Summary of S(A)-RIP Phase 1 and Plans for Phase 2:

Chemical Reanalyses & Air Quality, Tropospheric Circulation, Extreme Events, and More

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A·RIP APARC Reanalysis Intercomparison Project

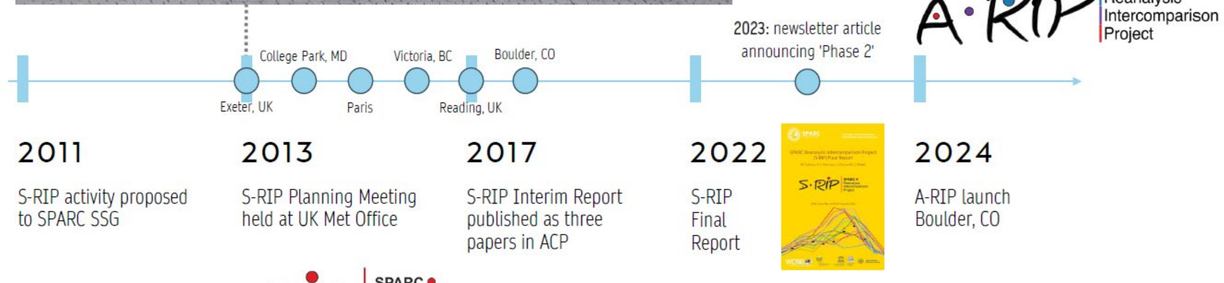
S·RIP SPARC Reanalysis Intercomparison Project

https://s-rip.github.io

INTRODUCTION

- **S-RIP**: WCRP/SPARC Reanalysis Intercomparison Project
- **A-RIP**: Phase 2 of the project – SPARC has changed its name to APARC (Atmospheric Processes And their Role in Climate)

- GOALs:
  - ➢ to create a **communication platform** between reanalysis data users and the reanalysis centres
  - ➢ to better **understand the differences** among current reanalysis products and **their underlying causes**
  - ➢ to **provide guidance** to reanalysis data users by documenting the results of this reanalysis intercomparison in peer reviewed papers and the ***S-RIP Final Report (2022)***
  - ➢ to contribute to future reanalysis improvements

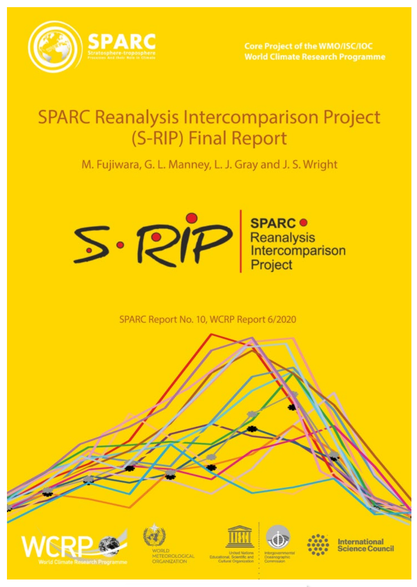


TIMELINE

S-RIP Final Report (2022)

- 12 Chapters, 612 pages
  - ➢ Documentation of 12 global atmospheric reanalysis systems (in Chapter 2)
  - ➢ Evaluation of various processes and regions (see right)

- RECOMMENDATIONS (in Chapter 12):
  - ➢ More recent reanalyses typically outperform earlier products
  - ➢ NCEP-NCAR R1 and NCEP-DOE R2 are unsuitable for many diagnostics and should not be used
  - ➢ Conventional-input and pre-satellite reanalyses are useful for many diagnostics but should be carefully validated against full-input satellite era products
  - ➢ Studies relying on reanalysis products should use multiple reanalyses whenever possible
  - ➢ All reanalyses show discontinuities; trends and climate shifts identified in reanalysis products should be carefully validated and justified
  - ➢ Reanalysis products on model levels should be used for all studies when sharp vertical gradients or fine-scale vertical features are involved
  - ➢ Several quantities, such as tendency terms, are handled and reported differently by different reanalyses
  - ➢ Homogenized and continuing data records are essential for reanalysis production and evaluation



https://www.sparc-climate.org/sparc-report-no-10/

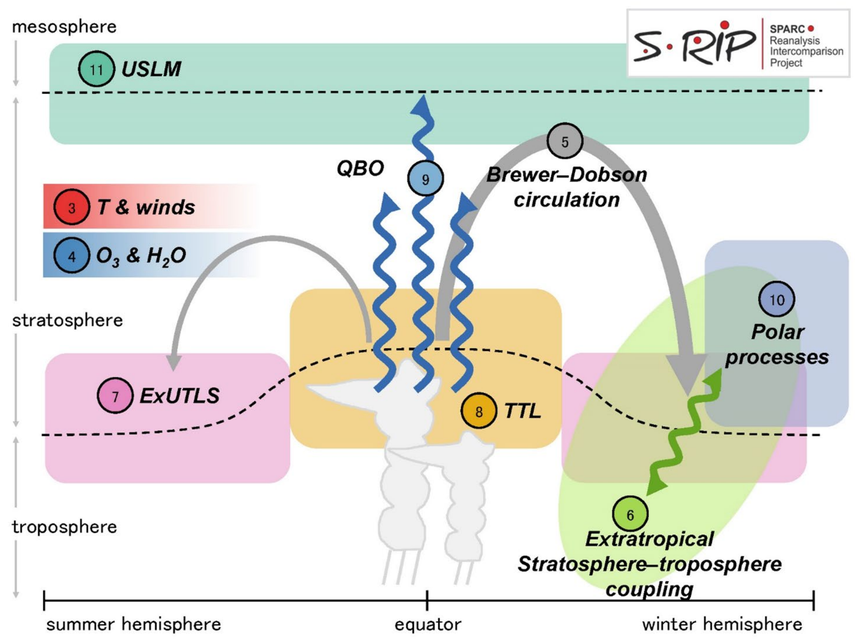


Figure 1.1

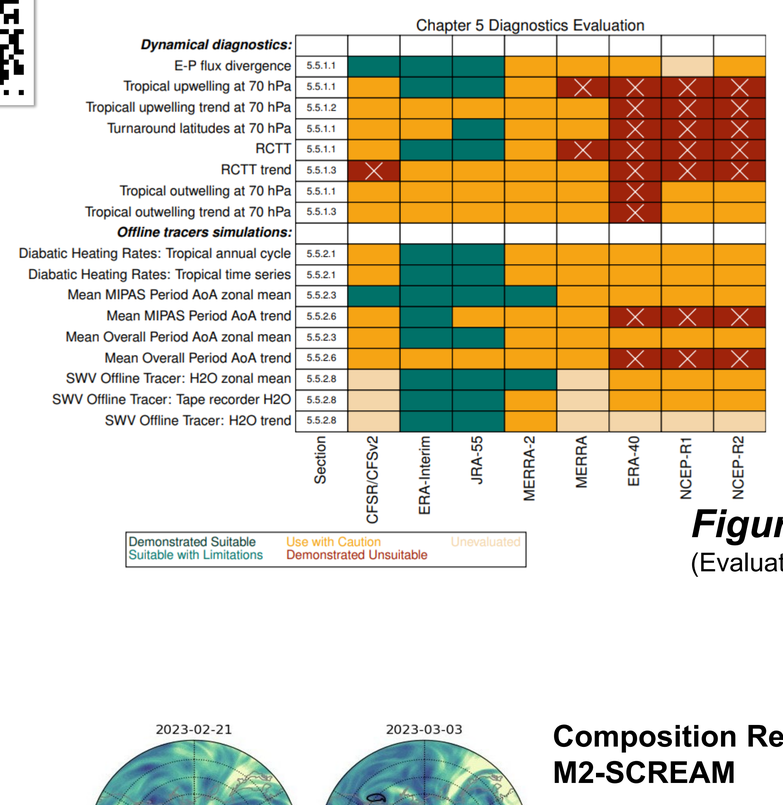


Figure 5.50
(Evaluation table for Chapter 5)

Plans for A-RIP (The Phase 2)

Will extend many of the studies from Phase 1, including:

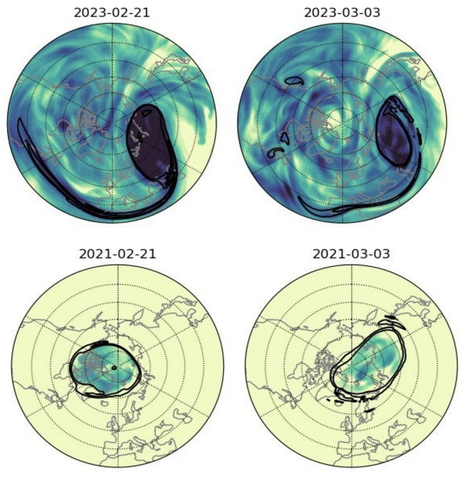
- ➢ Evaluation of new and forthcoming reanalyses (e.g., complete evaluation of ERA5, evaluation of JRA-3Q)
- ➢ More comprehensive evaluation of ASM circulation and composition, as well as that of other monsoon regions
- ➢ More extensive comparisons of the upper stratosphere and mesosphere including newer reanalyses with higher tops

New data set for A-RIP:

- ➢ Reanalysis Intercomparison Dataset (RID; see poster **PE3-23** by P. Martineau)

Two major new/expanded focus areas:

- ➢ Evaluation of tropospheric circulation (e.g., blocking, Rossby-wave breaking, jets and storm tracks) including relationships to both stratospheric influences and extreme weather events
  - ✓ <this new focus extends and broadens evaluations in Chapters 6 and 7 of the S-RIP Final Report>
- ➢ Evaluation of composition (including aerosol) reanalyses, both those focusing on upper tropospheric and stratospheric processes and those focusing on air quality (AQ) applications
  - ✓ <this will broaden and expand evaluations from Chapters 4, 5, 7, 8, and 10 in the S-RIP Final Report>
  - ✓ <expanded evaluations of tropospheric circulation will also be relevant to AQ studies.>



Composition Reanalysis Example: M2-SCREAM

Middle stratospheric (700K) water vapour from the MERRA-2 Stratospheric Composition Reanalysis of Aura MLS (M2-SCREAM), on the same days of year in 2023 (top) and 2021 (bottom); both are during strong sudden stratospheric warmings (SSWs); the color range is the same in each panel – demonstrating the mixing of enhanced water vapour from the 15 January 2022 Hunga Tonga-Hunga Ha'apai eruption into the Arctic polar regions during the 2023 SSW.

SPECIAL ISSUES

ACTIVE:

A-RIP: ACP & WCD
2023–
Link

EGU Special Issues

S-RIP: ACP & ESSD
2015–2022
Link

CLOSED:

All you need to do is "use more than one"