



SPARC
Stratosphere-troposphere
Processes And their Role in Climate

Capacity Development Strategy



ICSU

International Council for Science



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1. Introduction

Capacity development has been a focus of SPARC¹ since its inception. This has included support of attendance of early career researchers and scientists from developing countries to workshops and meetings, dedicated training activities, or data provision services. The goal of these activities has been to ensure that scientific knowledge, methodological skills, and modelling expertise are developed in atmospheric and climate sciences related to SPARC research. This document outlines actions that will support this goal.

In developing the SPARC capacity development strategy, we have consulted and discussed with the community on various occasions: The SPARC Scientific Steering Group, together with the SPARC Project Office, organised a lunchtime capacity development workshop during the 5th SPARC General Assembly held in Queenstown, New Zealand, in January 2014. One of the outcomes of that workshop was a clear indication of the need for a greater emphasis on capacity development in SPARC. To develop a deeper perception of the regional/national needs of the community, a survey was conducted of all participants of the 2008 and 2014 general assemblies. This survey aimed to assess the many SPARC-related research activities taking place in different regions and countries of the world, as well as where expertise is lacking. In January 2015, prior to the SPARC Scientific Steering Group meeting held in Granada, Spain, a two-day workshop was held with a dozen representatives from different regions and international organisations to further refine SPARC's strategy for capacity development.

This document is the culmination of developments to date and outlines a strategy for SPARC capacity development, with concrete goals and actions, providing a more structured approach with measurable outcomes. The goals of this strategy are in line with WCRP's own capacity development efforts and directly reflect SPARC's need to maintain and extend education and capacity development activities to ensure continued excellence in its scientific research and leadership. This document should be considered a 'living document' that evolves over time as we refine and prioritise initiatives along the way and explore new opportunities for activities and partnerships.

1.1 Overarching Goal

The main objective of the SPARC capacity development initiative is to encourage involvement in, and create opportunities for participation in, SPARC activities by establishing and supporting collaborations and training of scientists from developing countries, and, by doing so, to foster the careers of the next generation of scientists.

This will be achieved, for example, by continuing to support the participation of early career researchers and scientists from developing countries in SPARC meetings, workshops, and conferences, and encouraging their involvement in SPARC science activities; supporting or organizing dedicated training workshops; promoting the participation of regional scientists in field campaigns and experiments; and establishing a mentor-mentee programme.

¹ SPARC (Stratosphere-troposphere Processes And their Role in Climate) is a core project of the World Climate Research Programme.

This will require active mobilisation of expertise and voluntary engagement from within the SPARC community in the first instance, but likely also accessing resources from partner and parent organisations of WCRP. Additionally, this will involve targeted efforts towards raising financial support from a range of donors and partners.

1.2 Rationale

SPARC research has followed a natural evolution moving from tackling global issues towards regional problems, reflecting a more general evolution of climate science as a whole. Understanding regional impacts and implications of climate change inherently requires regional knowledge and participation. Building capacity in all regions, particularly those most exposed to climate change, is thus a vital element to ensuring SPARC's continued contribution to policy-relevant science.

1.3 Existing Capacity Development Activities

Capacity development has been an objective of many global programmes, including SPARC, for many years. In general, relevant activities carried out to date fall into three categories:

- **Supporting the participation of early career researchers (ECR) and scientists from developing countries in SPARC and SPARC-related meetings and workshops**

This provides important opportunities to bring these researchers into environments where they can interact with senior scientists, present results, and discuss plans for future research. Provision of this support has been an integral part of SPARC's capacity development to date, and there are numerous examples of this every year with SPARC's activity meetings and workshops.

- **Dedicated training workshops**

Directed training activities, such as summer schools, training programmes, and courses, provide an excellent opportunity for participants to gain hands-on experience, improve particular skills such as data analysis, and build confidence in their scientific abilities. SPARC has, to date, not placed much emphasis on this aspect of capacity development. However, recent training workshops, such as the joint IGAC-SPARC ACAM training school, or a workshop organised by the regional Japanese SPARC committee, have been successful in both training the next generation of scientists and enhancing regional collaborations.

- **Provision of SPARC data products and diagnostic tools**

SPARC has ensured free and open access to data products derived from SPARC-endorsed model simulations, laboratory experiments, and field campaigns. Easy access to data has traditionally been a challenge to scientists from developing countries. In addition to facilitating access to key data sets, SPARC has developed various tools to aid the analysis of model and observational data, such as the CCMVal diagnostic tool.

Overall, there is considerable room for SPARC to expand its capacity development activities. The following section describes where SPARC should aim these efforts and further sections outline concrete tasks and initiatives that would ensure an improved community involvement in SPARC capacity development activities.

1.4 Identification of Gaps

During the development of this strategy, which included the SPARC capacity development survey, several areas were identified where SPARC could improve on its capacity development activities. These initiatives, with clearly identified outcomes, if enacted will ensure that this strategy document is successful. These include:

- **Regional working groups**

To attain SPARC representation in all regions, informal regional working groups will need to be established or, at the least, individual regional experts need to be identified, to address regionally relevant capacity development needs. These regional experts should meet on a virtual platform to exchange knowledge and tools and discuss challenges and solutions.

- **An early career researcher (ECR) association**

Although SPARC has always encouraged and supported the participation of ECRs, no dedicated SPARC ECR association has existed to date. Such an association would provide a platform for communication between ECRs as well as between ECRs and more senior scientists. This would promote and encourage further involvement of ECRs in SPARC science and nurture SPARC's future leadership.

- **Mentor-mentee programme**

Similar to a dedicated ECR association, no formal SPARC mentor-mentee programme exists, although SPARC scientists may be involved on an individual basis in such a role. Establishing a SPARC mentor-mentee programme would provide a mechanism to propagate the knowledge and expertise of SPARC's world-class scientists to regions where mentor capacity may be lacking, but enthusiastic ECRs are present.

- **Opportunities for exchange and training to build up skills and expertise**

One of the outcomes of the survey was the clear need for methodological skills (modelling, processing of observations, and analysing measurements), and scientific knowledge of complex processes and systems (e.g. monsoon system processes; stratosphere-troposphere exchange; stratospheric sudden warmings). In addition to training, opportunities for exchanges and joint collaborations (e.g. mobility programmes, joint field campaigns/experiments) were identified as important for building up capabilities in conducting SPARC-related research.

- **Reviewing abstracts, scientific articles, and funding proposals**

Having a pool of SPARC scientists who would be willing to volunteer their time to proof read or review abstracts for conferences, scientific articles, and funding proposals before their submission would provide a great learning opportunity for scientists from developing countries.

- **Information on the SPARC website about capacity development**

The SPARC website is one of the project's main communication tool. Information about how to get involved in SPARC research as well as where to find learning material related to SPARC science would be useful to all scientists interested in becoming part of the SPARC community.

- **Participation of academic institutes from developing countries in SPARC initiatives**

The scientific community in developing countries (especially in south Asia) are often isolated from international funding agencies, national environmental agencies, and non-governmental organisations. It is vital that academic institutes and research groups are recognized as essential partners who can work together with other stakeholders to perform climate science in developing regions.

2. Implementation

2.1 Conditions for Success

To ensure the success of SPARC's Capacity Development efforts, several elements will need to be in place. These include:

- A capacity development strategy that is in line with WCRP's overall science and capacity development programme.
- A proper support structure for capacity development.
- Representation from all regions, including developing regions, on the SPARC SSG as well as, where possible, in SPARC activities.
- A group of people within SPARC dedicated to capacity development issues. This group should include at least one SSG member.
- A financial mechanism with the associated financial oversight that can accept funding from various sources, including philanthropic contributions, and disburse that funding to support the implementation of capacity development activities. Donors must then be actively sought to maintain that fund.
- Awareness and management of the challenges (see below) and the ability to continuously learn from monitoring and evaluation activities.
- Dedicated (at least 1 hour) slots at SPARC SSG meetings where capacity development achievements to date are reviewed and where plans for the future are discussed.

2.2 Implementation Approach

The progression of SPARC science towards a focus more on regional climate processes presents a new opportunity for capacity development whereby previously unrepresented communities can engage

with SPARC science through regional activities. These regional activities should aim to address regionally relevant issues, but within the larger global context of SPARC science.

This strategy document sets out a number of specific initiatives or tasks (see section 4) that need to be SMART, that is:

Specific – well defined, with a clear articulation of the resources required to complete the initiative;

Measurable – criteria for completion of the initiative must be well defined;

Attainable – activities need to be achievable within the time frame specified;

Realistic – state what results can realistically be achieved, given available resources;

Time-related – start and end dates must be clearly defined.

A designated person or people need to be responsible for each of these tasks to ensure that they are successful. Furthermore, a process for regular review of progress on existing initiatives, assessment of suggestions for new initiatives, and closure of completed tasks must be put in place.

2.3 Challenges and How to Meet Them

As with any ambitious endeavour there are risks that need to be borne in mind and options for mitigating these risks must be identified. Challenges to the efficacy of SPARC capacity development, and potential solutions to those risks are detailed below.

Risk	Mitigation option
Competition for resources, both human and financial.	SPARC capacity development initiatives must be defined with sufficient clarity and purpose that leaders of those activities, and potential funders of those activities, are inspired to commit the necessary time and financial resources.
SPARC is not a legal entity and therefore cannot engage in any contractual agreements. There is the possibility that this may pose a problem to certain donors who might require such agreements (if and when a mechanism for donors is established).	The WCRP may be approached to provide the necessary financial mechanism to overcome this risk. This could be achieved e.g. through a dedicated WMO trust fund.
Redundancy with existing capacity development initiatives being undertaken in other global change research programmes.	Regularly updated plans for SPARC capacity development initiatives must be shared with other WCRP core projects, and with e.g. all Future Earth programmes, so identify risks of overlap with existing activities as early as possible.

2.4 Monitoring and Evaluation

To ensure the success of SPARC's Capacity Development strategy, it is essential that monitoring and evaluation of all activities is done throughout the lifetime of the activity. This will be the main responsibility of the SPARC capacity development group, however, the evaluation process should be undemanding for both the capacity development group and the regional contact groups that will provide input. As with SPARC activities in general, the SPARC capacity development activity should be built on a rolling series of tasks each with tangible outcomes amenable to periodic evaluation over their lifetimes.

The SPARC capacity development group should report to the SSG every year in much the same way as every other SPARC activity. They will need to describe progress made over the past year, new ideas and tasks/initiatives for the upcoming year, and where SPARC capacity development could be more effective. Ideally, some sort of indicator should be developed that can be tracked from year to year to capture the effectiveness of SPARC capacity development activities.

Should a SPARC capacity development fund be set up, the use of these funds will also need to be monitored and evaluated, including appropriate audit procedures. A process for reporting on the achievements of SPARC capacity development activities to donors may also need to be established.

Finally, SPARC will also need to develop and maintain close links with WCRP and external partners to ensure they are informed of the outcomes of SPARC capacity development activities.

3. Partnerships and Resource Mobilization

3.1 International Partnerships

A large number of diverse programmes and projects already involved in capacity development activities on a global scale already exists. A list of such programmes and projects with which SPARC could seek collaboration is listed below in no particular order.

- **CATCOS – Capacity building and Twinning for Climate Observing Systems**

In the context of the Global Climate Observing System (GCOS) and WMO GAW (see below), the CATCOS project addresses the need to improve climate observations, particularly in developing countries and countries with economies in transition where these observations are scarce. Swiss partner institutions work with international collaborators in Africa, Southeast Asia, South America, and Central Asia.

- **GAW – Global Atmosphere Watch**

In the Global Atmosphere Watch (GAW) Programme capacity development plays a central role. For example, instrument intercomparison campaigns and calibration exercises have capacity development as an important ingredient where instrument operators receive training in data analysis and data submission. Since 2001, two training courses have been given every year close

to Zugspitze, Germany's highest mountain peak. These training courses are given at the GAW Training and Education Centre (GAWTEC) and are operated through funds from the German Federal Environment Agency ("Umweltbundesamt" UBA) and the Bavarian State Ministry of the Environment and Public Health. GAWTEC is based at the Environmental Research Station Schneefernerhaus ("Umweltforschungsstation Schneefernerhaus" UFS), which accommodates the high-alpine platform of the GAW Global Station "Zugspitze/Hohenpeissenberg". GAWTEC is also part of GAW's Quality Assurance and Science Activity Centre (QA/SAC) in Germany and is responsible for the training of station personnel from global and regional GAW stations, teaching them measurement and data analysis techniques. Since the first GAWTEC training course in the summer of 2001 more than 308 trainees from 62 different countries have visited the Schneefernerhaus. These GAWTEC training courses last two weeks and gather approximately a dozen trainees on each occasion.

- **GFCS – Global Framework for Climate Services**

GFCS aims to develop the capacity of countries to apply and generate climate information and products relevant to their development policies and strategy. Capacity Development is an essential component of the GFCS implementation plan, linking and supporting all other activities carried out within GFCS. A number of projects have been identified to receive funding within the framework, one of which, aimed at analysis of data from models, may be relevant to SPARC capacity development activities.

- **ICTP – Abdus Salam International Centre for Theoretical Physics**

The ICTP is an international centre based in Trieste, Italy, that has been carrying out research and providing scientific education and training in support of excellence in developing countries for over 50 years. The centre has developed high-level scientific programmes especially keeping in mind the needs of developing countries and serves as an international forum of scientific contact. The centre has been involved in the organisation of numerous summer schools and other regional training programmes as well as a variety of other scientific outreach activities of relevance to SPARC capacity development. *WCRP had several workshops here – SPARC could organise a summer school here?*

- **SHADOZ – Southern Hemisphere Additional Ozonesondes network**

The SHADOZ network was established by the USA's National Aeronautics and Space Administration (NASA) to address the lack of regular widespread ozonesonde measurements in the tropics and the Southern Hemisphere. The programme works extensively with local scientists, coordinates launches, supplies additional sondes where necessary, and provides a central data archive.

- **START – Global Change System for Analysis, Research, and Training**

START promotes research-driven capacity development to advance knowledge on global environmental change in Africa and the Asia-Pacific region. The programme provides research grants and fellowships, carries out assessments and syntheses, and takes part in place-based

strategic planning. START's actions target science, as well as the interface of science, policy, and practice to inform actions toward fostering more resilient and adaptable development.

- **WCRP – World Climate Research Programme**

WCRP, which coordinates global research on climate, has its own capacity development strategy. The four core projects, of which SPARC is one, as well as the WCRP Grand Challenges are the main instruments through which WCRP carries out capacity development.

- **WMO – World Meteorological Organisation**

The WMO manages its own Education and Training Programme (ETRP), which serves as an advisory body on all aspects of technical and scientific education for WMO members. Two divisions oversee this work: the Education and Fellowships Division, which coordinates the WMO fellowship programme, and the Training Activity Division, which develops training courses and learning material, amongst other things.

3.2 Regional Partnerships

Beyond the global programmes and projects listed above, a very large number of regional and national programmes and projects exist with which SPARC could establish collaborations. A non-exhaustive list is provided here on a region-by-region basis:

3.2.1 Africa

ACCESS – Applied Centre for Climate and Earth Systems Science (www.access.ac.za)

ACCESS is a consortium of several South African agencies, research councils, research programmes, universities, and research groups who have combined efforts to deliver a range of outputs aligned with the South African Department of Science and Technology's (DST) Global Change Grand Challenge (GCGC). It is a platform aimed at providing integrated and end-to-end research and education and services as well as outcomes related to the opportunities and challenges related to climate change. ACCESS provides an opportunity for unprecedented cooperation across a range of disciplines, reflecting the inter-connected nature of the southern African Earth system. Through ACCESS, SPARC would also be in a position to reach out to the rest of the African continent.

AUF – Alliance Universitaire Francophone (www.auf.org)

AUF is an international association comprising universities, 'grandes écoles', academic networks, and scientific research centers that use the French language all over the world. With a network of 804 members in 102 countries, it is one of the world's largest higher education and research associations. Amongst other activities AUF fosters academic cooperation between member institutions and offers services to students and researchers including mobility funding, access to courses, and support for research projects.

SASSCAL – Southern African Science Service Center for Climate Change and Adaptive Land Management (www.sasscal.org)

SASSCAL is a joint initiative of Angola, Botswana, Namibia, South Africa, Zambia, and Germany, tasked to conduct problem-oriented research in the area of adaptation to climate change and sustainable land management. The Center has a scope on the Southern African region and the work of the Centre is defined in partnership with the respective scientific communities, the users of science products, policy-makers, and decision-makers. Capacity development is a key objective of the Center, achieved mainly through the establishment of research infrastructures and joint research projects.

WASCAL – West African Science Service Center on Climate change and Adapted Land Use (www.wascal.org)

WASCAL is a large-scale research-focused Climate Service Center designed to help tackle the challenges of climate change and increased climate variability in the West African region. It does so by strengthening the research infrastructure and capacity in West Africa related to climate change and by pooling the expertise of ten West African countries and Germany. The Graduate Studies Programme, which involves the creation of ten graduate schools in West Africa, is core to WASCAL's capacity development activities.

3.2.2 Asia

ICIMOD – International Centre for Integrated Mountain Development (www.icimod.org)

The International Centre for Integrated Mountain Development (ICIMOD) is a regional intergovernmental learning and knowledge sharing center serving the eight regional member countries of the Hindu Kush Himalayas: Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan. ICIMOD aims to assist mountain people to understand climate changes, adapt to them, and make the most of new opportunities. ICIMOD is serving as a regional knowledge hub and provides a platform for regional transboundary programmes through partnership with regional partner institutions and facilitate the exchange of both experience and experts.

APN – Asia Pacific Network

The mission of the Asia-Pacific Network for Global Change Research (APN) is to enable research into drivers of changes in Earth's life support systems and the implications of these changes for sustainable development in the Asia-Pacific region. APN fosters understanding of global environmental change by supporting regional research through collaboration and capacity development. APN also supports research on cross-cutting issues, science-policy linkages, and the human dimensions of global change. APN has supported SPARC capacity development in the past, for example, by supporting the attendance of PhD students to the SPARC General Assembly in Queenstown in January 2014. Other capacity development activities in the Asia-Pacific region would likely also garner APN financial support.

APCC – APEC (Asia-Pacific Economic Cooperation) Climate Center (www.apcc21.org/eng/index.jsp)

The APCC, based in Busan, South Korea, was established in 2005 to support climate information and capacity development needs of APEC economies and the Asia Pacific region. In keeping with its mission of providing climate science to society, its activities span the range of research on climate prediction and downscaling, various operational subseasonal-to-seasonal climate information products and tools

based on multi-model ensembles, and projects on the use of climate information in climate-sensitive sectors. APCC also builds the capacity of developing countries through training programs on prediction, downscaling, and other topics as well as the Young Scientist Support Program (YSSP) that supports early career scientists in conducting mentored research in APCC.

3.2.3 Australasia and Oceania

PACE-SD – Pacific Centre for Environment and Sustainable Development (<http://pace.usp.ac.fj>)

PACE-SD, based in Suva, Fiji, is a centre for environmental education, research, and community engagement in the Pacific Island region. The centre collaborates with university faculties as well as national, regional, and international development partners with the aim to empower people with the adequate knowledge to be able to adapt to the impacts of climate change. The centre's activities include educational training and collaborative research in order to build capacity on local, national and regional levels.

3.2.4 Europe and Russia

ICTP (see above)

ICTP, which is based in Trieste, Italy, is involved in global capacity development efforts, but brings many researchers from developing countries to Europe through its fellowship programme and training schools.

3.3 Resource Mobilization

3.2.1 Engagement of the SPARC Community

The continuity and long-term success of capacity development in SPARC will depend on the engagement of the SPARC community. It must be recognized, however, that SPARC is a community of volunteers who are all busy and active scientists. Therefore, incentives will need to be created to encourage members of SPARC to participate in capacity development activities e.g. a culture of engagement in capacity development will need to be nurtured and promoted within SPARC. The establishment of a prize, or some form of recognition, to acknowledge contributions of individuals to SPARC capacity development would be one such way of encouraging this behaviour.

The diversity of SPARC research has meant that scientists from a very wide range of backgrounds have become involved in SPARC science. Conversely, this also means that scientists, particularly ECRs, with a broad spread of interests can become engaged in SPARC. Furthermore, the extension of SPARC's research into the troposphere provides an opportunity to link with an even wider community of scientists. These opportunities should be capitalised on wherever possible.

3.2.2 Financial Support Mechanisms

At present, SPARC has no dedicated funding for capacity development activities beyond the essential support provided by WCRP to support the attendance of early career scientists, and scientists from developing countries and countries with economies in transition, to SPARC meetings and workshops. To respond to the rapidly growing recognition of the importance of capacity development, funding to

more directly support SPARC capacity development activities needs to be found. A financial mechanism for accepting contributions to a SPARC capacity development fund, for deciding on what activities to support, and disbursement of funds to those activities needs to be established.

The possibility of establishing a SPARC capacity development fund at the SPARC Project Office's host institution (ETH Zurich) was explored. However, since SPARC is not an independent legal entity, and therefore ETH Zurich would be legally accountable for all investments and expenditure. For this reason, and the fact that the SPARC Project Office occasionally changes host institution (approximately every 5-10 years) (implying that the fund would likely also have to move accordingly), meant that this option was rejected.

The most realistic option (although possibly a lengthy process) may be to establish a WMO Trust Fund. Management of such a fund could be equivalent to, for example, the GCOS Cooperation Mechanism fund with defined terms of reference and a budget responsible within the WCRP Joint Planning Staff (payments would be commissioned by both SPARC co-chairs and the SPARC Office director). The benefit of such a fund with WMO would be two-fold: SPARC capacity development activities could be planned on a stable, long-term horizon and no relocation of the fund with subsequent moves of the SPARC Office would be required.

4. Action Plan – Implementation Activities

The list below of target outcomes and their associated activities will help address the needs and gaps identified above, and to enhance SPARC's capacity development activities worldwide; these will be reviewed as part of the monitoring and evaluation processes by the responsible SSG members. The activities/actions for the outcomes are documented in turn, with indicators, baseline, and targets for the given periods (the colours indicate the potential timing: green coloured activities could relatively easily be carried out in the next year, orange in the next 2-3 years, and red are activities likely to be achieved only on a longer timescale).

Outcomes	Activities	Measures/ Indicators	Baseline	Target timeframe	Resp. person(s)
<p>Every SPARC activity includes at least one actively participating scientist from a developing country.</p>	<p>Formation of regional contact groups to foster and coordinate involvement in SPARC activities in regions in need of capacity development.</p>	<p>Are the regional groups established and/or contact persons identified?</p>	<p>SPARC currently has contact persons for some regions/ countries (China, South Africa/East Asia).</p>	<p>Establishment of 2 regional groups in 2015, a further group in 2016.</p>	<p>SPARC CD group members and regional contact persons.</p>
	<p>The SPARC SSG and regional panels will identify opportunities in which researchers from developing countries and ECRs can make a substantive contribution to SPARC activities with little former involvement.</p>	<p>Researchers from developing countries are undertaking these tasks and contributing to SPARC science. (e.g. CCMI analysis, ACAM). Number of publications led by scientists from developing countries.</p>	<p>CCMVAL tool and archive exist. Small core group of people who have helped people work with tool. BAMS article. SPARC data centre. CCMI data currently being uploaded.</p>	<p>2015</p>	<p>SPARC CD group, CCMI co-leads?, ACAM co-leads?, other activity leaders?</p>
<p>The SPARC scientific steering group (SSG) includes at least three members from developing countries (ideally one from Africa, one from South America, one from southeast Asia).</p>	<p>Identification of suitable candidates from developing countries</p>	<p>Are there at least 3 SSG members from developing countries?</p>	<p>2 SSG members (Africa and East Asia)</p>	<p>Within the next year.</p>	<p>SPARC co-chairs.</p>

Outcomes	Activities	Measures/ Indicators	Baseline	Target timeframe	Resp. person(s)
A SPARC Early Career Network and associated activities (e.g. mentor-mentee programme) have been established.	The SPARC SSG will foster the establishment of mentor-mentee collaborations where the mentor is from a developed / developing country and the mentee ideally from a developing country.	At any time there are five or more mentor-mentee collaborations established per region and a few have been profiled in the SPARC newsletter.	Not sure of the present situation – individual SPARC community members may be mentoring somebody. The community will need to be asked.	Starts within the next year and is ongoing.	SPARC CD group and SPARC Office.
	Mentor-mentee programmes at SPARC general assemblies and activity conferences/works hops. (Senior scientists would mentor a group of mentees just for the duration of the workshop/conference).	The number of such mentor-mentee programmes held during the year at SPARC conferences and workshops.	This has not been done in SPARC in the past.	Starts within the next year and is ongoing.	SPARC CD group and SPARC Office.
	The SPARC SSG will liaise with the Young Earth System Scientists (YESS) community to establish a SPARC sub-group.	At least 50 people in the SPARC sub-group of the YESS community.	List of people that attended the GA young scientist dinner.	By the end of 2015.	Fiona Tummon

Outcomes	Activities	Measures/ Indicators	Baseline	Target timeframe	Resp. person(s)
The author teams on WMO/UNEP assessments of ozone depletion more accurately reflect the proportional populations across the six WMO regions.	The SPARC SSG should suggest names of potential contributors to the WMO/UNEP assessments from WMO Article-5 countries in order to help improve geographical representativeness.	WMO/UNEP author teams for each chapter each include at least 2 authors from developing countries.	Check WMO report for list of reviewers.	From now and next for 4 years. (and then repeat).	Someone from the SSG to act as liaison.
SPARC regularly holds, or supports, summer-schools, field-schools and workshops directed primarily at researchers from developing countries and/or early career researchers.	Atmospheric and remote sensing summer school held in southern Africa.	The summer school has taken place and a subsequent article in the newsletter.	Hassan has organised multiple such summer schools.	Dec 2015 / Mar 2016	Hassan Bencherif + SSG members responsible for CD.
	Survey SPARC activities willing to run similar activities.	Activity leads have responded to the survey.	-	2015	SPARC Office
	The SPARC SSG and/or the regional contact groups will establish and maintain a list of SPARC-related activities and atmospheric research programmes being taught in developing countries to more efficiently identify opportunities for capacity development and the formation of mentor-mentee collaborations.	Does the list exist?	Activity leaders should be aware of such activities in developing countries.	Start in 2015 and at least 2-3 years to have a complete list.	2 CD SSG members, regional contact groups and SPARC activity leads

Outcomes	Activities	Measures/ Indicators	Baseline	Target timeframe	Resp. person(s)
The SPARC website has a 'how to get involved' page, encouraging engagement particularly from scientists from developing countries.	Develop webpage that indicates how to get involved in SPARC.	Does this webpage exist?	Some information exists on the SPARC webpage.	2015	SPARC Office
SPARC has established educational material, the use of which is supported by SPARC scientists, to foster education in SPARC-related science in developing countries.	Compile a list of SPARC scientists willing to serve as trainers and potentially create template curricula.	Does such a list exist? (grouped by expertise)	Use SPARC CD survey as a starting point.	Start in 2015 and ongoing.	SPARC Office and regional contact groups (once established)
	Establish a list of already-available learning material and make it available on the SPARC website.	Does such a list exist? Is it available on the SPARC website.	None so far, but a lot of knowledge spread...	2015	Identify an ECR who would be willing to do this. Caradee Wright and Stefanie Kremser and Laura Revell? SPARC Office
	Work with WCRP to develop training material and funding proposals (specifically WMO fellowships).	Number of fellowships obtained.	-	Over the next 5 years	Part of the mentor-mentee framework. (SPARC CD group liaising with Boram and WMO).

Outcomes	Activities	Measures/ Indicators	Baseline	Target timeframe	Resp. person(s)
<p>SPARC's unique culture, which is a hallmark of SPARC's success in the international global change research arena, evolves to include outreach to researchers in developing countries as a fundamental facet of SPARC's culture.</p>	<p>Incentives will be created within the SPARC community to encourage an outward focus in SPARC activities needed to improve SPARC's outreach to researchers in developing countries.</p>	<p>Number of scientists from developing countries involved in SPARC activities. Ask activity leaders to report on this in their annual report.</p>	<p>Start from the SPARC website.</p>	<p>Start from 2015 (especially from next annual reports).</p>	<p>SPARC Office and activity leaders.</p>
<p>Establish mechanism for identifying financial support for capacity development.</p>	<p>Establish a list of capacity development needs for which SPARC seeks support.</p>	<p>Does the list exist?</p>	<p>-</p>	<p>In the next 2 years.</p>	<p>SPARC leadership (SSG, activity leaders, etc).</p>
	<p>Begin the discussion with WCRP (and other partners?) about how SPARC can access resources.</p>	<p>Did this discussion happen?</p>	<p>-</p>	<p>In the next year.</p>	<p>SPARC CD group, SPARC Office, co-chairs, WCRP JPS.</p>