

SPARC Report

1. Highlights for JSC

- Understanding and documenting the [role of stratospheric variability](#) and the [role of stratosphere-troposphere coupling](#) in [subseasonal to seasonal prediction](#)
- Documenting [solar variability as a source of decadal climate predictability](#)
- Progress in understanding atmospheric processes such as gravity waves, quasi-biennial oscillation, polar stratospheric clouds, stratospheric aerosol, and Asian monsoon, but also in analysing long-term trends of temperature and atmospheric composition
 - Global Space-based Stratospheric Aerosol Climatology (40-year data record) version 2.0 released
 - New ISSI international team working on Orographic Gravity Wave Stress and Drag
- Publication of [SPARC/IO3C/GAW “Report on Long-term Ozone Trends and Uncertainties in the Stratosphere”](#) (contribution to WMO/UNEP Ozone Assessment 2018)
- Publication of summary on the [Unreported Emissions of CFC-11](#) (symposium in Vienna, and report published in July 2019 SPARC newsletter) and participation in 2020 report for the Parties of the Montreal Protocol
- Submission of the S-RIP report on reanalysis inter-comparison (currently in review)
- Successful training schools in Kuala Lumpur (MYS) and Hong Kong (CHN)
- Currently 6 open SPARC-related journal special issues/ collections with over 55 papers published in 2019.

2. Primary science issues (looking ahead, 3 to 5 years)

- How will climate change on interannual to centennial timescales?
 - Exploiting long-term climate data records for fundamental understanding of short-term climate variability and long-term climate change
 - Understanding the uncertainties in observations, reanalyses, and climate models on various time scales.
 - Determining climate change effects on weather (including extremes) and regional circulations
 - Maintaining observation-modelling interactions
- How can prediction of weather and climate-related extreme events on sub-seasonal to decadal timescales be improved?
 - Characterizing dynamical extremes and compound events in the troposphere (e.g. blocking, stalled Rossby waves, others)
 - Attributing global and regional climate extremes, and improving their representation in climate models
 - Understanding stratospheric biases and uncertainties impacting sub-seasonal to decadal prediction
 - Quantifying the tropospheric responses to stratospheric extremes (e.g. sudden warmings and volcanic eruptions) and their sub-seasonal predictability

- How and why is atmospheric composition changing over time and what are the impacts?
 - Understanding the uncertainties of atmospheric composition change from past to future climate.
 - Understanding aerosol-cloud interaction in a changing climate
 - Monitoring emission change following measures to mitigate climate change
 - Exploring space weather impacts on stratosphere and mesosphere composition

3. Issues and challenges, for example:

- How you work with other WCRP activities
 - Joint activities with other core programs (e.g., S2S, Monsoon being re-visited)
 - New WCRP structure **must** be designed to help such joint activities
 - Inter-office telecons have started again, which is very welcome
 - SPARC office would be supportive of a central management software to share documents, meeting dates, and others between offices (preferred: not google).
- How you see your community evolving
 - SPARC now has three co-chairs, representing different regions and science themes. Seok-Woo Son became a third co-chair (end of 2019), but Judith Perlwitz stepped down in January 2020. We need to fill the vacancy.
 - New SSG member from South America, increasing geographic representation within SPARC
 - A challenge to link to African community
 - A challenge in ECS involvement: It is hard to keep good and engaged ECS. Need for more direct and strong involvement of ECS to WCRP – development of Implementation Plan is an excellent opportunity
- How you work with partners outside of WCRP
 - Co-organised activities with IGAC/Future Earth (e.g., ACAM)
 - Strong, but unclear relation to GAW through ozone-related activities; a document has been prepared by various groups involved in the Ozone Assessments and the Montreal Protocol process to clarify this
 - Initiating collaboration with TPE project
 - Inviting representatives from various programs and institutions (e.g., space agencies, science programs) to the SPARC SSG meetings
 - Newly identified liaison with ESA atmospheric satellites
- How the current funding affects your community, your activities, your service
 - Overwhelmingly reliant on participants' research funds for involvement in SPARC activities
 - Many activities ask small funding (for ECS support), but some activities ask full support. It is difficult to figure out what kind of support works well for each activity while keeping the balance between activities.
 - Need to assess the impact of the Covid-19 pandemic on how activities are run in 2020 and how that may change in future. It is likely that our resources will be spent in a different way in future, eg. publication costs of community papers, data storage
 - Need for long-term data storage for coordinated activities – can WCRP organise cloud (or other) support at lower cost?
 - Need for continued support ensuring maintenance and improving quality of long-term observations.
 - Can WCRP provide DOI for WCRP-related data set?
 - Move to a lower CO2 footprint for SPARC activities, incl. next General Assembly