45th Session of the World Climate Research Programme

Joint Scientific Committee

APARC

Atmospheric Processes And their Role in Climate

Amanda Maycock

28 May 2024

Lima, Peru

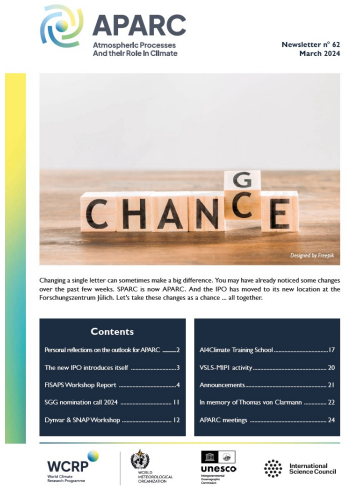
A year of change

SPARC
Stratosphere-troposphere
Processes And their Role in Climate

→

APARC
Atmospheric Processes
And their Role in Climate

- Rebranding approved by the JSC last year has been successfully rolled out.
- New website: https://www.aparc-climate.org/
  (work on updating content is beginning)
- Newsletter article to inform community



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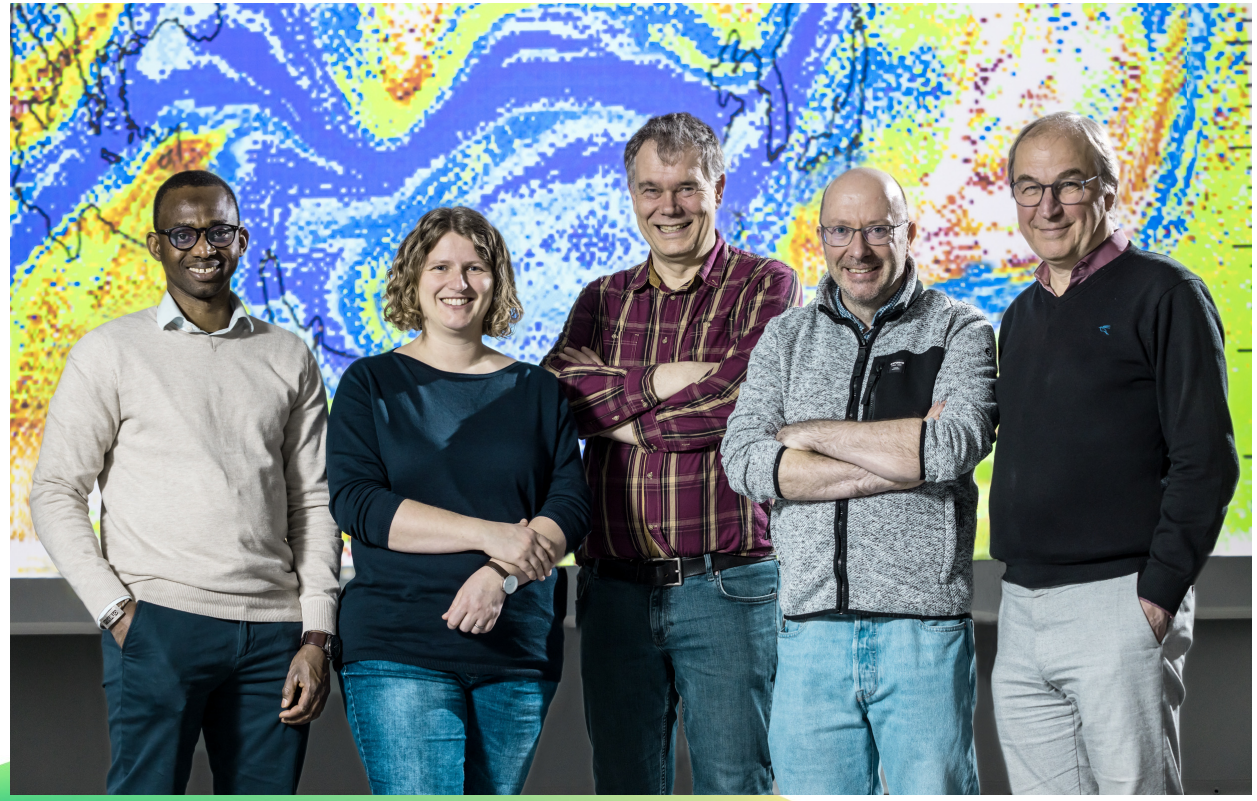
A year of change

- 1 January 2024: The APARC International Project Office has transitioned from DLR to Forschungszentrum Jülich, Germany.



The new IPO team; from left to right: Mohamadou Diallo, Ines Tritscher, Olaf Stein, Lars Hoffmann, and Rolf Müller

A year of change

- 1 January 2024: Olaf Morgenstern (NZ) succeeds Seok-Woo Son (KR) as APARC co-chair.

APARC thanks Seok-Woo for his commitment and leadership over the past 5 years.

Highlights for Joint Scientific Committee

- APARC has launched 3 new Scientific Activities:
  - Hunga Tonga-Hunga Ha'apai stratospheric impacts (HTHH)
  - Impact of chlorinated very-short-lived substances on stratospheric ozone (VSLS)
  - Large Ensembles for Attribution of Dynamically-driven ExtRemes (LEADER)
- All three are Limited-term cross-activity focused projects (LTCFs)
- Interdisciplinary with many APARC activities contributing expertise.

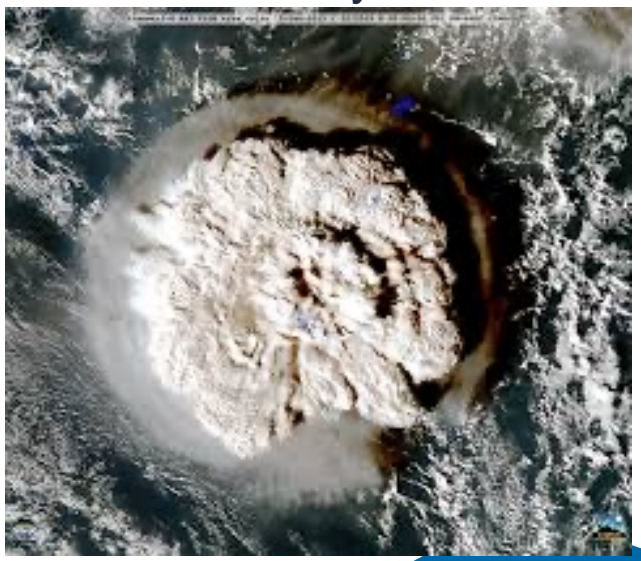
Highlights for Joint Scientific Committee

Hunga Tonga-Hunga Ha'apai stratospheric impacts (HTHH)

Leadership: Yunqian Zhu, Graham Mann, Paul A. Newman, William Randel

- Aim: to inform policymakers about the climatic impacts of the Hunga Tonga eruption
- Focus on three science themes:
  - A. Plume evolution, dispersion and large-scale transport
  - B. Impacts on stratospheric aerosols and the ozone layer
  - C. Radiative forcings from the eruption and surface climate impacts.
- Community modelling experiments to simulate eruptions impacts on climate and ozone
- Activity workshop held in Paris in April 2024
- APARC Assessment Report to be published in 2025 ahead of 2026 WMO/UNEP Ozone Assessment

15 January 2022



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Highlights for Joint Scientific Committee

Impact of chlorinated very-short-lived substances on stratospheric ozone (VSLS)

Leadership: Ryan Hossaini, Lucy Carpenter, Martyn Chipperfield, Doug Kinnison and Susann Tegtmeier

- Aim: to quantify the effect of observed trends in uncontrolled halogenated gases on the ozone layer
- Observations show increases in short-lived brominated & iodinated VSLS largely of natural oceanic origin (e.g. $CHBr_3$, CH_2Br_2, CH_3I, CH_2I_2) which are not controlled by the Montreal Protocol
- There is growing concern these trends are connected to climate change, e.g. through ocean-atmosphere exchange, and could affect ozone recovery
- The activity is coordinating model experiments to quantify the effects of VSLS trends on stratospheric ozone projections

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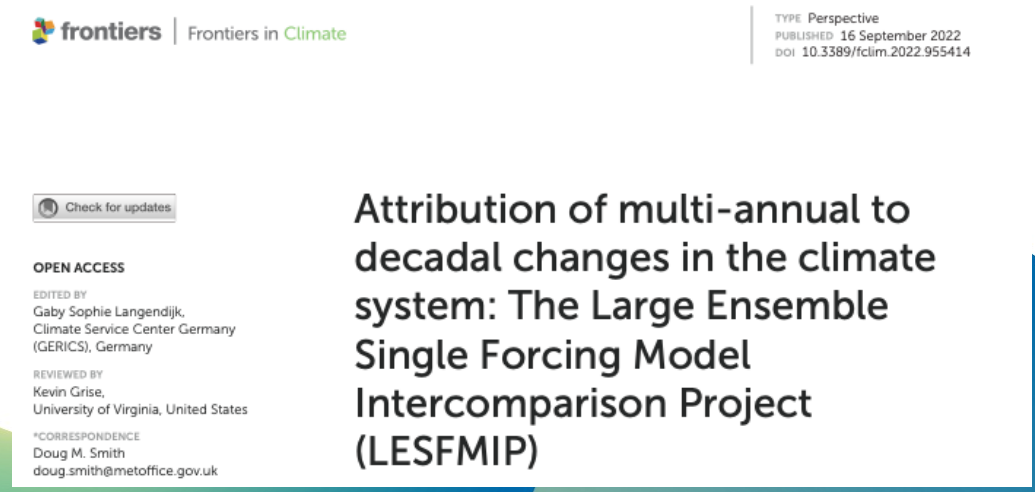
Highlights for Joint Scientific Committee

Large Ensembles for Attribution of Dynamically-driven ExtRemes (LEADER)

Leadership: Chaim I. Garfinkel , Scott Osprey, Alexey Karpechko, Amy Butler, Bernd Funke, Isla Simpson, Tiffany Shaw, Daniela Domeisen, Wenjuan Huo, Jonathon Wright, Anja Schmidt, Andrea Steiner, Amanda Maycock

- Aim: To understand the role of external forcings for large-scale atmospheric processes and surface predictability and extremes
- Provide a process-based understanding of recent annual to decadal climate changes and quantify the roles of internal variability and external drivers including greenhouse gases, aerosols, solar, volcanoes, ozone, land-use changes.
- Assess predictability, sources of skill, drivers and mechanisms – hence gain confidence in predictions and projections
- 2 LEADER working groups joint with EPESC WG2



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Highlights for Joint Scientific Committee

- **Training School** for ECS on "Climate Data Analysis and Artificial Intelligence in the Global South (AI4Climate)".
- Followed the Open Science Conference in Kigali and was organized by Mohamadou Diallo, Michaela Hegglin, Amadou Gaye and Ted Shepherd, in collaboration with the University of Rwanda.
- Attended by 30 researchers from Global South and North countries, selected based on their scientific background.

A joint WCRP/SPARC Training school at University of Rwanda, Kigali

SPARC Training School on "Climate Data Analysis and Artificial Intelligence in the Global South".

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29th-31st October 2023

University of Rwanda - College of Science and Technology, Kigali, Rwanda.

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Highlights for Joint Scientific Committee

APARC activities held several meetings (non-exhaustive):

- FISAPS Workshop on Research Using High Vertical-Resolution Radiosonde Data (30 August-1 September 2023, Boulder, Colorado, USA)
- DynVar & SNAP Workshop: The Role of Atmospheric Dynamics for Climate and Extremes (9-13 October 2023, Munich, Germany)
- HTHH workshop (22-24 April 2024, Paris, France)

The following workshops received additional support by ISSI and were held in Bern, Switzerland:

- OCTAV-UTLS: Understanding Satellite, Aircraft, Balloon, and Ground-Based Composition Trends: Using Dynamical Coordinates for Consistent Analysis of UTLS Composition
- SSiRC: Perspectives on stratospheric aerosol observations

DynVar & SNAP Workshop

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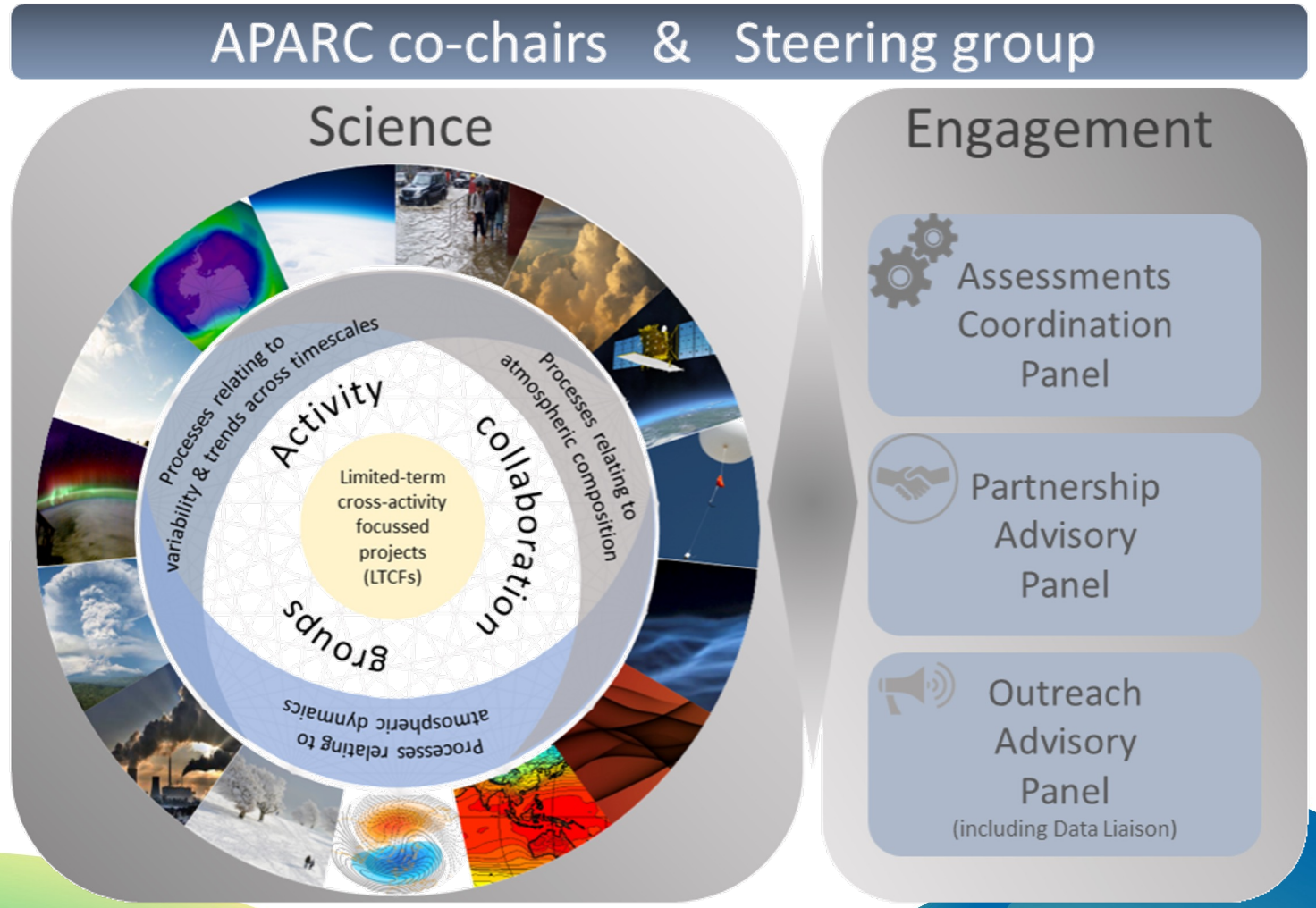
- Selected APARC publications
  - *Bernd Funke et al.: Towards the definition of a solar forcing dataset for CMIP7, Geosci. Model Dev., 17, 1217–1227, https://doi.org/10.5194/gmd-17-1217-2024, 2024.*
  - *Laura Pan et al.: East Asian summer monsoon delivers large abundances of very short-lived organic chlorine substances to the lower stratosphere, PNAS 121, 2024; https://doi.org/10.1073/pnas.2318716121*
  - *Bärbel Vogel et al.: Reconstructing high-resolution in-situ vertical carbon dioxide profiles in the sparsely monitored Asian monsoon region, Comm. Earth & Environ., 4, 72, https://doi.org/10.1038/s43247-023-00725-5, 2023.*
  - *Charlesworth, E., Plöger, F., Birner, T. et al. Stratospheric water vapor affecting atmospheric circulation. Nat Commun 14, 3925, https://doi.org/10.1038/s41467-023-39559-2, 2023.*
- Special issues led by APARC activities:
  - TUNER: AMT
  - S-RIP Phase 2: ACP/WCD
  - ACAM: GRL/JGR-Atmos

Update on APARC Strategic Plan 2022-2030

- The APARC Strategic Plan 2022-2030 is now in the implementation phase, establishing the new project structure.
- As part of its new Strategic Plan, APARC is continuing its efforts to include more tropospheric science.



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2026 APARC General Assembly

- Planning is beginning for the **APARC General Assembly in 2026**.
- Survey the community re. multi-hub event or single site.
- Feedback so far suggests people feel a 1 in 4 year event should bring the whole community together, but trade off with carbon emissions.
- Will include a hybrid option.

BAMS Essay

Decarbonizing Conference Travel

Testing a Multi-Hub Approach

Stefanie Kremser, Andrew Charlton-Perez, Jadwiga H. Richter, Jose Santos, Julia Danzer, and Stefanie Hölbling

https://doi.org/10.1175/BAMS-D-23-0160.1

Capacity Building

- APARC Outreach Advisory Panel is leading plans for a proposed **capacity building activity** to take place in **Dakar, Senegal, in 2025**.
- Proposed theme “Data Science for Weather and Climate Research in the Global South”.
- APARC will lead the design, planning and promotion of the workshop and provide resources and content to the workshop and training school.
- Plans to coordinate across WCRP with Academy, MCR, SLC, ESMO, CMIP and other interested CPs and LHAs.
- Funding included in the 2025 budget request.

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ECR training and development

- APARC plans to launch an **IPO Internship Scheme** to provide experience for ECRs in scientific coordination and project management.
- IPO to host an intern for 2-3 months to work on a specific project supporting the Partnerships Advisory Panel
- Recognises that ECRs pursue diverse career paths and many do not remain in research.

- APARC also plans to establish a **series of skills training for ECRs** focusing on transferable and soft skills (e.g. leadership, EDI). The virtual sessions will be facilitated by external trainers and will target ECRs from low and middle income countries who may have less access to similar training in their home institutions.

Planned products, high-level assessments or other key outputs/publications

- APARC 2025 Special Report on the HTHH eruption ahead of the 2026 WMO/UNEP Ozone Assessment Report
- APARC 2026 Special Report assessing the impact of industry-related emissions of chlorinated VSLSs on stratospheric ozone
- CCMi is working with the CMIP7 Forcing Task Force to produce an ozone forcing dataset for CMIP7
- SOLARIS-HEPPA is working with the CMIP7 Forcing Task Force to produce the solar forcing dataset for CMIP7
- LOTUS will contribute to the 2026 WMO/UNEP Ozone Assessment Report by updating observed vertically-resolved ozone trends.
- LEADER to produce community publications that will support EPESC WG2 and IPCC AR7.

Linkages with other WCRP activities

- Hunga Tonga Activity is strongly aligned with VolMIP from CMIP.
- LEADER will directly contribute to the EPESC LHA Working Group 2 on Integrated Attribution, Prediction and Projection.
- CMIP, Safe Landing Climates, ESMO, and My Climate Risk have expressed support for the APARC Training School in Dakar. Additional funding has been requested from International Commission on the Middle Atmosphere (ICMA). We will work with the Academy to promote the workshop.
- SSiRC in contact with LHA “Research on Climate Intervention” (Daniele Visioni is co-lead) can contribute expertise on stratospheric aerosols to the SRM/SAI. APARC co-chair Karen Rosenlof is part of the steering committee for the Climate Intervention LHA.
- SOLARIS-HEPPA activity lead Bernd Funke and Michaela Hegglin (CCMi) are members of the WCRP Climate forcing Task Team.
- Amanda Maycock has joined CLIVAR Climate Dynamics panel. Aim to build links especially with DynVar, Gravity Waves, SNAP and QBOi Activities.

Linkages with other WCRP activities

- APARC is continuing efforts to connect to the GEWEX/CLIVAR Monsoon Panel. ACAM has appointed new activity leads in 2023 which provides an opportunity to forge new links. (specific discussion item during JSC meeting)
- Gravity Waves has some interaction with GEWEX, on the role of gravity waves relative to clouds.
- Synergies between APARC and ESMO through modelling activities:
  - QBOi aims to improve QBO modelling
  - SNAP through continued S2S activities
  - Masatomo Fujiwara is A-RIP liaison with the WCRP TIRA, which is now within ESMO.
- Hella Garny is the APARC representative on the Digital Earth's steering committee. APARC is particularly interested in gravity waves in high resolution models.
- ATC contributed to the WCRP-GCOS Task Team on Earth's Energy and Budget Cycles Task Force and Workshops.

Partnerships with entities outside of WCRP

- APARC is establishing a new Partnerships Advisory Panel as a dedicated forum to review and plan APARC's engagement with other WCRP and external projects.
- APARC activities continue close collaborations with IGAC:
  - ACAM collaboration with IGAC activities including MANGO and MAP-AQ
  - CCMi collaborate with the ROSTEES working group under the Tropospheric Ozone Assessment Report (TOAR) activity of IGAC
  - LOTUS collaborates with the IGAC TOAR activity to interpret changes in tropospheric ozone that contribute to the total ozone changes.
  - OCTAV UTLS attend IGAC TOAR-2 meetings.
- ACAM collaborate with ACCLIP on the regional and global impact of the Asian summer monsoon and with the NASA ASIA-AQ field experiment in 2026

Partnerships with entities outside of WCRP

- LOTUS & OCTAV UTLS collaborate with GAW and NDACC through use of ground-based ozone records for trend analyses.
- LOTUS also collaborates with NASA, ESA, NOAA, and EUMETSAT that provide combined long-term satellite ozone records.
- SOLARIS HEPPA is strongly interacting with SCOSTEP within its PRESTO Science Programme.
- SSiRC collaborates with COSANOVA (https://www.cosanova.org/), a community of researchers that use atmospheric measurements of carbonyl sulfide and other emerging methods in ecosystem science.
- APARC continues to cooperate well with CEDA for long-term storage of data from various APARC activities. A next step is to publicise datasets to a wider user base.

Suggestions, issues or challenges

- It would be helpful if WCRP could provide a platform for abstract submission / registration to workshops and general assemblies.
- Very short notice for the new budget process this year. We did not have sufficient time to gather all necessary information.

Thank You

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