

The second joint SPARC-IGAC activity, the Chemistry-Climate

Model Initiative (CCMI), made good progress during 2015 on a number of fronts (**Michaela Hegglin**). Models continue to be improved and data from many of the participating modelling groups are now available on the BADC (British Atmospheric Data Centre) as well as the ESGF (Earth System Grid Federation). A CCMI joint special issue in the EGU journals (ACP/AMT/GMD/ESSD) has been established and will open in early 2016. The group is also very involved in CMIP6 through the AerChemMIP project, jointly developed with AEROCOM, as well as producing an updated ozone forcing dataset for models without interactive chemistry. CCMI's next workshop is planned for early 2017 however they are hoping to have a large presence at the IGAC 2016 Conference to be held in Breckenridge, USA, from 26-30 September.

The SPARC Data Assimilation Working Group (DAWG) again held a joint workshop with S-RIP in 2015 (**Quentin Errera**). The workshop focused on three themes: added value of chemical data assimilation, bias correction and harmonisation of datasets, and the representation of the stratosphere and mesosphere in models and reanalyses. Results from the new MERRA-2 reanalysis were presented, as well as a preview of the ERA-5 reanalysis which is planned for release in 2016 or early 2017. The latter model includes 137 vertical levels and has an improved gravity wave scheme which results in a significantly better quasi-biennial oscillation (QBO). The group is again planning a joint workshop for 2016, to be held in Victoria, Canada from 17-19 October.

Similar to CCMI, the Dynamical Variability activity (DynVar)

has been involved with the developments of CMIP6 (**Ed Gerber**). The group has established a diagnostic model intercomparison project (MIP), which is focused on ensuring that the right model output is archived to allow a proper diagnosis of processes related to stratosphere-troposphere coupling, the atmospheric momentum budget, and parameterised processes such as gravity waves and the planetary boundary layer. It is hoped that results from this MIP, and from the other MIPs with which DynVar is connected, will help modelling centres address certain persistent model biases. DynVar is organising a workshop to be held in Helsinki, Finland, from 6-10 June 2016.

The Stratospheric Network for the Assessment of Predictability (SNAP) completed one of their main experiments during 2015 (**Andrew Charlton-Perez**). This model experiment used operational forecasts of sudden stratospheric warmings (SSW) to investigate whether these events improve predictability in the Northern Hemisphere. They have published two papers on these results, and are hoping to submit a third about new results looking into a final warming event in the Southern Hemisphere. The group is very involved in the joint WCRP-WWRP sub-seasonal to seasonal (S2S) project and plan analyses of this project's archive of simulations as they evolve their focus to look more at the impacts of stratospheric predictability on tropospheric variability and the sub-seasonal forecasting timescale (see also p.11, this newsletter).

New studies from the Gravity Waves activity have shown that global models at very high horizontal and vertical resolution can produce relatively realistic gravity waves at a range of scales even without

a gravity wave parameterisation (**Joan Alexander**). However, not many models can be used at these high resolutions and even the best models don't simulate the entire range of gravity waves well. Parameterizations represent common small-amplitude waves but omit the uncommon large-amplitude waves that primarily drive the stratospheric circulation. These issues will be among the topics discussed at the upcoming SPARC Gravity Wave Symposium to be held from 16-20 May 2016 in Pennsylvania, USA, as well as the International Conference on the Whole Atmosphere to be held from 14-16 September 2016 in Tokyo, Japan.

The Solar Influences for SPARC (SOLARIS-HEPPA) activity published a series of papers in 2015 looking at the solar cycle in CMIP5 simulations (**Katja Matthes**). They found that much of the spread between models was related to how they represented ozone, with some having interactive ozone, others using the CMIP5 specified ozone, and some models with no ozone at all. It will be vital for CMIP6 that models include ozone, even if not interactively. The group will continue to study the solar cycle in models, in particular in the CCMI simulations, considering also various statistical approaches together with statisticians. A major focus of the activity is also producing the CMIP6 solar forcing, which will cover both the historical (1850-2014) and two future scenarios (2014-2300). They are planning the 6<sup>th</sup> SOLARIS-HEPPA workshop in Helsinki, Finland, in June 2016.

During 2015 the Stratospheric Sulfur and its Role in Climate (SSiRC) activity worked particularly on the analysis and observations side

(**Terry Deshler**). A database that is part of a SSiRC wikipage has been developed and includes a wide variety of observations, including several old lidar data, which they are in the process of rescuing. The group recently submitted a review paper on stratospheric aerosols and is working on various further publications, including one on estimates of the sulfur burden from observations. The first sonde measurements of the StratoClim field campaign were made in 2015 in Saudi Arabia and India, and the continuation of this campaign (including aircraft as well as ground-based measurements) will be a major focus of the group in 2016. Emphasis will also be on the SSiRC model intercomparison project, which will be continued and analysed in depth during 2016. Both these topics will be further discussed at the 2<sup>nd</sup> SSiRC workshop to be held in Potsdam, Germany, from 25-28 April 2016. Finally, a new Principal Investigator at the University of Colorado has been found, so it is hoped that the *in situ* record of stratospheric aerosol that started in Wyoming in 1971 will be continued from Boulder.

The Water Vapour Assessment (WAVAS-II) activity made significant progress on their satellite observations report (**Karen Rosenlof**). A significant component of this report is dedicated to comparing satellite water vapour observations with ground-based measurements. It also covers comparisons of derived quantities, for example, the tropical tape recorder and also includes some of the first analyses of water isotope observations from satellites. The report will provide one of the last major stratospheric water vapour reviews that can be done for the foreseeable future. They are aiming to finalise it by the end of 2016.

The SPARC Reanalysis Intercomparison Project (S-RIP) spent much of 2015 putting together the first chapters of the S-RIP report (**Sean Davis**). These chapters will focus on providing an overview of reanalyses as well as climatologies of dynamical variables, ozone, and water vapour, and will form the basis of an interim report to be published digitally in 2016. The group put considerable effort into converting data from the nine different reanalyses they are considering into a common format. These data have been included in the Ana4MIPs database and are available to the community. Two new co-leads for the activity have been elected: Gloria Manney and Lesley Gray, who will serve alongside Masatomo Fujiwara. Together with DAWG (see above) they are planning the 4<sup>th</sup> S-RIP workshop to be held in Victoria, Canada, from 19-21 October 2016.

The temperature trends activity held a workshop in April in Victoria, Canada, with much discussion about the future of the activity (**Andrea Steiner** and **Amanda Maycock**). There was strong consensus among participants and support for a continuation of the activity with new foci, including better understanding temperature variability, trends and uncertainty in climate records, and the role of composition in observed temperature changes. The group has already started looking into novel observational records, such as GPS radio occultation and GRUAN radiosonde observations, and will use these new datasets to continue previous work evaluating the consistency of atmospheric temperature records among observations, reanalyses, and models. The new focus of the activity, which has adapted its name to 'Atmospheric Temperature Changes', will be further discussed

at a workshop to be held from 25-26 April 2016 in Graz, Austria.

### Emerging activities

The Polar Stratospheric Clouds initiative (PSCi) developed from a workshop held in August 2014 (**Michael Pitts**). Since then, the group was successful in obtaining support through the International Space Science Institute (ISSI) for three meetings, one of which was held in October 2015 in Bern, Switzerland. The main aims of the initiative are to produce several reference data sets for different aspects of PSCs using both satellite and *in situ* observations. Most of this work is to be completed during 2016 and will be discussed at the second ISSI meeting planned for late 2016. They will work together with modellers to ensure that the datasets produced are easily accessible and useful for model validation. The final ISSI meeting will likely focus on a review paper in 2017, which hopefully will be finalised in time for the 2018 WMO/UNEP Ozone Assessment.

The Quasi-Biennial Oscillation initiative (QBOi) held their first workshop in March 2015 in Victoria, Canada, where the group decided on the model experiments to be carried out by participating modelling teams (see SPARC Newsletter July 2015) (**Scott Osprey**). They also carried out an assessment of how models and reanalyses currently simulate the QBO, with much more spread between models than reanalyses. The model QBOs generally did not extend down into the lowermost stratosphere as observed, and they weren't able to capture the rapid shifts between east and west QBO phases. Where these biases originate from and how they can be reduced are open questions that the initiative is hoping to address.

Ultimately, they would like to be able to understand how sensitive various teleconnections are to simulated QBO biases.

The activity focused on ‘Solving the Carbon Tetrachloride mystery’ has worked in earnest during 2015 to better understand the reported gap between top-down (satellite inversion techniques) and bottom-up (inventory-based) estimates of carbon tetrachloride ( $\text{CCl}_4$ ) emissions (**Paul Newman**). The slower than expected decrease in atmospheric levels of  $\text{CCl}_4$  has led to questions about reported emissions and the estimated lifetime of this species, which is controlled by the Montreal Protocol. A workshop held in Zurich, Switzerland, in October 2015 brought a wide range of experts together and went some way to solving the  $\text{CCl}_4$  ‘mystery’. The group is working to produce a SPARC report for release in the first half of 2016.

The three emerging activities, PSCi, QBOi, and  $\text{CCl}_4$ , were all accepted as full SPARC activities. Andrea Steiner and Amanda Maycock were approved as new co-leads of the Atmospheric Temperature Changes activity, while Lesley Gray and Gloria Manney were approved as

co-leads with Masatomo Fujiwara of S-RIP. SPARC thanks Dian Seidel, Bill Randel, and Dave Thompson for leading the Temperature Trends activity so successfully over the past years.

### Proposed new activities

On behalf of Marv Geller, **Kaoru Sato** presented a proposal for a new SPARC activity on Fine-Scale Atmospheric structures and Processes (FISAPS), which grew out of an effort to collect high-resolution radiosonde data from a number of countries. These data provide an excellent opportunity to investigate a wide range of processes in the atmosphere since the 10-20m vertical resolution of these data can easily be used to consider features at scales smaller than 1km. The data could potentially be used to look at processes such as the emission of gravity waves near mid-latitude jets, as well as other fine-scale structures near the tropopause and in the planetary boundary layer. The activity would aim to encourage other nations to provide the high-resolution radiosonde data, which are routinely measured but not often archived or distributed. It is hoped that several southeast Asian countries will contribute

data as part of the Years of the Maritime Continent field campaign (scheduled for 2017-2019).

**Seok-Woo Son** reported on an international workshop on ‘Stratosphere-troposphere dynamical coupling in the tropics’ on behalf of Shigeo Yoden. The workshop focused both on modelling and observations, with sessions on how the QBO influences various aspects of the tropical climate (*e.g.* deep convection, Madden-Julian Oscillation), the influence of SSWs on tropical dynamics, the solar cycle in the tropics, convection and waves, as well as other related on-going activities (*e.g.* within WCRP, *etc.*). Two further workshops are planned in 2017 and 2019. A SPARC activity may develop out of this effort, particularly given the complementarity with the QBOi and the WCRP Grand Challenge on clouds, circulation, and climate sensitivity, as well as links with regional capacity development.

### WCRP working groups and advisory councils

The WCRP Working Group on Coupled Modelling (WGCM; **Gerald Meehl**) recently met in conjunction with the third CMIP



**Figure 1:** Participants at the 23<sup>rd</sup> SSG meeting held in Boulder, CO, USA.

workshop meeting in October in Dubrovnik, Croatia. These workshops are aimed at providing an overview of the main CMIP science and have a very popular format of sessions with 20 scientists each presenting one slide for three minutes, before a half-day of poster discussions. Issues raised by modelling groups participating in CMIP5, such as too many intercomparison projects and not enough time to run experiments, have hopefully been addressed in the new framework for CMIP6. The duration of CMIP6 is planned from 2015-2020, with the hope that this will allow a more equal spread of computing and work load. This timeframe may, however, have to shift slightly given the plans for a 6<sup>th</sup> IPCC assessment report, which is expected to be finished at the end of 2020. A vital aspect to the new CMIP6 structure is the inclusion of a “vulnerability, impacts, and adaptation” advisory board to ensure that there is communication with the community that frequently uses climate model output.

The Working Group on Numerical Experimentation (WGNE; **Ayrton Zadra**) was set up over 30 years ago to serve as liaison between different modelling communities within WMO and WCRP. At their 30<sup>th</sup> annual meeting a number of activities of relevance to SPARC were discussed. One example is the joint WCRP-WWRP polar prediction project where there is clear connection to SPARC in terms of expertise in regional circulation. Another possible avenue for SPARC to connect with WGNE is through their ‘Grey Zone’ project that considers the range in resolution where convective parameterisations in models reach their limits. This project’s next case study will focus on tropical regions and SPARC could get involved in

this if there is interest. A workshop planned for April 2016 in Reading, UK, will consider atmospheric drag processes and their links to large-scale circulation, which links closely with the WGNE project on surface drag parameterisations as well as the SPARC gravity wave and DynVar activities.

The WCRP Model Advisory Council (WMAC) was established to coordinate modelling activities across WCRP’s various modelling working groups (**Joan Alexander**). They helped organise the first WMAC climate model development summer school, entitled ‘Atmospheric moist processes’, which took place in Hamburg, Germany, in June 2015. Videos of the lectures from the school have been archived and will be made available for training purposes soon. The first WMAC prize for model development was also awarded this year, while nominations for 2015 were closed on 1 October with the winner to be announced in early 2016. To further encourage model development, WMAC asks all WCRP groups to consider the possibility of highlighting model development at their meetings, for example, through invited speakers or dedicated sessions. WMAC has also been active in relation to CMIP6, suggesting that entry requirements may not be convenient for all MIPs and there may need to be some room for limited flexibility for particular MIPs.

The WCRP Data Advisory Council (WDAC) is similar to WMAC but focused on observations (**Susann Tegtmeier**). At their 4<sup>th</sup> meeting held in Reading, UK, in July 2015, it was noted that there was a looming gap in limb sounding observations of upper tropospheric/stratospheric composition and that a coordinated effort to advocate for

such measurements was needed. WDAC also highlighted the need for a WCRP-wide common data policy, with the main focus being the promotion of open data use and the use of DOIs when possible. Complementary to WMAC, WDAC is developing a joint WCRP-GCOS data prize, which is likely to be open for nominations in 2016. There was also discussion around the upcoming GCOS conference to be held from 2-4 March 2016 in Amsterdam, Holland, where SPARC is planning to participate. Finally, WDAC has a task team putting together a white paper on the intercomparison of reanalyses in which S-RIP will feature strongly.

### Updates on partner projects and programmes

**Claire Granier** gave an update on the IGAC (International Global Atmospheric Chemistry) project. Over the past year IGAC sponsored or endorsed about 20 workshops, meetings, and training schools, and have placed particular emphasis on reaching out to new communities, for example, air quality researchers in Asia. This links very much with their capacity development efforts, which are largely carried out by their regional working groups that are currently established in Japan, China, the Americas, and southeast Asia. In 2016 IGAC will be hosting their next biennial conference in Breckenridge, Colorado, USA, of which several sessions may be of interest to the SPARC community, including those on ‘atmospheric chemistry and climate’, ‘observing atmospheric composition and variability’, and ‘fundamental studies of atmospheric chemistry’.

The Global Atmosphere Watch (GAW) has recently established a new scientific advisory group on near-real time applications,

reflecting the renewed emphasis on providing information rather than just data (**Geir Braathen**). In this effort, GAW is collaborating with many groups, such as the World Health Organization (WHO) and the WMO agricultural meteorology community, to develop added-value products using GAW observations. They have also developed a new interface called GAWSIS, hosted by MeteoSwiss, which includes metadata from the entire GAW network and links to available data. In collaboration with SPARC, GAW is organising a workshop about UTLS observations from 23-27 May 2016 at WMO in Geneva, Switzerland. The workshop will focus largely on observations of ozone, water vapour, and carbon monoxide, assessing the quality of these observations from multiple instrument platforms in the UTLS region. It is possible that a new SPARC activity that looks at UTLS composition changes in a holistic way develops out of this workshop.

The Network for the Detection of Atmospheric Composition Change (NDACC) celebrated 25 years of existence in 2015 and is commemorating this with a special issue in ACP, AMT, and ESSD (**Michael Kurylo**). The network is made up of various working groups focused on particular measurement techniques. The Brewer/Dobson group has been reprocessing all records, including those from stations no longer measuring ozone, and is also evaluating a new instrument (Pandora) that could possibly replace old Dobson instruments. The FTIR group has been extending its analyses to provide profile retrievals rather than just partial columns, while the working group on UV and visible measurements has worked together with the European COPERNICUS Atmospheric Monitoring Service

to validate some of their forecast products.

GEWEX (Global Energy and Water EXchanges), also a WCRP core project, has several activities where collaboration with SPARC could be further developed (**Peter van Oevelen**). These include several PRocess and Evaluation Studies (PROES), such as their activities on Upper Tropospheric Clouds and Climate (UTCC), and Mid-latitude Storms, as well as a new activity on Clouds, Convection, and Aerosols, which is currently being developed in GEWEX. There may, in particular, be overlap between the UTCC activity and the focus on UTLS observations within both SPARC and GAW, as well as between the Mid-latitude storms activity and the WCRP Grand Challenge on clouds, circulation, and climate sensitivity.

The joint SPARC-CliC Polar Climate Predictability Initiative (PCPI) has six sub-initiatives, three of which are joint with the WWRP Polar Prediction Project (PPP) (**Marilyn Raphael**). All six sub-initiatives have been very active over the past year, with several special sessions at conferences such as EGU and AGU as well as journal publications. The sub-initiative focused on improving the predictability of polar sea-ice is hosting a workshop in May 2016 about Polar Predictability together with the PPP, and will contribute to the proposed WCRP Grand Challenge on near-term climate prediction. Two further workshops possibly of interest to the SPARC community are being planned for 2016, on 'Polar feedbacks' to be held in Belgium, and in 2017, on 'Zonal asymmetry in the Southern Hemisphere' (date and place still to be determined).

## Space agency updates

**Anne Grete Straume** presented an update from the European Space Agency (ESA), particularly focusing on the ADM-Aeolus mission, which is to be launched in March 2017. This will be the first time a Doppler lidar measuring in the UV is sent into space. The instrument will measure atmospheric winds from the surface up to an altitude of 30km in both cloud-free and cloudy conditions, producing data which will be used to improve weather forecasts as well as reanalyses. In addition to this mission, ESA has a large number of on-going and planned missions focusing on Earth system science. These include EarthCARE, focusing on aerosol-cloud-radiation interactions, the Earth Explorers, and the Sentinel series of satellites, which are largely focused on operational meteorology and air quality measurements.

NASA (US National Aeronautics and Space Administration) currently has a large number of satellites in space hosting various instruments that measure atmospheric composition (**Kenneth Jucks**). These include instruments on Aura, which is likely to continue at least another two years (with the exception of TES, which may discontinue operation at any time), as well as the OMPS instrument on-board the Suomi NPP satellite. The SAGE-III instrument will also be launched in May 2016 on the International Space Station with a planned mission length of three years, although this may be extended until 2023 if all goes well. NASA has also helped organise several workshops that have provided input for the Decadal Earth Science Survey, which is aimed at prioritising science foci for the 2017-2027 decade. Contributions to this survey have already been made by SPARC and there will be several

further opportunities to do so in the coming months.

**Kaoru Sato** presented a brief update on the Japanese Aerospace Exploration Agency (JAXA) on behalf of Makoto Suzuki. Of particular relevance to SPARC is the SMILES-2 programme, which is currently in design. This satellite mission is the follow-up of the SMILES-1 instrument which flew on-board the international space station for several months. SMILES-2 will be a relative light satellite with a planned lifetime of five years and instruments that will measure atmospheric composition at altitudes from 35-80km. JAXA also has several other satellites in space, including GOSAT, which measures carbon dioxide and methane very precisely, as well as the GPM satellite which measures vertical profiles of precipitation rates, even distinguishing between rain and snow.

The Canadian Space Agency (CSA) currently has three missions still in space: MOPITT, OSIRIS, and SCISAT (which hosts the ACE-FTS instrument) (**Thomas Piekutowski**). The data from these missions have been widely used in a number of applications, including, for example, in assimilation products used to guide Arctic airborne campaigns. Studies are currently underway for two micro-satellite missions: CATS, a follow-up mission to OSIRIS, and TICFIRE, to focus on thin ice clouds. The CSA also has several instruments under development for airborne campaigns, which hopefully would eventually also be launched on satellite platforms. These include SHOW, which makes fast high vertical resolution observations of water vapour, and FIRR, which, similar to TICFIRE,

will be used to study ice clouds.

There are no long-term satellite missions planned for the foreseeable future aimed at measuring stratospheric composition beyond ozone and water vapour (which will be measured, even if relatively sparsely, from the SAGE-III instrument to be on board the International Space Station from May 2016 onwards). A group of SPARC scientists led by **Karen Rosenlof** are working on an article addressing this upcoming 'gap' to be published in 2016. Volunteers are very welcome to contribute and asked to please contact the SPARC Office if interested.

#### Other SPARC items

During the final session of the meeting several organisational and strategic items were discussed. 2015 has seen much work on the new SPARC implementation plan, which has recently been finalised. Planning for the next SPARC General Assembly, to be held in Kyoto, Japan in September/October 2018, is well underway (Kaoru Sato). Teleconferences are to be organised throughout the year to encourage synergies between activities and also to promote links with related projects and programmes (*e.g.* the WCRP Grand Challenges and core projects, IGAC, *etc.*). It was also noted that it would be very helpful if papers that have developed out of WCRP and SPARC activities acknowledge this. A standard acknowledgement is now available on the SPARC website ([www.sparc-climate.org/publications](http://www.sparc-climate.org/publications)); please contact the SPARC Office if you wish to adapt this. There was quite some interest in SPARC becoming more active on social media, since this may prove an effective way to communicate SPARC science to a wider

community and to engage younger researchers. Various possibilities for how this can be put into practice are being investigated. SPARC is still exploring options for a new host for the Project Office, which will be moving on from Zurich, Switzerland, at the end of 2017.

A SPARC capacity development strategy has been put together in parallel and to complement the new science implementation plan (**Fiona Tummon**). The strategy seeks to build on existing efforts in an efficient way and in collaboration with WCRP. Emphasis is on building regional capacity and supporting early career researchers. Over the past year several successful capacity development activities have happened, for example, the ACAM training school (see article p.20 this newsletter), a lunch time capacity development session at the ICHSMO 2015 conference in Santiago, Chile (see p.43 this newsletter), as well as links being built with the YESS (Young Earth System Scientists) network, which is being promoted by WCRP, WWRP, and GAW. **Seok-Woo Son** has also put significant effort into establishing a regional SPARC working group covering Asia and the Pacific. This group has ensured that SPARC is more visible at regionally focused conferences (*e.g.* AOGS and the 1<sup>st</sup> Asian conference on Meteorology). A training school was also organised from 5-8 January 2016 in Bandung, Indonesia, on tropical meteorology. Over the coming year SPARC is hoping to expand capacity development efforts further by continuing support for regional working groups and training schools, growing the SPARC group within the YESS network, and making capacity development more visible on the SPARC website. 