

The logo for S-RIP, featuring the letters 'S' and 'RIP' in a stylized, handwritten font. The 'S' has a red dot above it, and the 'RIP' has red dots above the 'I' and 'P'.

SPARC ●
Reanalysis
Intercomparison
Project



<http://s-rip.ees.hokudai.ac.jp/>

SPARC Reanalysis Intercomparison Project (S-RIP)

Co-leads: **Masatomo Fujiwara** (Hokkaido Univ.), and **David Jackson** (Met Office)

presented by Kaoru Sato (U Tokyo) at WDAC3

Outline

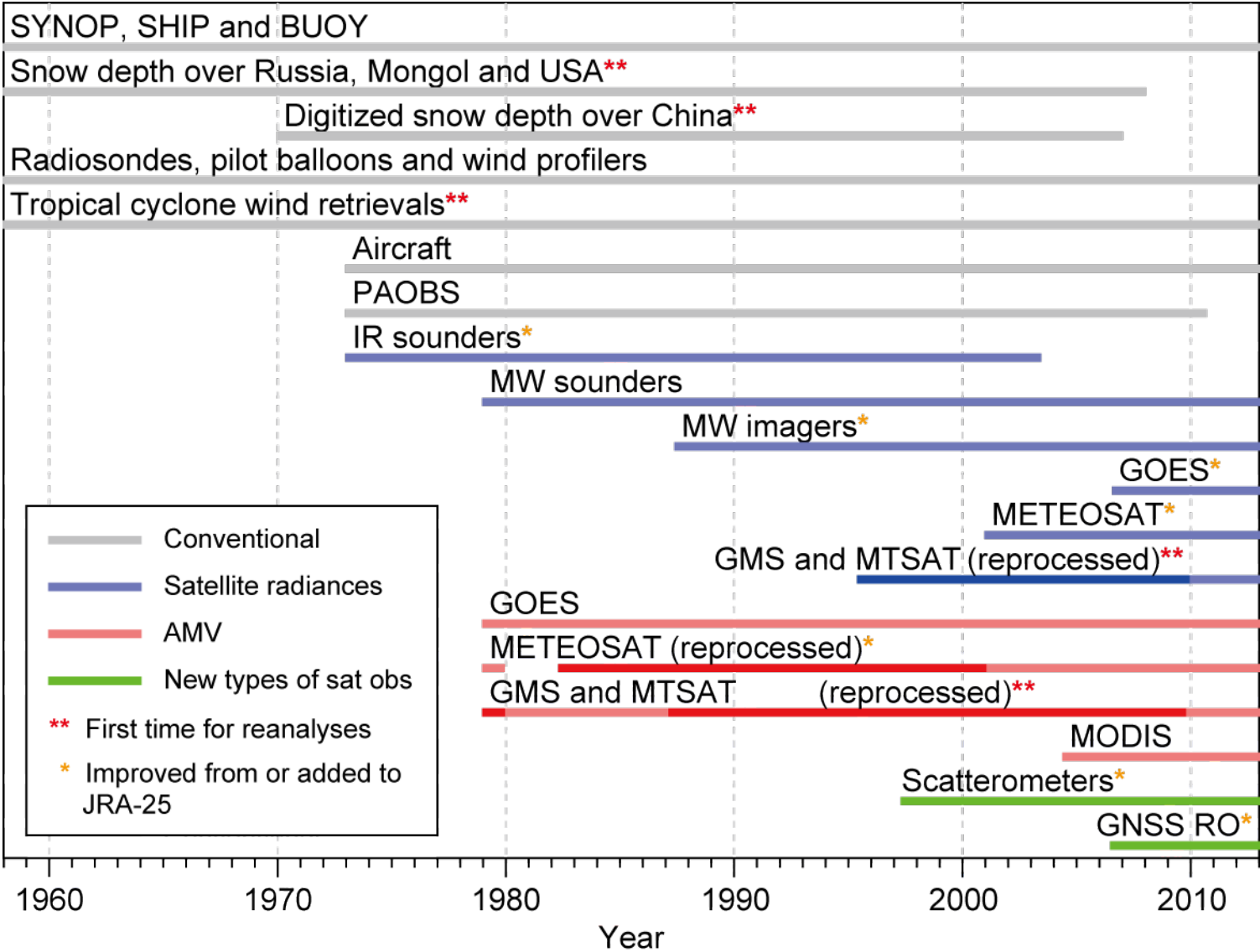
- Reanalysis?
 - Motivation and Goals
 - Progress to Date
 - Scope
 - Outline Plan for S-RIP Report
 - Schedule
 - Management
 - Links to Other Projects
 - Prospects for the Future
 - A brief side-meeting report
- (Items in red are what are written in the Implementation Plan draft.)

Reanalysis?

- Provided (mostly) by national weather services based on the weather forecasting and global analysis systems
- Input observational data (mostly “operational” data):
 - Surface measurements (over land and from ships & buoys), upper air sounding, aircraft, various operational satellite sensors, etc.
- “Data Assimilation”:
 - Combining observations and forecast model outputs to produce an estimate of the state of the atmosphere (the “analysis”) at a particular time
 - (forecast model is adjusted by observations; or, limited inhomogeneous observations are interpolated physically)
- “Re”analysis:
 - a fixed assimilation system (forecast model + assimilation scheme) (but note the “stream” issues)
 - additional observational data that were not available real time

Observation list - time series -

Example from JRA-55



Update from Ebata et al., SOLA, 2011

Available Global Atmospheric Reanalyses

Product	Centre	Period	Resolution and Lid Height of the Forecast Model	Contact for S-RIP
MERRA	NASA	1979 – present	(2/3)x(1/2) deg., L72, 0.01 hPa	S. Pawson
ERA-Interim	ECMWF	1979 – present	T _L 255 & N128 reduced Gaussian (79km), L60, 0.1 hPa	D. Tan
ERA-40	ECMWF	1957.9 - 2002.8	T _L 159 & N80 reduced Gaussian (125km), L60, 0.1 hPa	D. Tan
NCEP-CFSR	NCEP	1979 – 2009 2010 - present	T382 (T574 for post 2010), L64, 0.266 hPa	C. Long
JRA-55	JMA	1958 - 2012	T319, L60, 0.1 hPa	K. Onogi
JRA-25/JCDAS	JMA and CRIEPI	1979 – present	T106, L40, 0.4 hPa	K. Onogi
NCEP-2 (R-2)	NCEP and DOE AMIP-II	1979 – present	T62, L28, 3 hPa	W. Ebisuzaki
NCEP-1 (R-1)	NCEP and NCAR	1948 – present	T62, L28, 3 hPa	W. Ebisuzaki
NOAA-CIRES 20th Century Reanalysis (20CR_v2) ^(*)	NOAA/ESRL PSD	1871 – 2010	T62, L28, 2.511hPa	G. Compo & J. S. Whitaker

(*) 20CR assimilates only surface pressure reports and uses observed monthly sea-surface temperature and sea-ice distributions as boundary conditions.

- New reanalysis data sets, within a few years:
 - ERA-20C (and ERA-SAT), MERRA-2, etc.

NOTE: Volcanic aerosols are considered only in CFSR and 20CR (in the radiative calculation of the forecast model)

Motivation and Goals

- Middle atmosphere/climate community has used reanalysis and analysis data sets
 - to understand atmospheric processes and variability
 - to validate chemistry-climate models (e.g., CCMVal)
 - for trend analyses (potential)
- There are currently **~9** global reanalysis data sets available worldwide
- Different reanalyses give different results for the same diagnostic
- Depending on the diagnostic, the different results may be due to differences either in
 - observational data assimilated
 - assimilation scheme
 - forecast model
 - or any combination of these
- **→ Need to investigate each diagnostic to evaluate RAs**

Motivation and Goals

- The goals of S-RIP are to:
 - Create **a communication platform** between the SPARC community (middle atmosphere, UTLS, etc.) and the reanalysis centres
 - Understand current reanalysis products and to contribute to future reanalysis improvements in the middle atmosphere region (including UTLS, etc.)
 - Write up the results of the reanalysis intercomparison in peer reviewed papers and **a SPARC report (2013-2018)**

Progress to Date

- June 2011: Discussion started at 8th SPARC Data Assimilation (DA) workshop, Brussels
- January 2012: Proposal article in SPARC Newsletter
- February 2012: S-RIP officially endorsed by the SPARC SSG as an emerging activity of SPARC
- Summer 2012: Scientific WG was formed
 - Discussion in WG on the chapter titles, co-leads, contributors, and planning meeting
 - Two co-leads for most of the planned chapters (most of the WG members became chapter co-leads)
- April 2013: S-RIP Planning Meeting at Exeter, UK (3 days, 39 participants + 1 remotely)
- July 2013: Planning meeting report article in SPARC Newsletter
- January 2014: S-RIP side meeting (Tuesday lunchtime, 27 participants + 3 remotely)

Outline Plan for S-RIP Report

S-RIP Report Structure

determined at the S-RIP Planning Meeting (Met Office, 29 April-1 May 2013)

	Chapter Title	Chapter Co-leads
1	Introduction	Masatomo Fujiwara, David Jackson
2	Description of the Reanalysis System	Masatomo Fujiwara, David Tan, Craig Long
3	Climatology and Interannual Variability of Dynamical Variables	Craig Long, Masatomo Fujiwara
4	Climatology and Interannual Variability of Ozone and Water Vapour	Michaela Hegglin, Sean Davis
5	Brewer-Dobson Circulation	Thomas Birner, Beatriz Monge-Sanz
6	Stratosphere-Troposphere Coupling	Edwin Gerber, Yulia Zyulyaeva
7	ExUTLS	Cameron Homeyer, Gloria Manney
8	TTL	Susann Tegtmeier, Kirstin Krüger
9	QBO and Tropical Variability	James Anstey, Lesley Gray
10	Polar Processes	Michelle Santee, Alyn Lambert
11	USLM	Diane Pendlebury, Lynn Harvey
12	Synthesis Summary	Masatomo Fujiwara, David Jackson

Chapters 1-4: Basic chapters

Chapters 5-11: Advanced chapters

Schedule

(as written in S-RIP Implementation Plan draft)

- We shall finalize the “basic” chapters (*i.e.*, Chapters 1-4) within 2 years after the S-RIP Planning Meeting. The “advanced” chapters (5-12) will evolve slightly more slowly, with an interim report on these chapters every year. The plan is as follows. Top Level deliverables are in **bold**.
- May 2014:
 - Basics in place for reanalysis intercomparison – reanalysis and observational data downloaded, diagnostics being developed, initial results produced
 - Write progress report for SPARC SSG
- May 2015:
 - **complete “basic” chapters (Chapters 1-4)**
 - complete interim (first draft) Chapters 5-11
- May 2016
 - Write progress report for SPARC SSG
- May 2018
 - **complete “Advanced” Chapters (Chapters 5-12) and whole report**
 - **review S-RIP and decide on extension of activity**
- A further key part of S-RIP will be to write peer-reviewed papers. This will be done at any appropriate time. Wherever possible, the aim will be to write these papers prior to completion of the report, rather than the other way around. This avoids problems with citations of original research.

Facilities for the S-RIP

- British Atmospheric Data Centre (BADC)
 - James Anstey and Lesley Gray; Charlotte Pascoe at BADC
 - 10 TB disk space for the S-RIP
 - Various tools available for data analysis
 - Archive “value-added” data (e.g., commonly gridded monthly mean dataset that Sean Davis is preparing)
- S-RIP website (<http://s-rip.ees.hokudai.ac.jp>)
 - Jonathon Wright for the page creation; Masatomo Fujiwara for the server preparation at Hokkaido University, Japan; both are maintaining the website
 - Also has a discussion board function (for internal discussion for each chapter team) and a wiki function (for writing manuscripts)
 - → See next page



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Introduction to S-RIP

The SPARC Reanalysis Intercomparison Project (S-RIP) is a coordinated activity to

- **compare** all (or some of the newer) reanalysis data sets for various key diagnostics;
- **understand the causes of differences** among reanalyses;
- **provide guidance on the appropriate usage** of various reanalysis products in scientific studies; and
- connect such activities with future improvements in the reanalysis products by **establishing collaborative links** between the reanalysis centres and the SPARC community.

S-RIP focuses on reanalysis output in the stratosphere, upper troposphere and lower mesosphere. This activity is closely connected with the [SPARC Data Assimilation](#) activity (see also SPARC's [emerging activities](#).)

We welcome your contributions to this project. Please contact the [S-RIP preparation team](#) and/or the [co-leads of the relevant chapters](#) directly.

S-RIP News

JRA-55 Data Now Available

30 September 2013 | Monthly mean data from the Japanese 55-year Reanalysis (JRA-55) is now available for download (registration is required). [\[link\]](#)

Website for Chapter 6 Launched

4 September 2013 | A website for Chapter 6 of the S-RIP report, "Stratosphere-Troposphere Coupling", was launched early last month. [\[link\]](#)

S-RIP Update Published in SPARC Newsletter

30 July 2013 | An article summarizing the discussions held during the S-RIP Planning Meeting hosted at the UK Met Office between 29 April and 1 May 2013 was published in Issue 41 of the SPARC Newsletter. [\[pdf\]](#)

S-RIP Planning Meeting Held

1 May 2013 | An S-RIP planning meeting was held at the UK Met Office in Exeter from 29 April to 1 May 2013. The purposes of the meeting were to finalize the outline of the S-RIP report, to determine the diagnostics and data required for each chapter, to agree on general guidelines and protocols, and to define the timetable for the project. 39 scientists participated, with 20 oral presentations and 21 poster presentations.

Questions or Comments:

S-RIP: [Masatomo Fujiwara](#)

Website: [Jonathon Wright](#)

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Prospects for the future

- S-RIP is planned to last for 5 years.
- However, given that a goal of S-RIP is to feed back scientific results to the reanalysis centres (thus forming a “virtuous circle” of assessment => improved reanalyses => more assessment => further improvement in reanalyses), and that most reanalysis centres have in any event ongoing programmes to deliver new, improved reanalyses, it would be valuable to continue S-RIP beyond its initial 5 yrs.
- It is thus critical to review the value of S-RIP with the research community, reanalysis centres and the SPARC SSG after its first 5 years to determine whether, and if so in what form, S-RIP should continue. It is hoped that some support from SPARC will be maintained if it is decided that S-RIP should continue longer.
- It is important that the project has a lasting legacy to sustain the international interest in the assessment of reanalyses.
- A prime legacy of the project is likely to be development of links between researchers and reanalysis centres that mean future reanalysis developments will use the outcomes from S-RIP assessments of reanalyses in a systematic, standardised way, rather than the more ad hoc approaches that may pertain at present.
- A further legacy will be a data archive (at BADC) of reanalyses datasets, at standard resolution to enable ease of intercomparison without further processing, which will be freely available to researchers world-wide and will continue to be a useful means of assessing reanalyses beyond the lifetime of the project.