SPARC Data Assimilation Workshop
Introduction

Quentin Errera

quentin@oma.be

Belgian Institute for Space Aeronomy (BIRA-IASB)

Université Pierre et Marie Curie

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Outline

- What is SPARC
- Data Assimilation Working Group (DAWG)
- This workshop and themes

SPARC: Stratosphere troposphere Processes and their role in climate

- Core project of WCRP "coordinates international efforts to bring knowledge of the stratosphere to bear on relevant issues in climate variability and prediction"
- Other WCRP core projects – Cryosphere, Water cycle, Climate Variability
- Publicity / activities
  - SPARC newsletters, reports
  - General Assembly every ~4yrs (last one: Jan 2014, NZ; next one: 2018, Japan)
  - Workshops like this
  - http://www.sparc-climate.org

SPARC Themes

- 3 interlinked overarching themes - serve to consolidate its contributions to the WCRP Strategic Framework.

a) Detection, attribution and prediction of stratospheric changes

b) Stratospheric chemistry and climate

c) Stratosphere-troposphere coupling

- To address the questions of the 3 themes, underpinning activities have been, and continue to be, developed. In many cases, facilitating these activities has led to the setting-up of targeted working groups, with specific bitesized objectives.

SPARC Activities

- Chemistry Climate Model initiative (CCMI)
- Gravity waves
- Solar influence (SOLARIS-HEPPA)
- Synamical variability (DynVar)
- Trace gas climatologies (Data Initiative)
- **Data assimilation**
- Water vapour (II) (WAVAS II)
- Ozone profile (II) (SI2N)
- Assessing predictability (SNAP)
- Temperature trends
- Reanalysis intercomparison (S-RIP)
- Stratospheric sulfur (SSiRC)
- Atmospheric Composition and the Asian Summer Monsoon (ACAM)

Emerging activities

- Towards Improving the Quasi-Biennial Oscillation in Global Climate Models (QBOi)

SPARC DA Working Group

- Advancement of assimilation techniques requires interaction of assimilators with dynamicists, chemists and users.
- Workshops bring together assimilators, users, and experts in modelling, measurements and process studies.
- Workshops are reported in SPARC newsletter
- DAWG tends not to have beginning/middle/end but serves as a means for stratosphere researchers to interact and to kick off new projects where necessary (eg S-RIP, SNAP)

Themes for this Workshop

- Joint session with S-RIP workshop
- Harmonization of long term data record and bias correction in data assimilation
- On the added value of chemical data assimilation of upper tropospheric and stratospheric measurements
- Representation of the stratosphere-mesosphere in model and analysis

- Future directions (Friday at 12 am) – next workshop, themes selection, …

S-RIP SPARC Reanalysis Intercomparison Project

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

SPARC Stratosphere-troposphere Processes And their Role in Climate

SPARC Reanalysis Intercomparison Project (S-RIP) - Introduction -

Masatomo Fujiwara (Hokkaido Univ., Japan)
(and David Tan (now at London, UK))

Joint S-RIP – SPARC DA Workshop, Paris, France, 14 October 2015

Overview of the S-RIP

- 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, strato-tropo coupling, etc.)
  - Write up the results of the reanalysis intercomparison in peer reviewed papers and two SPARC reports

- S-RIP "interim" Report (May 2015→early 2016), for the basic chapters
- S-RIP "full" Report (May 2018), for all chapters

Outline Plan for S-RIP Report

	Chapter Title	Chapter Co-leads
1	Introduction	Fujiwara & WG members
2	Description of the Reanalysis Systems	Jonathon Wright, Masatomo Fujiwara, 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, Patrick Martineau
7	Extratropical UTLS	Cameron Homeyer, Gloria Manney
8	Tropical Tropopause Layler	Susann Tegtmeier, Kirstin Krüger
9	QBO and Tropical Variability	James Anstey, Lesley Gray
10	Polar Processes	Michelle Santee, Alyn Lambert, Gloria Manney
11	Upper Strato. Lower Mesosphere	Lynn Harvey
12	Synthesis Summary	Fujiwara & WG members

Chapters 1-4: Basic chapters

Chapters 5-11: Advanced chapters

Available Global Atmospheric Reanalyses

Reanalysis Centre	Products	Contacts for S-RIP
ECMWF	ERA-40, ERA-Interim, ERA-20C, [ERA5]	Rossana Dragani
JMA (& CRIEPI)	JRA-25/JCDAS, JRA-55	Kazutoshi Onogi & Yayoi Harada
NASA	MERRA, [MERRA-2]	Steven Pawson
NOAA NCEP	NCEP/NCAR (R-1), NCEP/DOE (R-2), NCEP-CFSR	Wesley Ebisuzaki & Craig Long
NOAA & Univ. Colorado	20CR	Gilbert Compo & Jeffrey S. Whitaker

S-RIP: Progress to Date / Schedule

- June 2011: Discussion started at 8th SPARC Data Assimilation (DA) workshop, Brussels
- February 2012: S-RIP became an *emerging* activity of SPARC
- Summer 2012: Scientific Working Group was formed
- April-May 2013: S-RIP Planning Meeting at Exeter, UK
- January 2014: S-RIP side meeting; S-RIP Implementation Plan; S-RIP officially endorsed by the SSG as a *full* activity of SPARC
- September 2014: S-RIP Workshop
- October 2015: S-RIP Workshop

- May 2015→early 2016:
  - complete "basic" chapters (Chapters 1-4) → "S-RIP 2015 Report"
  - complete zero-th order draft for Chapters 5-11 → already done
- May 2016, May 2017: Write progress report to SPARC SSG
- May 2018:
  - complete the whole report (Chapters 1-12)
  - review S-RIP and decide on extension of activity

- S-RIP workshop every year
- Write peer-reviewed papers at any appropriate time

Poster presentations (1/2)

- Marta Abalos
  - Interannual variability of effective diffusivity in ERA-Interim (1980-2012)
  - Evaluating the advective Brewer-Dobson circulation in three reanalyses for the period 1979-2012
- Yoshio Kawatani
  - Comparison of zonal wind in the equatorial stratosphere among several reanalysis data
- Chiaki Kobayashi
  - Comparison of the stratospheric and tropospheric circulations among the JRA-55 family members
- Paul Konopka (presented by Felix Ploeger)
  - How robust are stratospheric H2O trends derived from different re-analysis products?
- Patrick Martineau
  - Dynamical consistency of reanalysis data sets in the extratropical stratosphere

Poster presentations (2/2)

- Aurélien Podglajen
  - Comparison of vertical velocities in the lower stratosphere between different reanalyses and long-duration stratospheric balloon observations
- Takatoshi Sakazaki
  - Diurnal tides in reanalysis data sets
- Xiaoyi Sun
  - A Preliminary Intercomparison of Reanalysis Cloud Variables in the Tropical Upper Troposphere and Tropopause Layer
- Krzysztof Wargan
  - Validation of the MERRA-2 ozone product
- Jonathon Wright
  - Effects of Madden–Julian Oscillation Propagation Characteristics on Stratospheric Water Vapor Entry Mixing Ratio
- Peter Hitchcock
  - Evaluating pre-1979 polar-cap variability
- Ann'Sophie Tissier
  - Transport across the tropical tropopause layer and convection