



SPARC

STRATOSPHERIC PROCESSES AND THEIR ROLE IN CLIMATE
A Project of the World Climate Research Programme

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Report on the 16th Session of the SPARC Scientific Steering Group

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The 16th Session of the SPARC Scientific Steering Group (SSG) was held at the University of Toronto and hosted by the SPARC Office. The main focus of this session was on the future of SPARC, taking into account the outcomes of the 4th SPARC General Assembly and new developments within SPARC's parent programme, the World Climate Research Programme (WCRP), over the past year.

T. Shepherd, Co-Chair with T. Peter of the SSG, welcomed the participants and briefly discussed the main issues to be addressed during the meeting. During the past year a comprehensive review of the WCRP by its sponsors was carried out,¹ and a draft was sent to the WCRP core projects, panels and working groups for their consideration and input for the WCRP response. The final version of the review is expected to be published in 2009. In addition, the WCRP is currently developing a new implementa-

tion plan that looks to the future of climate science in the next decade and beyond. This action is the result of deliberations undertaken at the most recent JSC meeting in Arcachon, France (see the report on JSC Session 29 in SPARC Newsletter No. 31), but issues raised by the WCRP review must also be taken into consideration when developing this new plan. SPARC input to the plan was needed by the middle of December 2008. The SPARC SSG meeting provided a valuable and timely opportunity for the SSG and SPARC activity leaders to assist in formulating the SPARC input for the response to the draft of the WCRP review and, at the same time, to provide input to formulating the SPARC component of the Implementation Plan.

Highlights of the 4th SPARC General Assembly

The SPARC General Assemblies, which are held every 4 years, are high quality international conferences that have become a key forum for presentation and discussion of new SPARC science, and timely surveys of key developments in the main areas of current and emerging research. The 4th SPARC General Assembly (GA) was held at the CNR Conference Centre in Bologna, Italy from August 31 to September 5. The venue and arrangements put in place by the

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Local Organising Committee (co-chaired by E. Manzini and S. Corti) were excellent, and the conference continued the tradition of previous SPARC GAs in that it was well attended and attracted a large number of young scientists and scientists from developing countries.

P. Haynes, co-chair with T. Peter of the Scientific Organising Committee for the 4th SPARC GA, summarised highlights at the SSG meeting. These are discussed in

¹This review was carried out by a Review Panel appointed by WCRP's sponsors ICSU (International Council for Science), WMO (World Meteorological Organization) and IOC (Intergovernmental Oceanographic Commission) of UNESCO, together with IGFA (International Group of Funding Agencies for Global Change Research). The review was undertaken in parallel with a review of the International Geosphere-Biosphere Programme (IGBP).



more detail in an article in this issue of the SPARC Newsletter. The presentation and ensuing discussion affirmed that the 4th GA was a great success with a total of 335 registered participants, 49 of them from countries with developing/transitional economies (~50% more than for the 3rd GA), and strong participation by young scientists. The SPARC GA was held back-to-back with the International Conference of IGAC, the International Global Atmospheric Chemistry project of the IGBP (September 8-12 in Annecy, France). About 30 scientists made use of this special arrangement, and took advantage of the special offer of reduced fees for a 2-day participation in the sister conference.

Also raised was the issue of the recurring conflict with the Quadrennial Ozone Symposium (QOS), which is inherent in the four-year period adopted by both SPARC and the International Ozone Commission (IO3C). It was agreed that moving one year out of phase would not work, as that would then clash with IUGG and IAMAS, which are major meetings for SPARC-related science. An attractive option is two years out of phase with the QOS, which would keep open the possibility of back-to-back meetings with the IGAC International Conference. However, it is already too late to plan a GA for 2010, so the idea emerged of holding the next GA in three years – but half a year out of phase with IUGG – and the next one three years after that, in order to reach this point. This option would have the added benefit of meeting more frequently during a time of rapid evolution of SPARC and the WCRP.

WCRP Update

The WCRP leadership and management were well represented at the SSG meeting with **G. Asrar** (WCRP Director) and **V. Ryabinin** (Senior Scientific Officer of the WCRP Joint Planning Staff) attending the entire SSG meeting, and **T. Busalacchi** (Chair of the WCRP Joint Scientific Committee) present for the second day. T. Busalacchi noted some key issues for the WCRP, *e.g.* the importance of a response by SPARC to the WCRP review and input to the Implementation Plan mentioned above. He also pointed to the upcoming World Climate Conference-3 (WCC-3), an event that will be of great importance for the future of the WCRP, and of climate science in general. (The WCRP itself was

brought into being following WCC-1.)

The 2008 JSC meeting identified two important time periods in the future development of the WCRP: 2008-2013 and post-2013. During this period a major goal is to implement the WCRP Strategic Framework - the Coordinated Observation and Prediction of the Earth System (COPEs) - which represents several years of intensive thinking on the role and workings of the WCRP. During this period, the WCRP must also prepare for changes in structure that may be required for the post-2013 period. In addition to maintaining some key structures and addressing key emerging science issues, the WCRP must become more effective in interfacing with users of climate information. Changes in WCRP structure and its strategic planning may be needed to meet these challenges.

T. Busalacchi stressed that the WCRP will always be focused on research, and G. Asrar emphasised that any change in form must be driven by function, and that grassroots input from the WCRP core projects in developing the implementation plan is of great importance. The COPEs framework includes a range of cross-cutting initiatives and activities, many of which are being addressed by the SPARC themes and activities. Reassurance that the COPEs framework would not usurp the core projects was welcomed by the SSG. The COPEs implementation plan must be completed in draft form for the next JSC meeting to be held in April 2009.

Discussion on the Future of SPARC

The stage for the discussion of the future of SPARC was set at the 4th SPARC GA in a presentation by T. Shepherd entitled “SPARC – Quo Vadis?” Additional comments by T. Busalacchi and G. Asrar provided context for the lively discussion that took place in separate sessions over the course of the SSG meeting. While it is clear that the WCRP will remain fundamentally focused on climate research, it will increasingly be called upon to address the growing demands for more information to meet the challenges of the societal impacts of climate change.

With regard to the future of SPARC, the SSG discussed SPARC’s contribution to the COPEs implementation plan. G. Asrar indicated that early input from SPARC is

needed to address three key science questions in the implementation plan, namely:

- (1) What will be the key science issues SPARC aims to address over the coming years to 2013?
- (2) What elements of this science need to be taken forward beyond 2013?
- (3) What new science should the WCRP address beyond 2013 in the context of SPARC?

Similar questions were posed to the other WCRP core projects at the 2008 JSC meeting in Arcachon. The response given by the SSG after the JSC meeting is provided in the SPARC legacy document.

The discussion on the future of SPARC initiated at the GA was, in part, motivated by the desire of the Co-Chairs and the SSG to engage the broader SPARC community concerning the future of SPARC. As promised during the discussion at the GA, the **SPARC Café** has been set up as an on-line bulletin board to facilitate this community-wide discussion.

The future of the SPARC Office: As noted at the GA discussion and in the JSC report in SPARC Newsletter No. 31, the major part of the current funding to support the SPARC Office in Canada, provided by the Canadian Foundation for Climate and Atmospheric Sciences, will cease at the end of the 2010 calendar year with no current prospect of renewal. In addition, N. McFarlane plans to step down as Director at the end of 2009. A number of options for the future of the SPARC Office were brought forward in the discussion and will be followed up by the Co-Chairs in collaboration with SSG members who volunteered to help.

The SPARC Themes

Detection/Attribution/Prediction

W. Randel provided an update concerning the ongoing work of the Temperature Trends Assessment Group. The recent work of the group is summarised in a paper now in press (Randel *et al.*, 2008). Current re-analysis and radiosonde records have both been problematic in estimating stratospheric temperature trends, however there is reasonable agreement between trend estimates from satellite data and radiosonde data, once instrument changes and the effects of CO₂ changes on the SSU weighting functions are taken into account. Water vapour



SPARC SSG meeting participants

variations in the tropical lower stratosphere evaluated from satellite observations (HALOE and MLS) are well correlated with temperature variations at the cold point tropopause. During the last decade temperatures in the lower stratosphere have been relatively constant. Possible causes for this will be investigated in the future. Other future activities will include detailed comparisons of CCMVal runs with updated observations. A further meeting of the group is planned to take place in the first half of 2009.

E. Manzini summarised recent research on decadal prediction from the perspective of the SPARC community. (See also the article on this topic by Keenlyside *et al.*, in SPARC Newsletter No. 31). The issue of decadal predictability and prediction is relevant for SPARC because the stratosphere exhibits decadal variability associated both with internal processes (*e.g.* sudden stratospheric warmings and the quasi-biennial oscillation (QBO)) and with responses to external forcings (such as decadal-scale variations in solar irradiance, volcanic eruptions, and anthropogenic effects such as ozone depletion/recovery and increased GHG concentrations), and the relevance of teleconnection pathways that couple stratospheric and tropospheric variability is now recognised in regard to tropospheric predictability. In addition, there is a societal motivation for decadal prediction since this is the typical planning time scale for changes in infrastructure that may be needed to

prepare, for example, for the impacts of climate change.

Modelling the role of stratosphere-troposphere coupling for decadal scale prediction poses a number of issues that SPARC can and is addressing. The importance of changes in atmospheric composition is of course central to the SPARC CCMVal activity. In addition, understanding and modelling physical and dynamical variability and its role in decadal prediction includes a range of modelling issues, such as the importance of horizontal/vertical resolution and vertical domain, and the role of parameterization of unresolved processes (*e.g.* gravity-wave drag) in modelling stratospheric variability. Many of these issues are addressed in the context of the DynVar activity.

S. Corti gave an overview presentation on seasonal prediction. Given that predictability from initial states is typically limited to periods of the order of 10-14 days, the accuracy of seasonal forecasts relies on lower frequency signals/forcing in the climate system. For example, in the tropics, enhanced predictability is associated with ENSO events, and this contributes to the relatively higher skill of seasonal forecasts in the tropics. In contrast, seasonal forecasting in regions where there is relatively high synoptic scale variability is typically not very skillful. However, there are some extratropical influences from events such as El Niño that may provide some skill.

Time scales and memory in the stratosphere are typically longer than in the troposphere and studies have shown that circulation anomalies in the stratosphere may propagate down into the troposphere on time scales of several weeks (Baldwin and Dunkerton, 2001; Baldwin *et al.*, 2003). Current forecast models, even those that extend into the stratosphere, typically show systematic errors, such as underprediction of the stratospheric jet, that may be associated with inadequate resolution and modelling of stratospheric circulation anomalies and their downward influence.

K. Rosenlof presented an update on the SPARC Water Vapour Assessment (WAVAS-2) activity. This new activity was proposed at the previous SSG meeting (see C. Schiller *et al.*, in SPARC Newsletter No. 30). The SPARC Water Vapour Assessment Report was published in 2000 (SPARC Report No. 2). Since then, many more satellite measurements have been made, and reprocessing of past satellite measurements has occurred. There has also been continual evaluation of discrepancies with *in situ* data; questions have been raised in regard to extremes in existing data (the so-called supersaturation puzzle); chemistry/climate models have improved to the point where they are better at simulating UTLS water vapour; and lower stratospheric trends have reversed - the consequences of which have not been thoroughly explored from a radiative and chemical standpoint.

The WAVAS-2 activity is co-chaired by C. Schiller, K. Rosenlof and T. Peter. A major outcome of the activity is expected to be an updated WAVAS report that summarises findings and recommends future directions. A SPARC sponsored workshop will be held in Toronto, Canada in March 2009 to identify and discuss the relevant issues and facilitate the formation of working groups to address them. Focus themes for the workshop are *in situ* data quality (AquaVIT), the supersaturation puzzle, data quality and merged (remote sensing) data records (stratosphere and UTH), and development of a modelling strategy for UTLS water vapour studies.

Stratosphere-Troposphere Dynamical Coupling

M. Baldwin presented a brief overview of activities in the last year that were relevant to this theme. Apart from the 4th SPARC

GA, the Chapman Conference on the Role of the Stratosphere in Climate and Climate Change, co-sponsored by SPARC, was another major conference within the past year that dealt with a range of topics within the general scope of the Stratosphere-Troposphere Dynamical Coupling theme (see Baldwin *et al.*, SPARC Newsletter No. 31). A review paper on this topic is in preparation for Reviews of Geophysics.

While there is much active research in stratosphere-troposphere coupling, ensuring that contributions from it are represented in forthcoming WMO/UNEP and IPCC assessments continues to be an important issue for SPARC.

S. Yoden summarised recent work on dynamical aspects of stratosphere-troposphere coupling. Funding has recently been obtained for a new research project entitled “Assessment of the Stratospheric Effects on Climate Change and Elucidation of the Dynamical Role.” This project includes co-investigators from several Japanese institutions and will involve collaborations with international groups. In addition to this new research project there are a number of ongoing research activities in Japan on a range of topics relevant to stratosphere-troposphere coupling. Recent examples are studies on the influence of tropical features (*e.g.* QBO and solar forcing) on the winter polar vortex, and studies on the tropospheric impact of stratospheric reflection of planetary waves.

P. Kushner summarised recent progress in the DynVar Activity. There has been steady progress since the initial planning report (see Kushner *et al.*, SPARC Newsletter No. 29), and a follow-on planning workshop was held in Toronto in March 2008. This workshop has set the stage for DynVar activities for the coming 2-3 years. Work on several of the DynVar activity areas is under way and some relevant new research results are emerging. (See the article by Kushner *et al.*, in this issue of the newsletter).

Chemistry-Climate Coupling

A. Ravishankara reviewed the development and timelines for the WCRP/IGBP Activity on Atmospheric Chemistry and Climate (AC&C), which is being carried forward jointly by SPARC and IGAC. Activity plans developed following the

groundwork laid over the 2006-2007 period, notably by the initial scoping meeting (August, 2006), and the first AC&C workshop (January, 2007). Liaisons with existing ongoing activities were developed (*e.g.* AeroCom, CCMVal, ACCENT, HTAP). Details of modelling activities and engagement with all of the modelling groups involved were finalised in the first half of 2008, and from June to November, the AC&C Steering Group members have been working with the New Scenarios group to define emissions for AR5.

Model runs will be carried out in the coming year and preparation of publications will get under way. The modelling activity builds upon existing projects (CCMVal, AeroCom), and a new activity, TropChem, will augment and build upon the ACCENT Model Intercomparison Project and the HTAP (Hemispheric Transport of Atmospheric Pollutants) project. The AC&C activity has been generally successful in meeting its time lines and fulfilling its objectives, although it has faced a number of challenges, including limited human and computer resources, funding for travel, and ensuring that it is resonating with both the science community and the funding agencies.

Important issues for AC&C concern its future role and leadership. The importance of the SPARC role in AC&C was noted. Ongoing concerns are not only the contributions of SPARC to AC&C but also the benefits that SPARC receives from it (*e.g.* augmenting CCMVal contributions to the WMO/UNEP Ozone Assessment and AR5).

T. Shepherd summarised CCMVal development and activities. The CCMVal project has evolved substantially from its initial conception. CCMVal played a major role in the 2006 WMO/UNEP Ozone Assessment through its coordination of the CCMVal-1 reference simulations that were used in support of the assessment, and also contributed to IPCC AR4. Planning for CCMVal-2, which will provide similar and enhanced contributions to the 2010 WMO/UNEP Ozone Assessment and AR5, was initiated at the 3rd CCMVal workshop in Leeds in 2007 (see Eyring *et al.*, SPARC Newsletter No. 30). There are now 20 modelling groups involved in CCMVal-2 – an increase from the 13 groups that participated in CCMVal-1.

Currently, 65 CCMVal collaborators are working with output that is available on an open access basis from the model archive (see Guidelines for CCMVal Collaborators at <http://www.pa.op.dlr.de/CCMVal/>). Several papers have been published or submitted, and others are in preparation.

Planning for the SPARC CCMVal report began at the 3rd workshop, and it is now well under way with a target publication date in early 2010 in time to be available for the next WMO/UNEP Ozone Assessment. The overarching goal of the report is to improve understanding on the representation of key processes in CCMs. To that end it will look at radiation and chemistry, in addition to transport and dynamics. Observations will be key for the success of the report, and the report will help identify observational needs. The report will aim to develop quantitative performance metrics (extended from Waugh and Eyring, 2008).

The SPARC initiative on the role of halogen chemistry in ozone depletion was proposed and endorsed at the 2007 SSG meeting. The main objectives of the initiative are to (a) evaluate consequences of new data on the ClO dimer photolysis rate, (b) evaluate laboratory results for the photolysis rate, and determine further studies that are necessary to resolve current differences, and (c) assess evidence linking ozone depletion to stratospheric active chlorine/bromine amounts. **M. Kurylo** reported on progress during the last year. A workshop was held in Cambridge, UK in June 2008, which focused on laboratory/theory studies, atmospheric measurements, and modelling/analysis investigations (see Kurylo *et al.*, in this newsletter). A special journal issue (TBD), on a time scale suitable for use in the 2010 UNEP/WMO Ozone Assessment, is planned.

A. Ravishankara also discussed the role of laboratory studies. The old paradigm, which was to isolate individual reactions for detailed study to isolate rate-limiting steps, must be replaced by one that considers complex mechanisms. It was agreed that this activity should be rejuvenated within SPARC. Scientists who could lead this activity will be considered.

G. Bodeker reported on the outcomes from two SPARC workshops — one on Ozone Recovery, held in Boulder in May 2008, and the other on the Ozone Data Base,

held in Bologna in conjunction with the 4th SPARC GA. Companion articles summarising the key issues and outcomes of these meetings are available in this issue of the newsletter.

The Ozone Recovery Workshop was held to:

- redefine what is meant by ozone recovery, whether non-attributed (when ozone reaches pre-1980 levels) or attributed (when ozone concentration is no longer affected by the Ozone Depleting Substances (ODSs)),
- develop an improved framework for the next WMO/UNEP Ozone Assessment,
- generate a publication that describes this new framework for ozone recovery.

The Ozone Database workshop was convened to address the disparities in specifying past ozone forcing in the models that contributed to IPCC AR4. The goal of the workshop was to discuss the creation of a new ozone database, or a suite of databases, that will meet all of the needs of modellers, based on observations (see the report by Bodeker *et al.*, in this newsletter). Substantial progress has been made since the workshop. A paper is underway, with a projected completion date by the end of 2008. The database will be made available to the CMIP5 community under the auspices of the WGCM, and possibly made available through the SPARC Data Center.

Cross-Cutting Issues

Polar Initiative

The role of the polar regions in climate was raised by SPARC at the 2008 JSC meeting as an important cross-cutting issue for the WCRP in the near future. A. Ravishankara reviewed the issues and progress on this initiative. Detectable climate change is occurring significantly earlier in the polar regions than in other regions of the earth, and these changes are separable from natural variability. These changes are taking place in the context of decreasing concentrations of ozone depleting substances and increasing concentrations of greenhouse gases. There are connections between different components of the Earth System that are driving these changes.

The WCRP, through its core projects, has all of the key components and expertise to address these issues. The decision of

the JSC, as written in its report, was to: “Form a WCRP-wide group (from projects and WGCM) with involvement of IGBP representative(s) to work, initially by correspondence, on a topic of climate and polar regions, to scope the scientific issues pertaining to this topic (including predictability of Arctic, relevant biogeochemical processes), and present to the next JSC session a proposal for a WCRP way forward in this area. Recommend an effort aimed at using IPY results and other available knowledge and capacity to undertake an assessment of polar predictability at various time scales.” A first step toward carrying the initiative forward within SPARC was taken in a small meeting convened at the GA. In this meeting, a list of potential members of a scientific committee was assembled, and timing, possible locations and themes for a focused workshop were suggested. At the SSG meeting it was decided to prepare a concept proposal for consideration by the JSC at its meeting in April 2009.

The Modelling Summit

E. Manzini reported on the World Modelling Summit for Climate Prediction that was held in May 2008, and hosted by the European Centre for Medium Range Weather Forecasts (ECMWF). This event was co-sponsored by the WCRP, the World Weather Research Programme (WWRP), and IGBP. The World Modelling Summit was motivated by the perception in the climate science community that more rapid progress is needed in climate modelling in order to respond adequately to societal needs for the information that underpins decisions on adaptation to climate change and mitigation of its effects. The intent was to address the question of whether a radical new strategy for climate prediction is necessary and possible. The main tangible outcome of the Modelling Summit is the BAMS article entitled “A revolution in climate prediction is both necessary and possible,” which includes the Summit statement and a proposal for an international climate prediction project. However, a number of issues of particular interest to SPARC raised at the Modelling Summit are discussed in an accompanying article by Manzini *et al.*, in this issue of the newsletter.

Geoengineering

T. Peter reported on the discussions on geoengineering subsequent to those that

first took place at the 2007 SSG meeting (see SPARC Newsletter No. 30). This topic was also put before the JSC in the SPARC presentation at its 2008 meeting. In the meantime some additional studies have been done and others are under way that are relevant to geoengineering proposals, such as that in the essay by Paul Crutzen (Crutzen, 2006). Recent examples include studies that deal with uncertainties in the stratospheric impact of volcanic eruptions (Kenzelmann, 2008). These uncertainties put into doubt present abilities to assess the effects of geoengineering proposals involving stratospheric aerosols. The discussion pointed to a number of possibilities for addressing scientific and policy issues concerning geoengineering. There are also related activities under way, planned by other organisations and individuals including forthcoming focused workshops. SPARC may be able to contribute to WCRP efforts through CCMVal by studying CCM responses to volcanic forcing. This issue will be passed back to the JSC for further action with recommendations for investigating the science underlying geoengineering applications.

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The Gravity-Wave Initiative

A workshop on the Gravity Wave Initiative was held in Toronto in March 2008 in conjunction with the DynVar workshop, with a half-day joint session. Some interesting and provocative new results were presented at the workshop (See the article by M. J. Alexander in SPARC newsletter No. 31). Follow-on activities include preparation of a review paper summarising recent developments in the field, and a planned focused workshop early in 2009 to address mapping of global observational constraints on gravity-wave momentum flux sources. The review article is in preparation and planned to be published in the Quarterly Journal of the Royal Meteorological Society in early 2009.

M. Geller drew attention to an emerging issue concerning the archiving of high-resolution radiosonde data at the SPARC Data Center, supported by an NSF grant. It was recently discovered that the number of 6-second radiosonde data available from US stations has been decreasing because the National Weather Service is replacing the 6-second system with a 1-second system, a fact not widely known in the research community. The 6-second data have been

widely used by the SPARC community, but the 1-second data will require additional processing. It may be desirable to process it further to produce a 6-second data set that is consistent with the previously archived data set. This will involve additional effort on the part of the Data Center. If this action is undertaken, should it be expanded to include archiving of world-wide high resolution radiosonde data? It was decided that a small working group would explore the information content of the 1-second radiosonde data and make recommendations concerning its use and archiving.

SPARC DA and SPARC-IPY

D. Pendlebury presented an update on the SPARC-IPY activity, which is to put together a well-organised data archive of measurements and analyses of the polar stratosphere during the IPY period. A substantial contribution to these objectives is being carried out under the auspices of the SPARC-DA activity. The collection and archiving of analyses has progressed as planned; data is being gathered for 6 DA systems (5 with ozone, 2 with other chemical constituents, 5 with water vapour). In addition, progress has also been made on the other main components of SPARC-IPY, namely the Pan-Arctic Study, and a range of outreach activities. The Pan-Arctic Study is aimed at better understanding the middle atmospheric circulation with the help of a network of Arctic lidar measurements, satellite measurements, and meteorological soundings and analysis. Outreach activities and interactions between SPARC-IPY research activities are being coordinated at the SPARC Office by E. Farahani.

SOLARIS and Solar Variability

K. Kodera reported on recent activities within the SOLARIS project. A side meeting was convened at the 4th SPARC GA to discuss the issue of the discrepancies in observed and modelled tropical solar ozone signals for the CCMVal-1 simulations (Austin *et al.*, 2008). A series of new coordinated CCM experiments has been proposed to elucidate the impacts of QBO, solar and ENSO signals and their interaction in climate simulations. A SOLARIS meeting is tentatively planned for the second half of 2009.

M. Geller drew attention to the forthcoming review paper entitled “Solar Influences

on Climate” (Gray *et al.*) that is being prepared under the auspices of SCOSTEP/CAWSES. This review examines recent direct measurements and reconstructions of the solar signal in the more distant past when direct observations were not available. It concludes that recent reconstructions are still uncertain but indicate much smaller solar luminosity changes than earlier reconstructions did. It also emphasises that there is a consensus among solar physicists and climate scientists that climate change due to solar variations in the recent past were much smaller than those attributed to increasing greenhouse gas concentrations.

Update on the Tropopause Initiative

P. Haynes presented an update on the Tropopause Initiative which is being led by himself and A. Gettelman. Recent activities related to this initiative include involvement in recent and forthcoming special sessions on the UTLS and tropopause at the AGU and EGU. In addition, the SPARC Tropopause Web Site has been active for the past year (<http://www.acd.ucar.edu/sparcotrop>). The key issues outlined in the white paper (see SPARC Newsletter No. 29) remain relevant and progress on them is being made. A review paper on the TTL (Fueglistaler *et al.*, 2009) is in press. TTL transport issues and the role of deep convection are still subjects of active research. New work on the extratropical tropopause layer (ExTL) is under way aided by new observations and platforms and chemical measurements in the ExTL. Plans for future activities include organising UTLS sessions at future AGU and EGU meetings, and holding two focused workshops over the next two years: (a) UTLS observations and theory workshop, Boulder (October, 2009) and (b) AGU Chapman conference (or similar) workshop on the “Future evolution of the Tropopause” (likely in Spain, September, 2010).

Report on the WOAP meeting

The WCRP Observations and Assimilation Panel (WOAP) is co-sponsored by the Global Climate Observing System (GCOS). The WOAP members represent all WCRP core projects and working groups, as well as the WCRP/GCOS co-sponsored panels AOPC/OOPC/TOPC (Atmospheric/Ocean/Terrestrial Observation Panel for Climate). The 3rd meeting of WOAP was held in

Boulder during September 28-October 1, 2008. During the past year, **C. von Savigny** was appointed as the SPARC representative to WOAP and attended the meeting on behalf of SPARC. The most important topics discussed were (a) progress achieved during the last two years in terms of observations, reprocessing and reanalysis, interactions between GCOS and WCRP activities, and participation in GEOSS; (b) transition of WCRP core projects and datasets beyond 2013, (c) assessment of the activities and results of the Task Group on Data Management and the Joint Working Group on Observational Data Sets for Reanalysis, (d) development of contributions to the WCRP implementation plan.

Some issues raised during the meeting that are relevant for SPARC include:

- ensuring the continuity of satellite capability for limb profiling for ozone and other relevant species, which is important to monitor the evolution and recovery of the stratospheric ozone layer
- the importance of restoring the climate instruments on NPOESS or other platforms
- the need to evaluate climate data sets, and to derive ECVs (essential climate variables), which are obtained by processing measurements from satellites or by combining measurements from various instruments.

Coordination with Other Agencies/ Programmes

The Third ACC Workshop on Long Term Data Sets and Climate Modelling

E. Hilsenrath summarised the role of the Atmospheric Composition Constellation (ACC) within the CEOS (Committee on Earth Observation Satellites) Agencies. The main objectives of ACC are to (a) establish a framework for long term coordination among the CEOS agencies, (b) collect and deliver data to improve predictive capabilities for coupled changes in ozone, air quality, and climate forcing associated with changes in the environment. The objectives of the workshop were to identify data gaps, review the status of on-going and planned research to develop Climate Data Records/Essential Climate Variables, review observational requirements for validation of CCMs and improved prediction, identify potential impact of data gaps on climate models, and to establish priorities.

One of the expected outcomes of the workshop is a report to the CEOS Agencies that will (a) identify gaps that are urgent and need immediate attention, (b) recommend longer term data and modelling studies that consider gaps or other data deficiencies, and (c) provide prioritisation of tasks. SPARC may contribute to this report. Immediate post-workshop plans include further updating of gap analyses, and recommendations to CEOS by the end of January 2009 to permit them to be considered in preparation for the GCOS meeting in early February. In the longer term, discussions with SPARC and IGAC on the implications of gaps must continue.

Other Agencies

S. Melo summarised the status of current and planned CSA (Canadian Space Agency) atmospheric satellite missions. Current operational missions of the CSA include MOPITT/Terra, OSIRIS/Odin, SciSat-1, and CloudSat. Most of the planned new missions will focus on tropospheric and near surface observations. However, of particular interest to the SPARC community is the SWIFT mission, currently in development, which will measure stratospheric winds, and the STEP (Stratosphere-Troposphere Exchange Processes) mission concept. The CSA now relies heavily upon both atmospheric modelling and ground-based stations to support its satellite missions. Models play a key role in mission development and exploitation of the data sets in realising mission science objectives. The CSA invests in model development through collaboration with universities via its grants and contributions programme, and other government agencies.

M. Kurylo reported on recent developments concerning the Network for Detection of Atmospheric Composition Change (NDACC). The 2008 meeting of the NDACC Steering Committee was hosted by the DMI in Kangerlussuaq and Ilulissat, Greenland from 25-29 September, 2008. The designation of measurement sites as “Primary” or “Complementary” has been terminated. See the short article on NDACC by Chipperfield *et al.*, in the current newsletter for news on the NDACC. Also, a “Hot News” section will be initiated on the web site (www.ndacc.org).

G. Asrar briefly reviewed efforts to enhance collaboration between the WWRP

and WCRP towards the development of routine climate prediction that would be on the same footing as weather forecasting. Their main objective is to develop the required infrastructure and make it accessible to the research community.

Update on the SPARC Data Center

S. Liess presented an update on the operation of the SPARC Data Center. The Data Center has been operational since 1999 at the Institute for Terrestrial and Planetary Atmospheres within Stony Brook University, New York, supported by grants from NASA. There have been recent hardware upgrades, with upgraded stability and security implementations. However, because of their very high storage space requirements, CCMVal data and SPARC-IPY data have been outsourced to the BADC (British Atmospheric Data Centre) and the University of Toronto, respectively. New hardware acquisitions are under consideration. Anticipated future services include installation of online plotting and downloading using NOAA’s Live Access Server software.

S. Liess has accepted a position at the U. of Minnesota and will be winding down his SPARC-related activities over the next few months. A suitable replacement will hopefully be found by March 2009.

Future SSG meetings, and closure of the 16th session

The 2009 SSG meeting will be held in Japan in conjunction with the IGAC SSC meeting. The likely dates are in the week of October 26-30, 2009. **P. C. S. Devara** has invited the SPARC SSG to hold its 2010 meeting at the Indian Institute of Tropical Meteorology in Pune, his home institution. He provided a short presentation to describe the excellent meeting facilities that are available at IITM. The Co-Chairs thanked Dr. Devara for his kind offer to host the 18th Session of the SPARC SSG.

The 16th session of the SPARC SSG was closed at noon on Thursday, November 13, 2008. The Co-Chairs were joined by G. Asrar on behalf of the WCRP in thanking the local hosts for the meeting arrangements, and the participants for contributing to a very productive session.

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