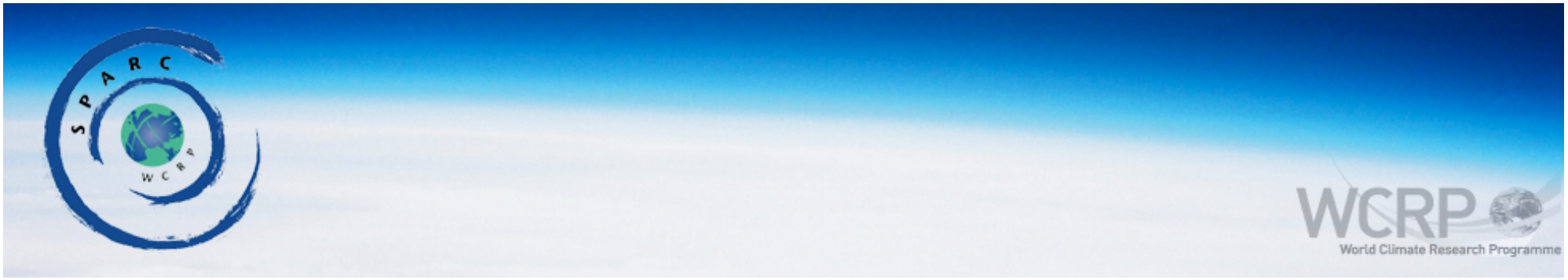


Stratospheric Processes And their Role in Climate (SPARC)

Co-chairs: Joan Alexander (NWRA)
Greg Bodeker (Bodeker Scientific)

SPARC Office Director: Johannes Staehelin (ETH Zürich)

Other SPARC Office staff: Fiona Tummon, Anke Witten and Carolin Arndt Foppa (ETH Zürich), Diane Pendlebury (Univ. of Toronto)

WCRP Liaison: Vladimir Ryabinin

Objectives and Scope

SPARC has facilitated international efforts to bring knowledge of the stratosphere to bear on relevant issues in climate variability and prediction.

- An important focus on "**P**rocesses"
- Scope includes chemical and large-scale dynamical processes in the stratosphere and troposphere

Scientific goals are currently encapsulated in three main themes:

- Detection, attribution, and prediction of stratospheric change
- Chemistry–climate interactions
- Stratosphere–troposphere dynamical coupling

SPARC Approach

- Contribute to WCRP priorities.
- Respond to the needs of assessments (WMO/UNEP and IPCC).
- Grow new activities to meet the needs of research and users of SPARC science – seek emerging talent.
- Ensure activities remain highly focussed – clear deliverables and timelines facilitated through dedicated workshops. Broad community support and involvement.
- Promote the value of SPARC science to national agencies for defining research priorities.
- Communicate broadly: SPARC newsletters and SPARC Annual Report.

Next Priorities

- Provide scientific support for the **WCRP Grand Challenges**. :)
- Organise the **next SPARC General Assembly**!
  - January 12-17, 2014
  - New name and new logo will be formally announced.
  - Meeting scope reflects the expansion of SPARC goals in troposphere.
- **Develop capacity** in developing countries to both promote their contribution to and use of SPARC.
- Develop a revised SPARC implementation plan.

Main Activities and Accomplishments over the Past Year

Now documented in the 2012 SPARC Annual Report

http://www.sparc-climate.org/fileadmin/customer/6_Publications/ProgPlan_PDF/SPARC_Annual_Report_2012_small.pdf

Chemistry-Climate Model Initiative (CCMI)

Co-leads: Veronika Eyring (SPARC), Jean-Francois Lamarque (IGAC)

- Collaborative project between SPARC and IGAC.
- A response to the SPARC mandate to extend its interests/reach into the troposphere.
- Incorporates core aspects of the former IGAC/SPARC Atmospheric Chemistry and Climate (AC&C) collaboration.
- CCMI has helped define and analyse the climate simulations made in support of the 5th IPCC assessment.
- CCMI will be providing the simulations required by the 2014 WMO/UNEP ozone assessment.
- Highly successful workshop held in Boulder 14-16 May 2013.

IGAC/SPARC CCMI 2013 Science Workshop

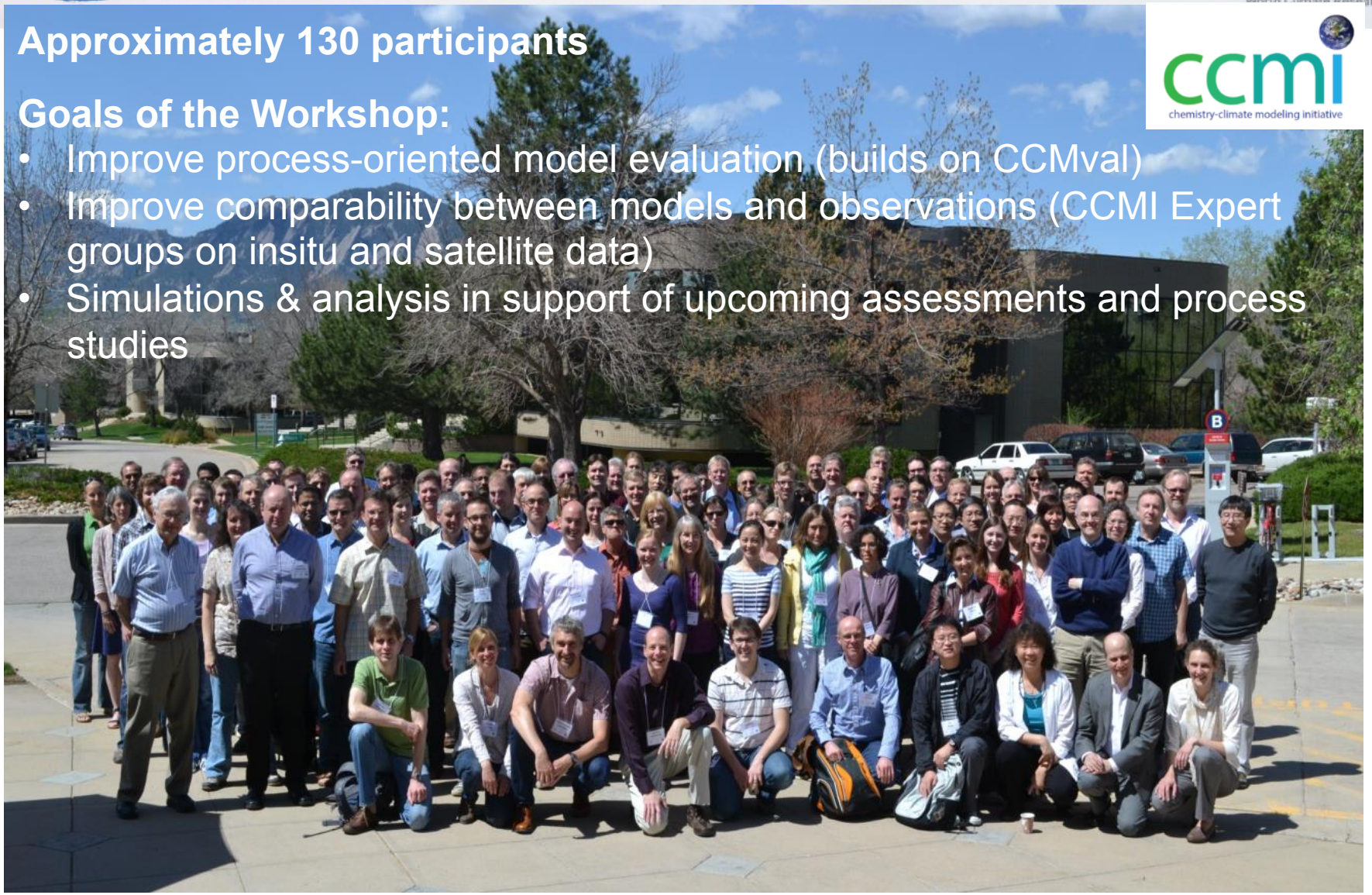
NCAR, Boulder, CO, 14-16 May 2013

Co-Chairs: Veronika Eyring & Jean-Francois Lamarque

Approximately 130 participants

Goals of the Workshop:

- Improve process-oriented model evaluation (builds on CCMval)
- Improve comparability between models and observations (CCMI Expert groups on insitu and satellite data)
- Simulations & analysis in support of upcoming assessments and process studies



Chemistry-Climate Model Initiative (CCMI)

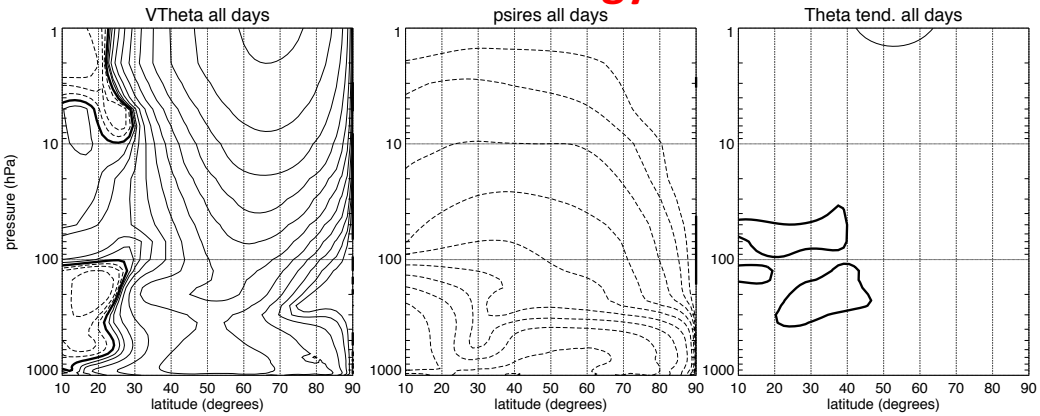
- Example chemistry “grand challenge” focus: Tropospheric OH
  - Relevance to methane, VSLS lifetimes, and aerosols
  - Builds on expertise/interest/observations from a variety of communities
- Initiative uses such community interest as an opportunity to combine tropospheric and stratospheric observational and modeling expertises towards the effort.
- Observational and process experts are integral part of CCMI
- Emphasis on process-oriented evaluation

Extreme Negative Heat Flux Events

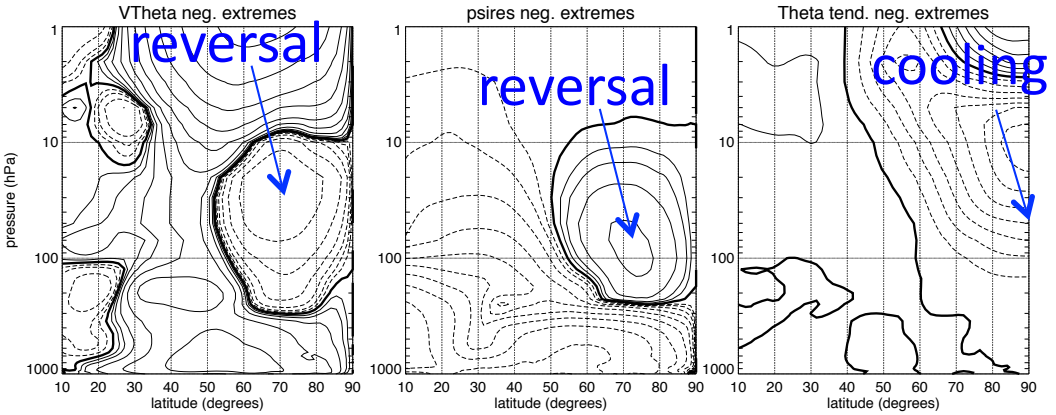
- High-latitude residual circulation is reversed.
- Air advected upward over the pole producing adiabatic cooling and advected downward in midlatitudes producing warming.
- During Winter of 2011, negative heat flux events dominated, causing extreme low stratospheric Arctic temperatures and record NH ozone hole.

Meridional Heat Flux | **Residual Circulation** | **Temperature Tendency**

Climatology



Negative Heat Flux Events

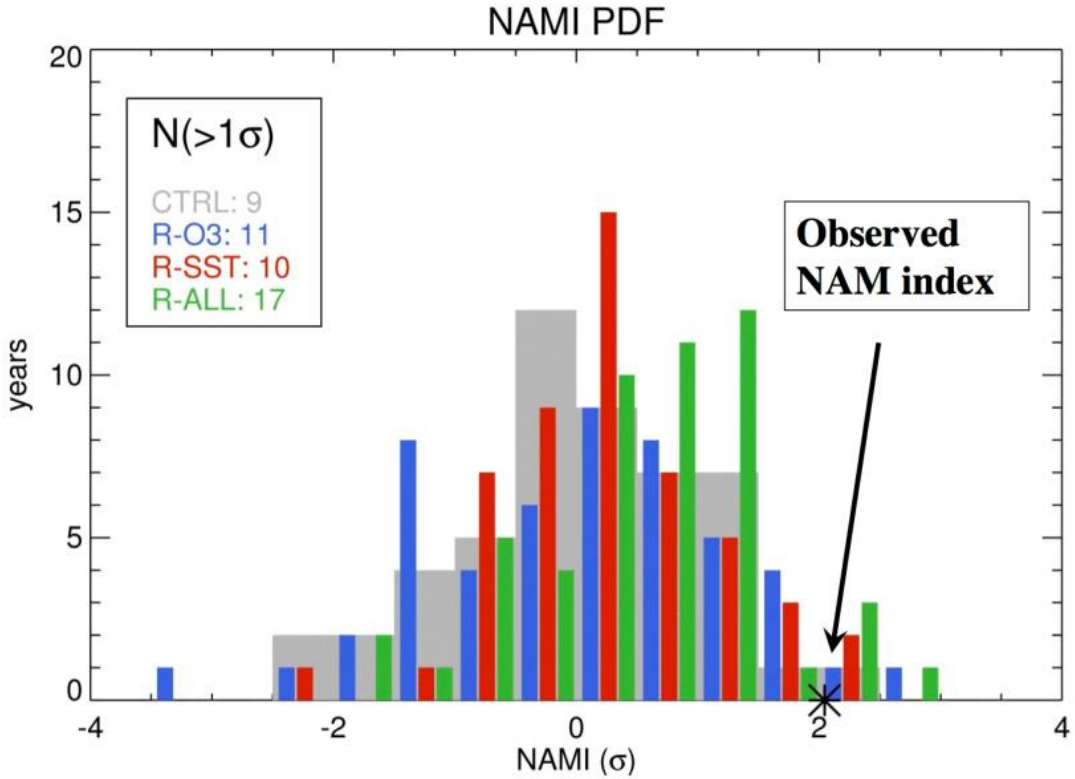


(Shaw and Perlwitz, 2013)

Modeling tropospheric impacts of the 2011 Arctic ozone depletion

Event attribution study to determine potential causes of record positive surface NAM index in spring

- The effects of ozone depletion and SST anomalies reinforce each other, doubling the probability of large (> 1σ) positive NAM events in March/April.



Karpechko et al. 2013

DynVar
Dynamical Variability

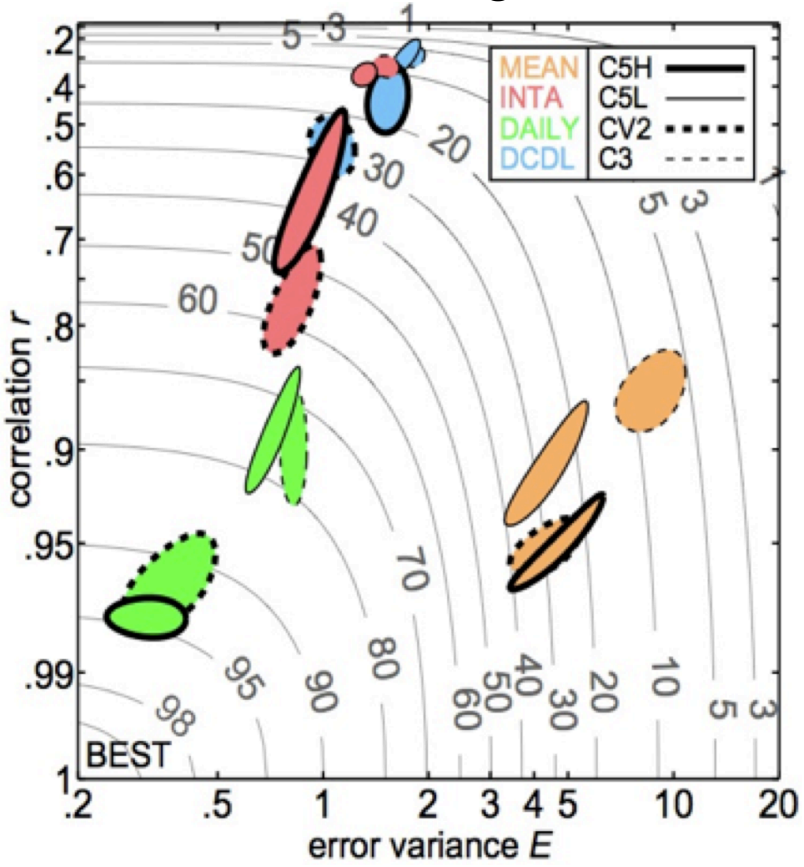
Lead: Elisa Manzini

Achievements last year:

- **Review in BAMS**: *Gerber et al. 2012: Assessing and Understanding the Impact of Stratospheric Dynamics and Variability on the Earth System.*
- **Analyses of CMIP5** on stratosphere dynamical influences on climate, leading to publications for the AR-5.
- > 54% of CMIP5 models had model tops at pressures < 1hPa.

  (CMIP3 only 17%.)

100-10 hPa global



Charleton-Perez et al. (2012)

DynVar
Dynamical Variability

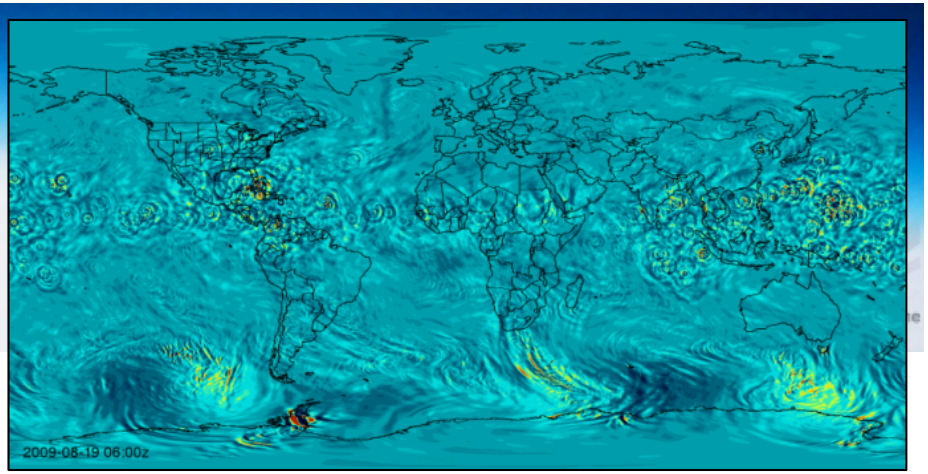
Lead: Elisa Manzini

Next focus on understanding what is needed (resolution, physics) to properly represent key processes:

- Quasibiennial Oscillation modeling
- Reducing circulation biases and improving variability
- Mechanisms of Stratosphere-Troposphere coupling

- Lend expertise on large-scale dynamical processes to support GCs on Regional Climate and Clouds-Circulation-Climate Sensitivity.

Gravity Waves



Lead: Joan Alexander

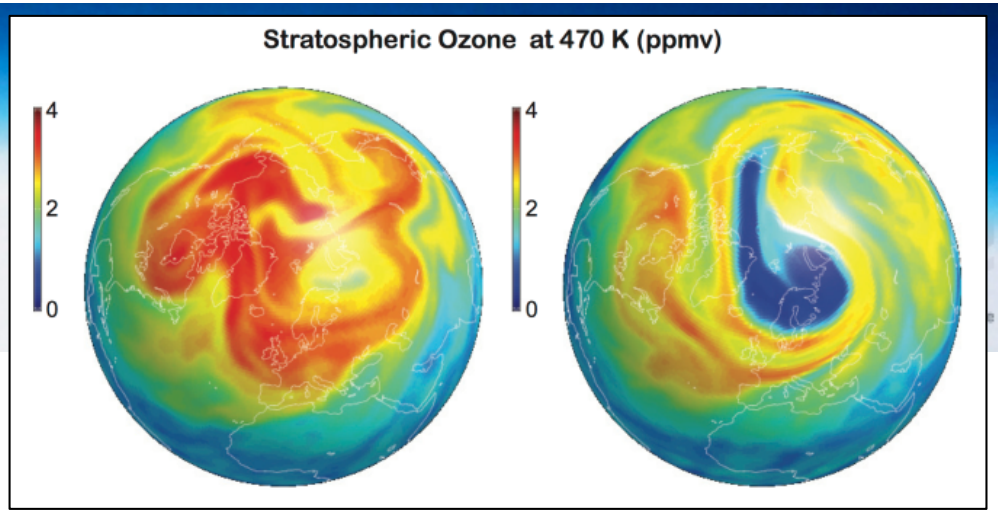
- Completed comparison of various global data sets and model estimates of gravity wave momentum fluxes, their global distributions, seasonal variations, and interannual variations. (International team effort partly supported by ISSI.)
- **Key publication**: *Geller et al., A comparison between gravity wave momentum fluxes in observations and climate models. Journal of Climate, (early online release), 2013.*
- Meeting 8-12 April 2013 hosted by ISSI.
- **New momentum budget study** led by D. Long (U. Exeter) comparing climate models and reanalyses; including wave driving, diffusion, and surface drag. (Will coordinate with WGNE.)

SOLARIS-HEPPA
Solar Influences

Co-leads: Katja Matthes and Bernd Funke

- First joint SOLARIS-HEPPA meeting (9-12 October 2012 in Boulder). 60 participants from 12 countries hosted by NCAR. Focus on observational and modelling studies of the influences of solar radiation and energetic particle precipitation (EPP) on the atmosphere and climate.
- **Key publication**: *Ermolli et al., Recent variability of the solar spectral irradiance and its impact on climate modelling, Atmos. Chem. Phys., 13, 3945–3977, 17 April 2013.*
- Outlook → Publish results on solar signals in CMIP5 simulations, →Collaborating with CCMI on SSI sensitivity and analysis of solar signal in the models.

Data Assimilation



Lead: David Jackson

Data Assimilation (DA) development trends include:

- Extension of DA systems to higher mesospheric altitudes, leading to increasing examples of mesosphere/stratosphere/troposphere linkages (e.g. NRL's 4DVAR NAVGEM).
- Use of chemical DA to diagnose model performance and errors (e.g. Nakamura et al. 2013)
- Increasing number of chemical reanalyses produced (e.g. MACC, Inness et al., 2013) suggesting the possibility of a future chemical DA intercomparison project.
- The DA Activity is closely linked with other activities: S-RIP, SNAP and Gravity Waves. Also WGNE.

Water Vapour Phase II

Co-leads: Karen Rosenlof, Thomas Peter, Gabriele Stiller

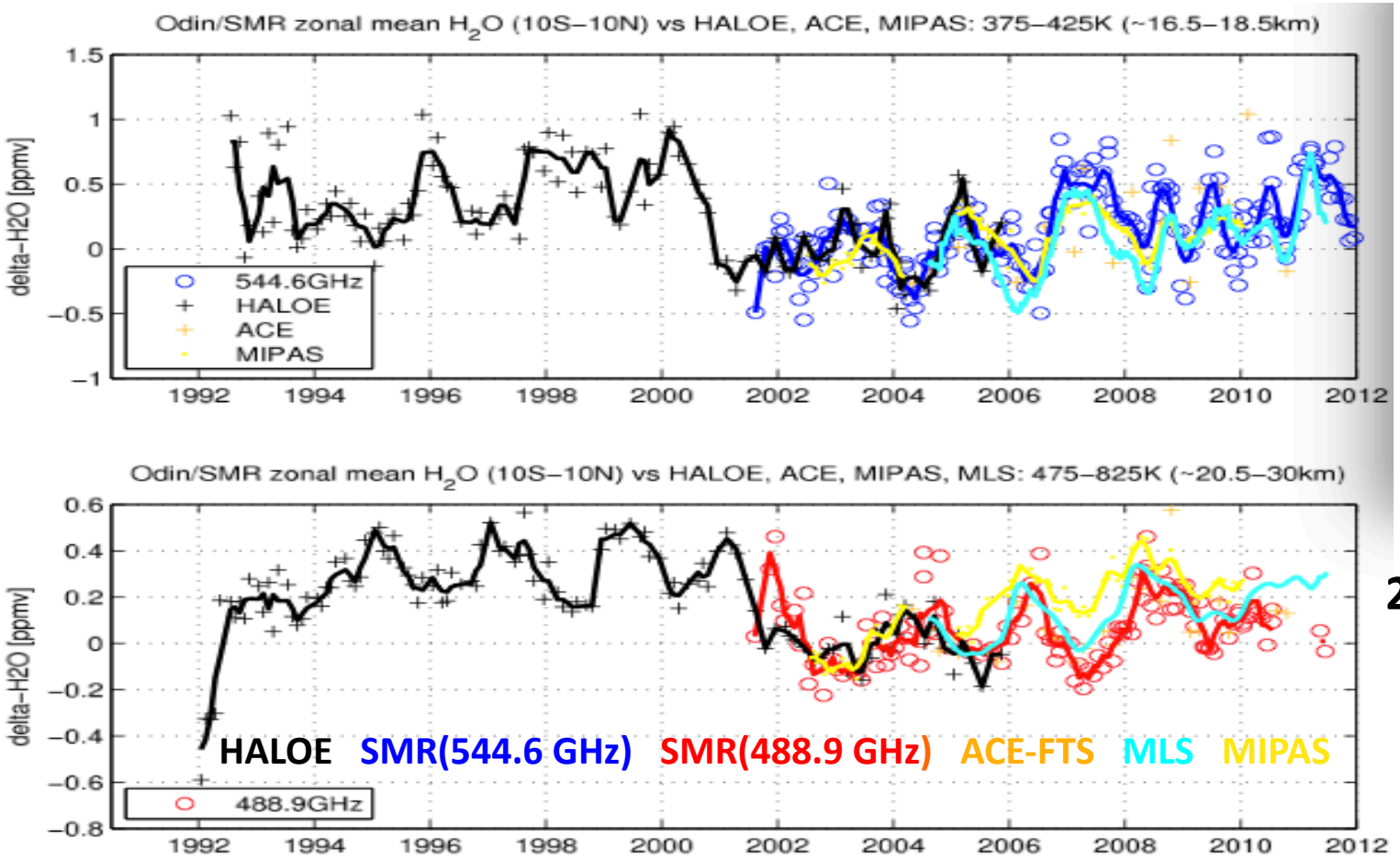
1. Review in preparation: *"Upper Tropospheric Humidity, Supersaturation, and Cirrus Formation"*
2. Quality assessment of water vapor records from satellite data including data from 20 limb sounders and 4 nadir sounders.

Approach:

- Frost-point Hygrometer comparisons
- Regional comparisons & variability
- Isotopologues e.g. HDO
- Review of existing merged and long-term datasets

Water Vapour Phase II

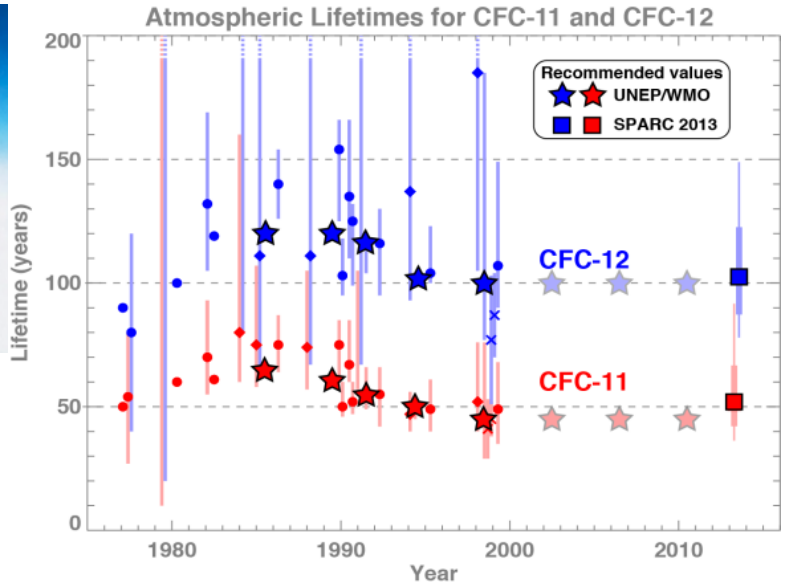
Example temporal variability, deseasonalized and bias-corrected time series in tropical TTL and middle stratosphere:



16.5 – 18.5 km

20 – 30 km

Lifetime of halogen source gases

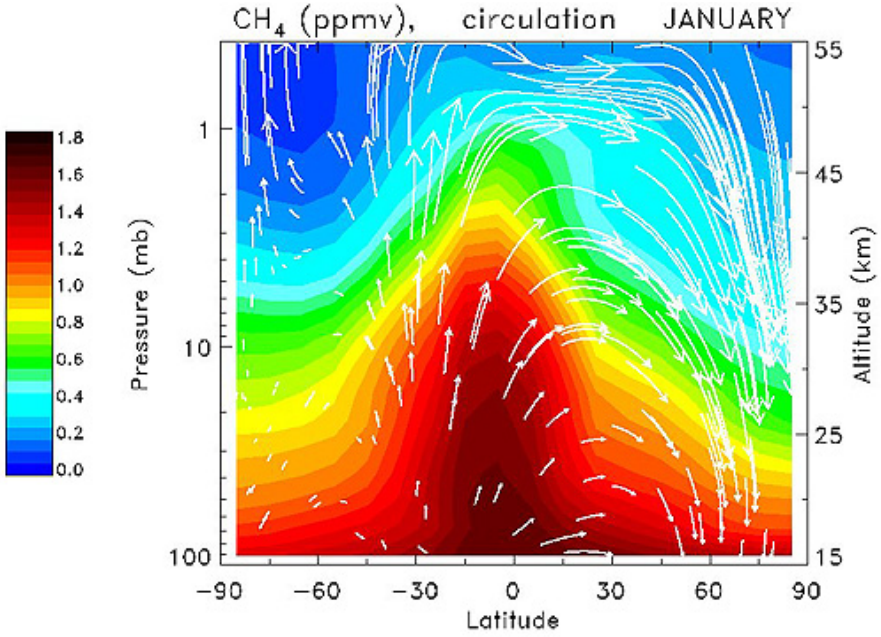


Co-leads: Malcolm Ko, Paul Newman, Stefan Reimann, Susan Strahan
(input here from Martyn Chipperfield)

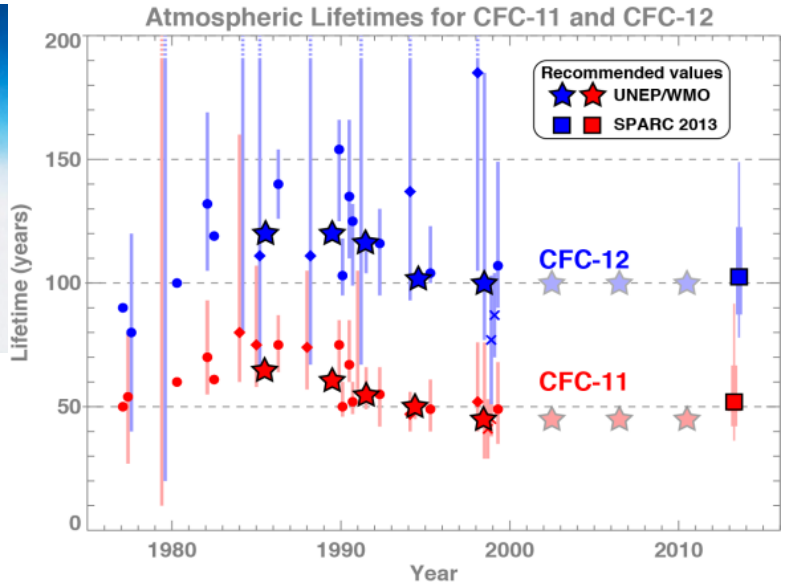
- Accurate knowledge of the lifetime of gases is essential for predicting the ozone-depletion and climate effects of emissions.

Key processes determining atmospheric lifetimes are:

- Chemical loss rates: Photolysis (stratosphere), O(1D) reaction (stratosphere), OH reaction (troposphere)
- Speed of the stratospheric Brewer-Dobson circulation.



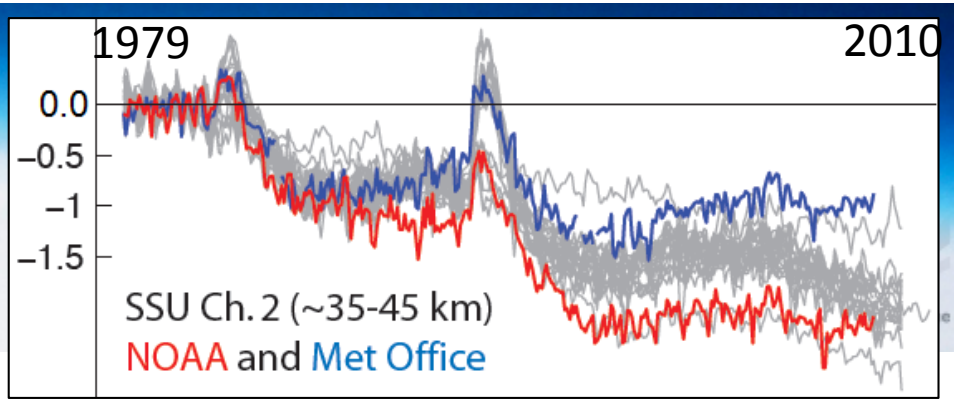
Lifetime of halogen source gases



Co-leads: Malcolm Ko, Paul Newman, Stefan Reimann, Susan Strahan
(input here from Martyn Chipperfield)

- Utilizes revised (Lab) Kinetics for ODS/GHG
- Builds on CCM-Val2 with use of chemistry-climate models to improve lifetime estimates.
- Most significant changes to CFC-11, CCl_4, CFC-115, NF_3, CH_3Br.
- New ODS surface volume mixing ratio scenarios will be created for CCMi and CMIP6 runs.
- Report to be published June 2013.

Temperature trends



Co-leads: Bill Randel, Dian Seidel, Dave Thompson

- Goal is to address key uncertainties in our understanding of stratospheric temperature change.
- Key publication → Nature Nov 2012
- Workshop on Remotely-Sensed Stratospheric Temperature Observations (Silver Spring, Maryland, Nov. 2012)
- Workshop on SSU Observations and Temperature Trends in Reanalyses (Reading, UK, Sept. 2013)

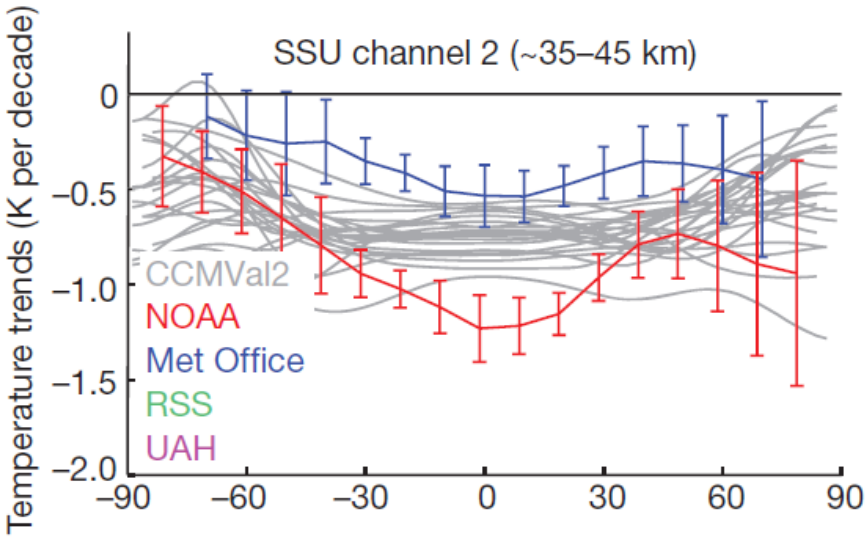
PERSPECTIVE

doi:10.1038/nature11579

The mystery of recent stratospheric temperature trends

David W. J. Thompson[1], Dian J. Seidel[2], William J. Randel[3], Cheng-Zhi Zou[4], Amy H. Butler[5], Carl Mears[6], Albert Osso[7], Craig Long[3] & Roger Lin[5]

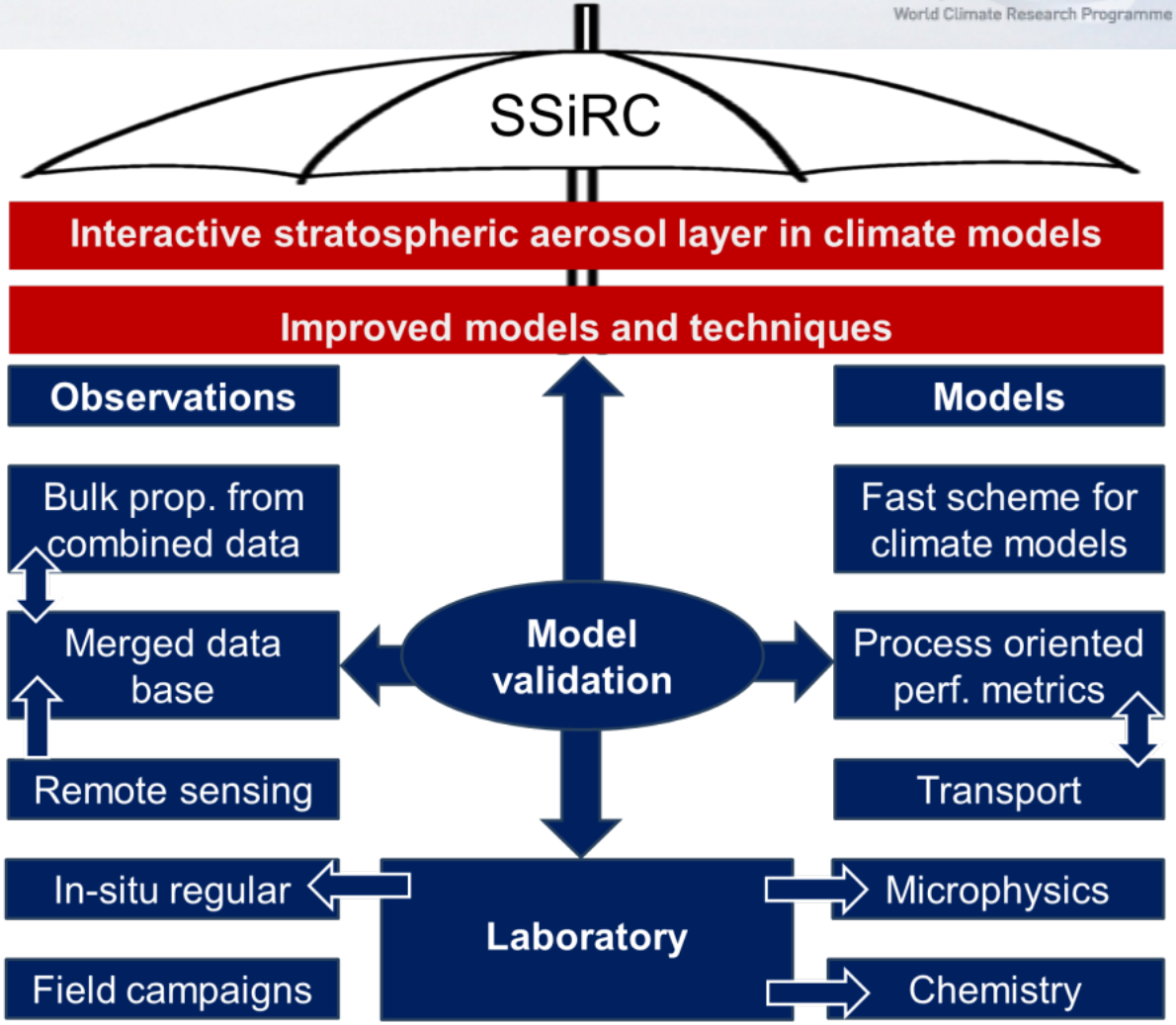
A new data set of middle- and upper-stratospheric temperatures based on reprocessing of satellite radiances provides a view of stratospheric climate change during the period 1979–2005 that is strikingly different from that provided by earlier data sets. The new data call into question our understanding of observed stratospheric temperature trends and our ability to test simulations of the stratospheric response to emissions of greenhouse gases and ozone-depleting substances. Here we highlight the important issues raised by the new data and suggest how the climate science community can resolve them.



SSiRC - Stratospheric Sulfur and its Role in Climate

Co-leads: Markus Rex, Claudia Timmreck

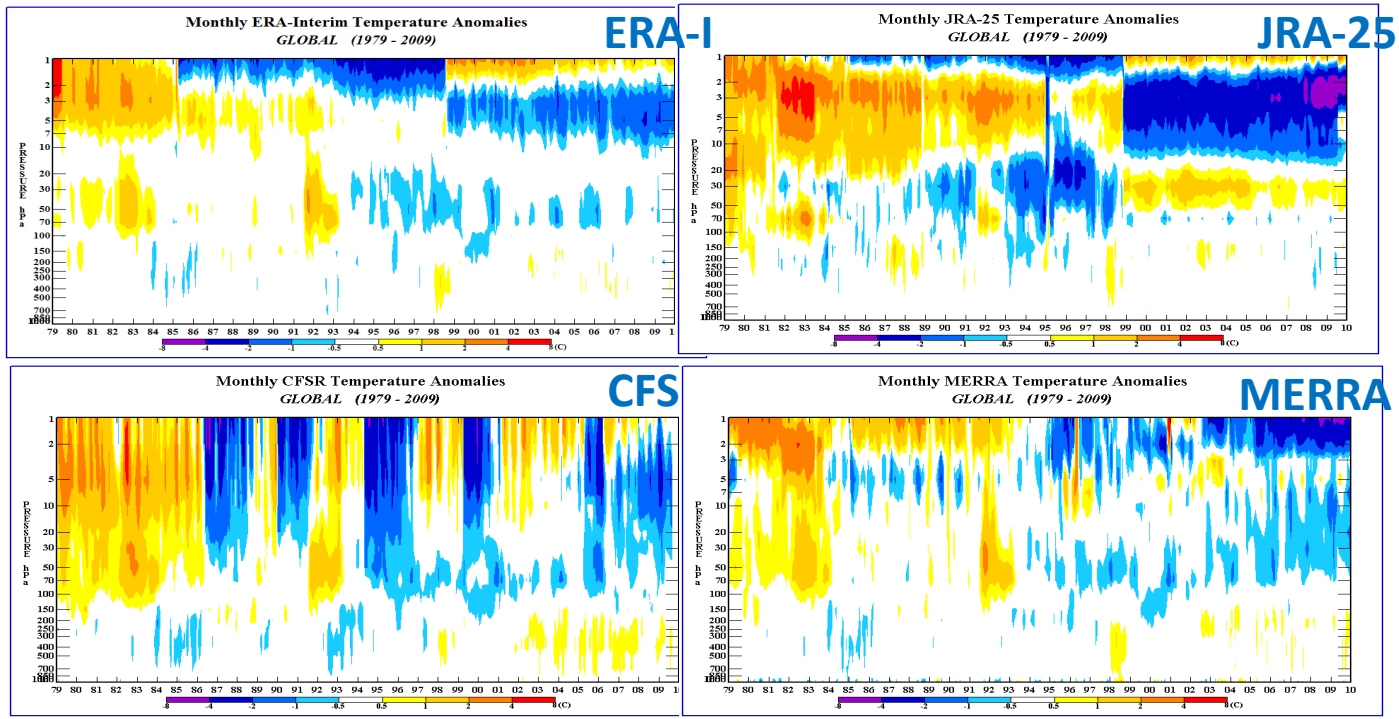
- New activity in 2012: Planning meeting in Bern w/help from ISSI
- First SSiRC workshop 28-30 October 2013, Atlanta, GA in US
- Planning of model and data intercomparisons



Other Coordinators: L. Thomason, J-P Vernier, S. Kremser

Steering Committee: J.C. Antuna (Cuba), J. Barnes (USA), J. Bian (China), J. Curtius (Germany), T. Deshler I(USA), M. Herman (Germany), A. Stohl (Norway), M. von Hohe (Germany)

S-RIP - Reanalysis/analysis Intercomparison Project



1979 – 2010

Temperature scale: -8 to +8 K

Co-leads:

Masatomo Fujiwara

Saroja Polavarapu

David Jackson

- First planning meeting 29 April to 1 May.

- Global T anomalies in reanalyses are vastly different.
- Currently 8 reanalyses products.
- Different reanalyses give different results for same diagnostic…

S-RIP - Reanalysis/analysis Intercomparison Project

Outlook

- Planning a report on climatologies and trends, but also several chapters organized on key processes: e.g.

  Climatology and interannual variability of ozone and water vapor

  Brewer-Dobson circulation

  Stratosphere-Troposphere Coupling

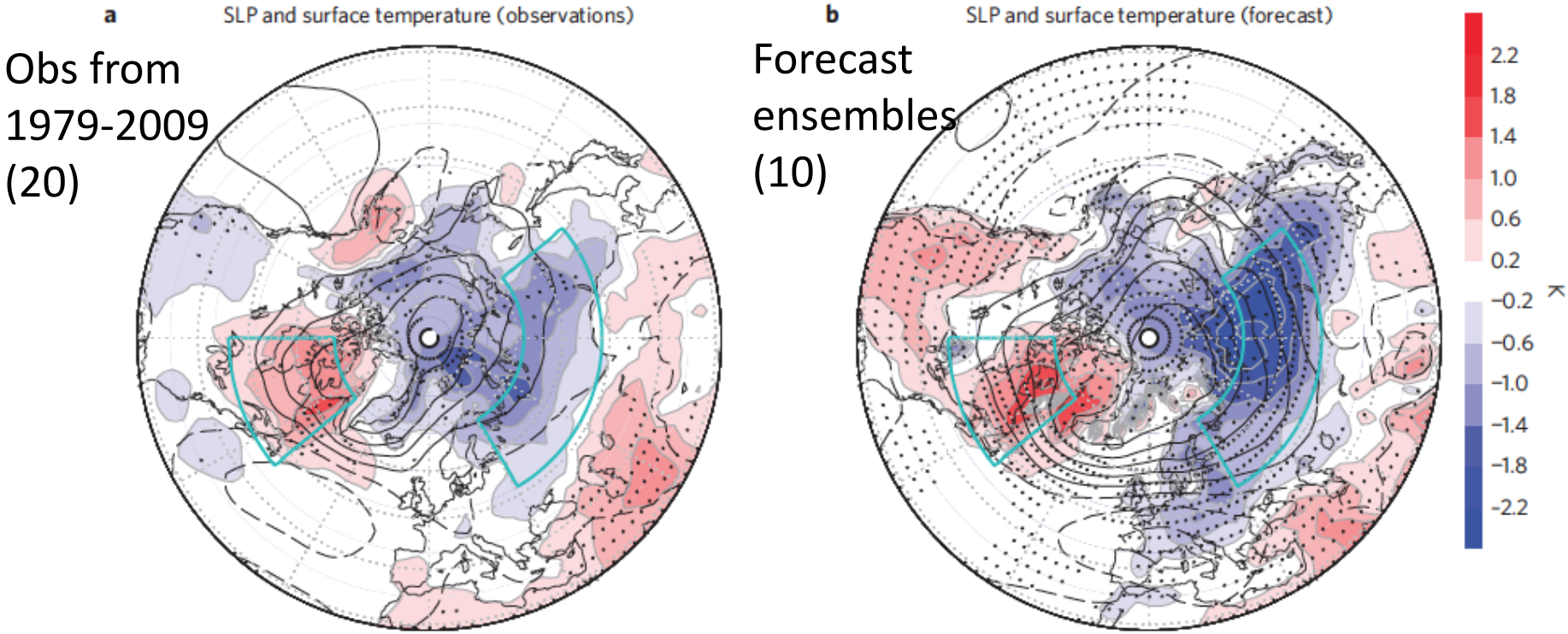
  Quasibiennial oscillation

  Polar processes

SNAP - The Stratospheric Network for the Assessment of Predictability

Lead: Andrew Charlton-Perez

- The stratosphere link can add forecast skill at ~5-60 day timescales on large regional scales and in both NH and SH.
- SLP response averaged 16-60 d after SSW. (Sigmond et al. 2013)



Obs from 1979-2009 (20)

Forecast ensembles (10)

SNAP - The Stratospheric Network for the Assessment of Predictability

Lead: Andrew Charlton-Perez

- Key Questions about stratospheric predictability:

- Are strat-trop coupling effects important throughout the winter or only during major stratospheric warmings?

- How far in advance can major stratospheric dynamical events be predicted and usefully add skill to tropospheric forecasts?

- Which stratospheric processes need to be captured by models to gain optimal predictability?

- First meeting April 27-29, 2013 (Joint with DynVar)
- Planning a review paper.
- Planning a multi-model experiment to quantify stratospheric predictability 2013-2014.

Ozone Profile Phase II

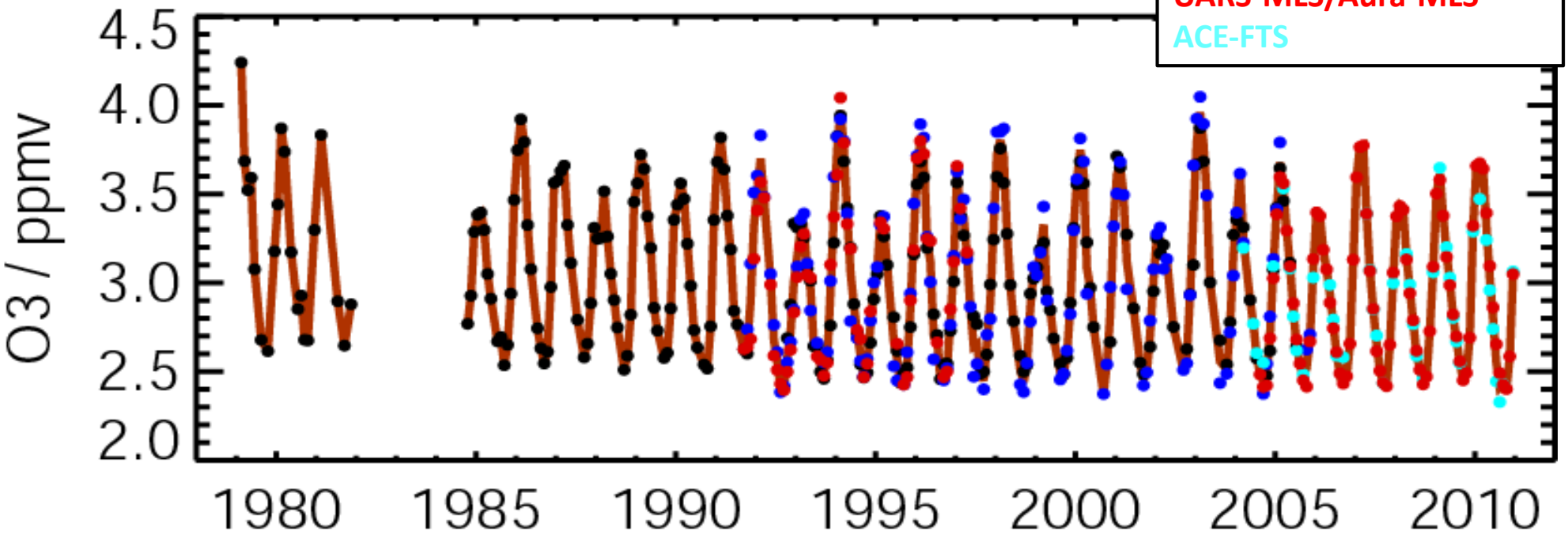
Co-leads: Neil Harris, Johannes Stähelin, Richard Stolarski

- A SPARC activity specifically established to meet the needs of the 2014 WMO/UNEP ozone assessment.
- A collaborative initiative with IGACO, IO3C and NDACC.
- A focus on ozone needs for climate studies by developing ozone climate data records.
- Two workshops have been held → 25-27 January 2011 in Geneva and 18-19 April 2012 in Columbia, Maryland.
- Third and final workshop will be held in Helsinki 18-20 September 2013.
- Final results will be presented at the SPARC General Assembly in January 2014 (more on that later).

Ozone Profile Phase II

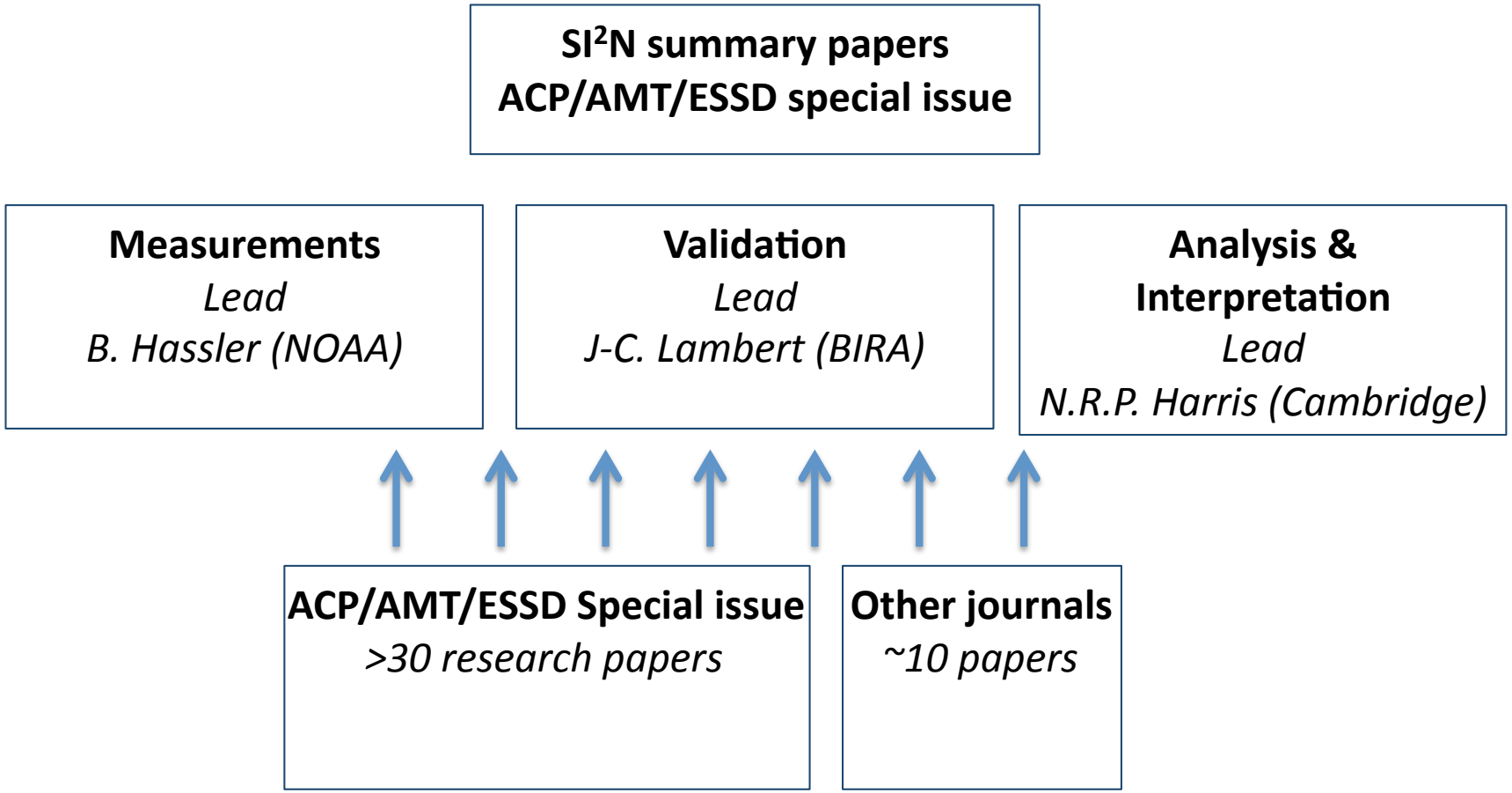
GOZCARDS (Global OZone Chemistry And Related trace gas Data records for the Stratosphere) → data from individual satellites were screened, systematic biases were removed and the data were then merged to produce a long-term ozone time series.

Brown: merged
(after offset adjustm.),
40 and 50°N at 46 hPa:
SAGE-I/II
HALOE
UARS-MLS/Aura-MLS
ACE-FTS



Ozone Profile Phase II

New delivery mechanism → rather than a SPARC report, a special issue of ACP/AMT/ESSD considered to better suit the user community.



Ozone Profile Phase II

Special issue advantages:

- Fully peer-reviewed.
- Open access journals → process is transparent and open to public scrutiny.
- All material is readily accessible.
- Adds to publication records of participating scientists.
- Joint special issue allows papers covering technical issues (AMT) and scientific issues (ACP) to be published jointly with databases (ESSD) making the process more traceable.
- Doesn't require early definition of boundaries → new developments can be included in overview papers or in the WMO-UNEP report.
- The facility for publishing supplementary material facilitates making more of the underlying analyses available.

SPARC Data Initiative

Co-leads: Michaela Hegglin and Susann Tegtmeier

Goal: Intercomparison of 18 different multi-national satellite instrument limb measurements and 25 different trace gas species and aerosol.

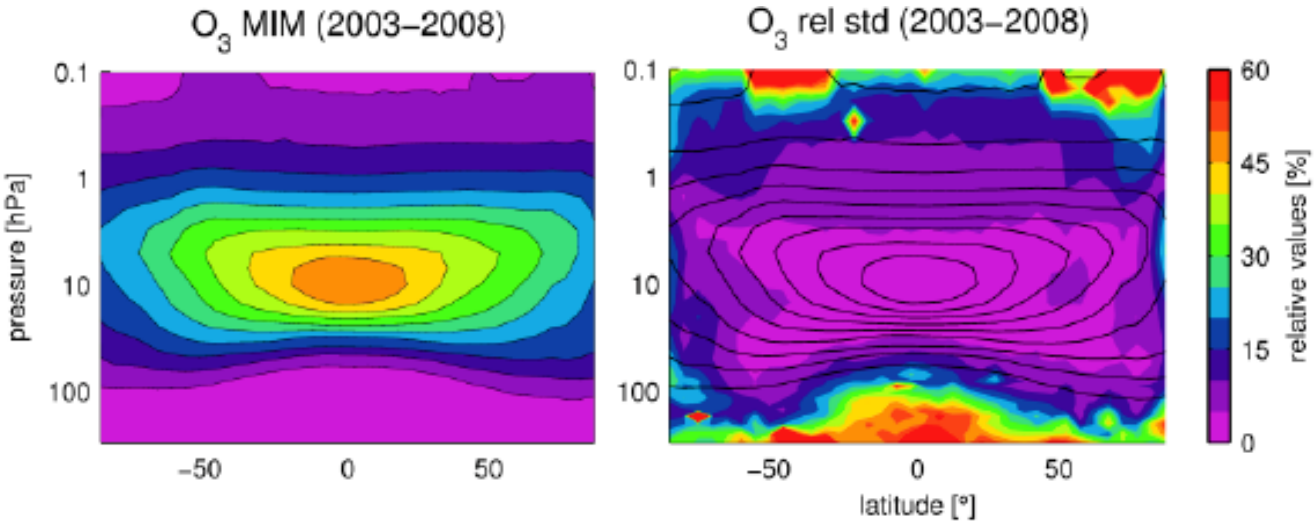
✔ finished
✔ first draft available
✗ to be done

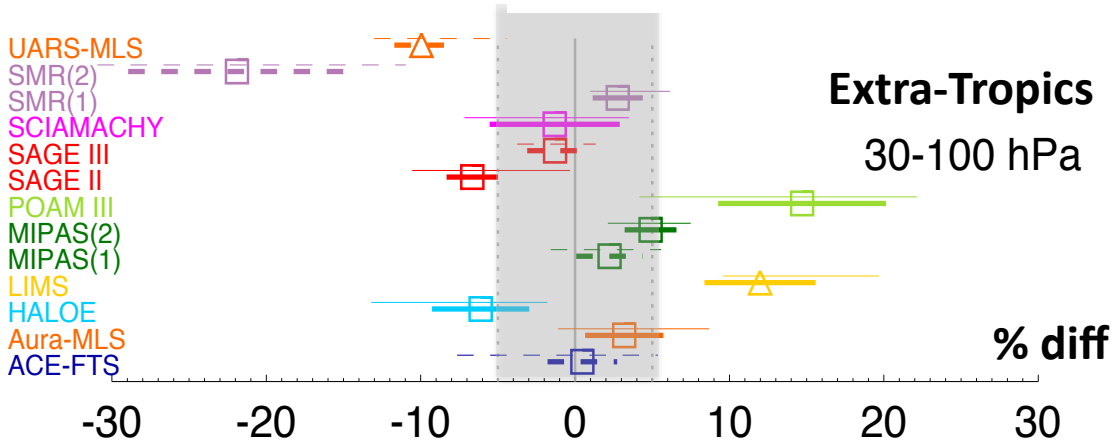
✔✔✔✔✔✔✔✔✔✔✔✔✔✔✔✔✔✔✔✗✗✗✗✗✗✗✔

	O_3	H_2O	CH_4	N_2O	CCl_3F	CCl_2F_2	CO	HF	SF_6	NO	NO_2	NO_x	HNO_3	HNO_4	N_2O_5	$ClONO_2$	NO_y	HCl	ClO	HOCl	BrO	OH	HO_2	CH_2O	CH_3CN	aerosol
ACE-FTS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x						x		
Aura-MLS	x	x		x			x						x					x	x	x		x	x			
GOMOS	x										x															x
HALOE	x	x	x					x		x	x	x						x								
HIRDLS	x				x	x					x		x													
LIMS	x	x									x		x													
MAESTRO	x																									
MIPAS	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x				x		
OSIRIS	x										x	x_d					x_m				x					x
POAM II	x										x															x
POAM III	x	x									x															x
SAGE I	x																									
SAGE II	x	x									x															x
SAGE III	x	x									x															x
SCIAMACHY	x	x									x	x_d									x					x
SMILES	x												x					x	x	x	x		x		x	
Odin/SMR	x	x		x			x			x			x				x_m		x				x_{lo}			
TES	x_t						x_t																			
UARS-MLS	x	x											x						x							

SPARC Data Initiative

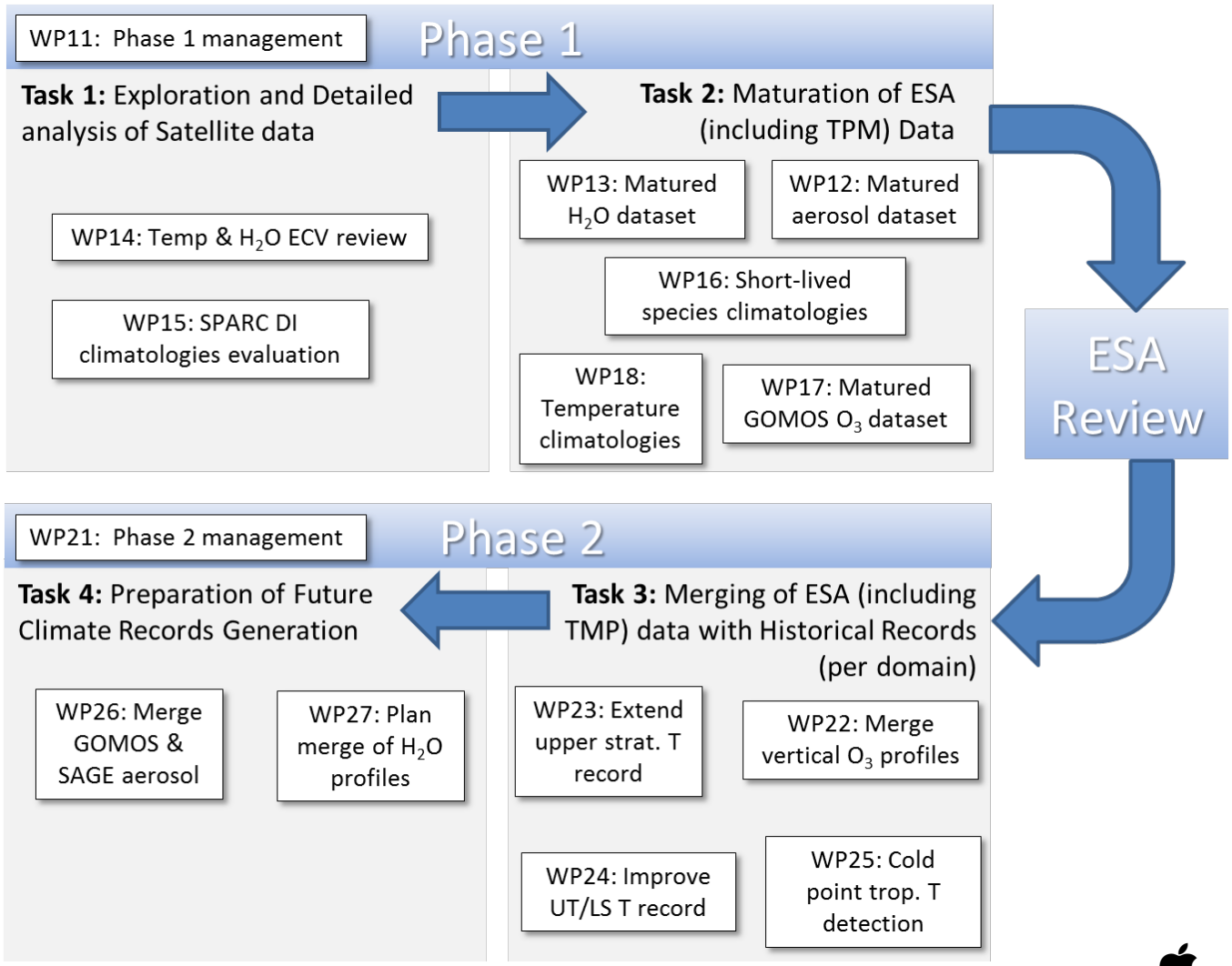
- Comparisons yield new assessment of our knowledge of the atmospheric mean state of different trace gases and its uncertainty.
- Mean state of ozone and 1-sigma uncertainty.
- Inter-instrument differences in extra-tropical lower stratosphere.
- A number of publications and a SPARC report.





The ESA-SPARC initiative (SPIN)

- The goals of SPIN are to improve the quality of existing measurements and to make new climate data records
- Mid-term review meeting was held in conjunction with a SPARC Data Requirements workshop
- Now into phase II.



SPARC Data Requirements Initiative

- Define kind and quality of measurements needed by SPARC.
- Provide input to the WDAC, GCOS, CEOS, space agencies.
- Respond to requests from funding agencies.
- Stimulate use of improved products by SPARC activities.
- Support key existing long-term measurement programmes.
- Data requirements workshop → 20 and 21 February 2013, Frascati, Italy (thanks to ESA for hosting the workshop).
- Input to WDAC → Susann Tegtmeier attended WDAC meeting (4-5 March).

Key outcomes of data requirements workshop

- Need for error characterised data.
- Current ‘golden age’ of measurements will be a key reference period → make sure it is fully exploited.
- Support *design* of observing networks → tropical stations.
- Foster continuation of long-term measurement series.
- Need more SSU products.
- Support the development of GNSS radio-occultation products.
- Diurnal scaling factors for comparing short-lived species.
- Need for measurements and models to ‘meet in the middle’ → hand-shaking between WDAC and WMAC?
- Make source data traceable → provide guidance on use of DOIs.
- Expand Obs4MIP efforts.

Response to Grand Challenges

Regional climate information

- The SPARC DynVar activity will contribute to **Frontier 1**: Identify and understand phenomena that offer some degree of intra-seasonal to inter-annual predictability, and skilfully predict these climate fluctuations and trends → current research looking at stratospheric influence on changes in storm tracks. Necessary links to CLIVAR have been forged → Elisa Manzini attended CLIVAR SSG meeting 6-8 May 2013. Recall Lisa Goddard's talk from yesterday.
- The SPARC SNAP activity also directly addresses the sources of predictability and the limits of predictability → the planned SPARC report from this activity needs to be cognizant of the needs of this grand challenge.

Response to Grand Challenges

Regional climate information

- SPARC role in WGCM should help to identify key model errors that limit prediction skill.
- SPARC's participation in WGSIP (primarily through CHFP and SHFP) may also channel relevant SPARC research in support of this Grand Challenge → Adam Scaife can comment.
- A number of SPARC activities (including SPIN) focus on producing observational data sets aimed at enhancing the use of observations by the climate modelling community.
- SPARC is ready to suggest possible candidates for the proposed Grand Challenge Joint Steering Committee (GC-JSC).
- SPARC supported a special workshop on climatic effects of ozone depletion in the Southern Hemisphere in Buenos Aires from 25 February to 1 March 2013.

Response to Grand Challenges

Cryosphere in a changing climate

- SPARC is not formally involved in this grand challenge but will provide any relevant research through its role in the Polar Climate Predictability Initiative (PCPI) which will be discussed further tomorrow.

Clouds, circulation and climate sensitivity

- **Barrier 2** → lack of understanding of regional circulation and precipitation changes, especially over land. Need to quantitatively predict how large-scale atmospheric circulation systems will respond to climate change. SPARC expertise on stratospheric drivers of changes in large-scale circulation systems → relating changes in heating to changes in circulation → **Initiative 1: Climate and hydrological sensitivity**
- **Barrier 3** → improving the representation of the coupling between cloud-processes and large-scale dynamics.

Response to Grand Challenges

Clouds, circulation and climate sensitivity

- **Initiative 3: Changing patterns** (Ted and Adam) → need to better understand the relative role of local forcing versus large-scale or remotely forced changes in driving regional changes.
- Links to aerosol communities:
  - ACPC (Aerosols, Clouds, Precipitation, & Climate) a combined GEWEX, IGAC, iLEAPS project (Graham Feingold, Meinrat Andrea),
  - AeroComm (Michael Schulz, Stefan Kinne, Mian Chin) → the CCMI activity of SPARC will establish links to AeroCom.
  - Proposed aerosol climate initiative within GASS.

will be helpful. But how should that best be done to meet the needs of the Grand Challenges? It is clear that SPARC's role will be primarily a co-ordination role. Inclusion of aerosols was raised yesterday (Filippo Giorgi).

Response to Grand Challenges

Clouds, circulation and climate sensitivity

- **Initiative 5: Toward more reliable models** → build on SPARC's process-oriented validation of models.
- Effects of solar radiation-management strategies for climate mitigation through SPARC's involvement in GeoMIP

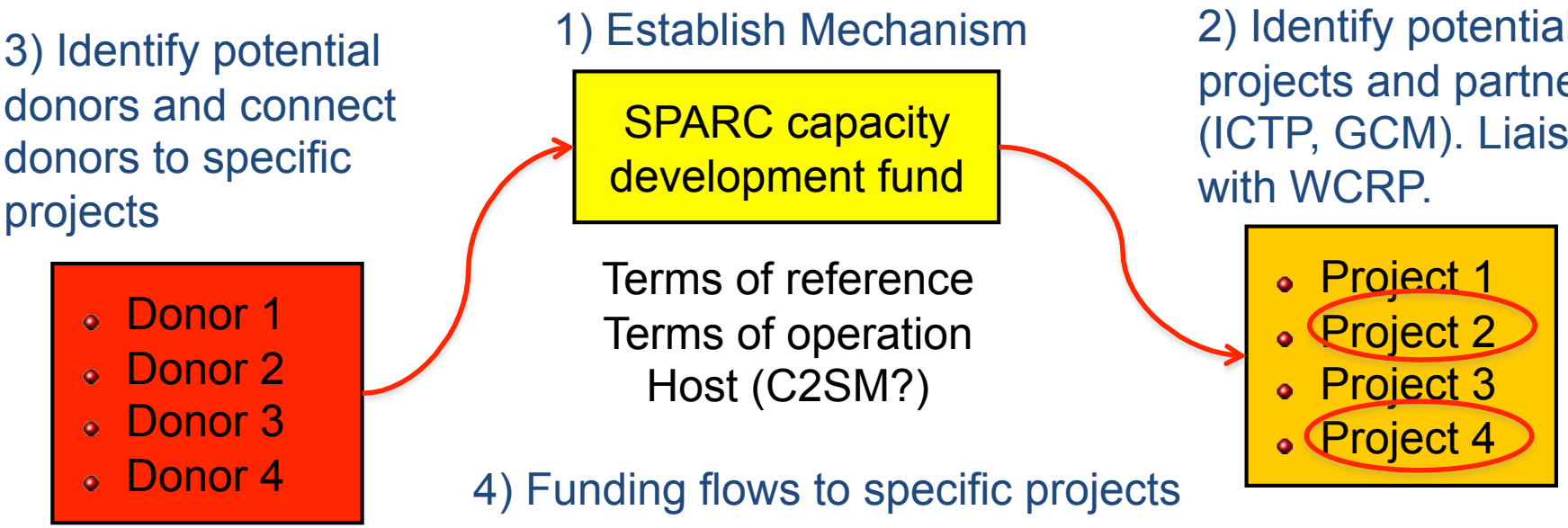
Prediction and attribution of extreme events

- SPARC can contribute to **Initiative 2**: Improved understanding of process interactions important for extremes.
- CCMI community diagnostics tool provides a template for confronting models with new observational products.
- Extreme polar vortex conditions and effects in the troposphere.

Capacity Development

(Carolin Arndt)

- If SPARC is to provide regionally tailored climate services, then regional engagement of the research community is essential
- If that capacity is not available, SPARC needs to actively identify where that is the case, where that presents an impediment to delivery of climate services, and then work to develop regional capacity



Capacity Development

(Next steps)

- Organising summer and/or winter schools with a large share of participants from least-developed countries and small island states
- Regional capacity development as part of the next General Assembly (see later)
- Developing visiting scientist programmes (or: mobility exchange programme)
- Creating a mentoring programme
- Organising training initiatives
- Providing regular travel support for SPARC workshops, General Assemblies and other events
- Fostering engagement in current and emerging SPARC activities
- Establish a mechanism to accept and disburse contributions, transparently way with sufficient managerial oversight, for capacity development
- New person on the SSG focussing on capacity development.

Inter-project liaison

- Veronika Eyring and Elisa Manzini attended the WGCM meeting in Hamburg (24-26 Sep 2012).
- Greg Bodeker attended the 25th session of the GEWEX SSG meeting (15-19 October 2012).
- David Jackson attended the 28th session of WGNE in Toulouse (5-9 November 2012).
- Marie-Lise Chanin attended the GEC workshop on Future Earth (28-29 November 2012).
- Ted Shepherd attended the CliC SSG meeting in Potsdam (2 February 2013)
- Susann Tegtmeier attended the WDAC meeting (4-5 March 2013).
- Veronika Eyring attended the 4th WGNE workshop on systematic errors in weather and climate models (15-19 April 2013).
- Elisa Manzini attended the CLIVAR SSG meeting (6-8 May 2013).
- Neil Harris attended the Future Earth European Workshop (13-14 May 2013).

SSG changes

Continuing into 2014

Joan Alexander (USA), co-chair
Greg Bodeker (NZ), co-chair
Julie Arblaster (Australia)
Kusuma Rao (India)
Veronika Eyring (Germany)

New SSG members as of January 2013 already approved by JSC

Ed Gerber (USA)
Martin Schultz (Germany)
Kaoru Sato (Japan)

Renewals from January 2014

Michelle Santee (USA)
Adam Scaife (UK)

Stepping down on December 2013

Dave Fahey (USA)
Roseanne Diab (RSA)
Hong-Bin Chen (China)
Manuel Pulido (Argentina)

Proposed new members

Mark Baldwin (USA)
Thando Ndarana (RSA)
Seok Woo Son (S. Korea)
Carolin Vera (Argentina)

General Assembly

- Queenstown, New Zealand
- 12-17 January 2014
- Millennium and Copthorne Hotels
- Also next SSG meeting
- Community support and attendance is critical. We need good attendance.
- We have established a comprehensive carbon offsetting initiative for the meeting → The Air New Zealand environment trust will match us $ for $ up to NZ$15,000 → The United Bank of Carbon will find a corporate sponsor who will also match us $ for $ up to NZ$15,000 to purchase NZ$30,000 of carbon credits through (UBoC).

General Assembly

SOC co-chairs: Adam Scaife and Veronika Eyring

Themes

- Atmospheric Chemistry, Aerosols and Climate (Jean-Francois Lamarque).
- Stratosphere-Troposphere-Ocean Dynamics and Predictability of Regional Climate (Julie Arblaster).
- Coupling to the mesosphere and upper atmosphere (Kaoru Sato)
- Observational datasets, reanalyses, and attribution studies (Michelle Santee)
- Tropical Processes (David Fahey)
- Emerging and Outstanding Research of Relevance to SPARC (Veronika Eyring and Adam Scaife)

General Assembly

Key-note speakers

Jerry Meehl: IPCC AR5: projections, predictions and progress since AR4

Steve Sherwood: Clouds, Circulation and Climate Sensitivity

Ted Shepherd: Polar Climate Predictability

Christian Jakob: Long-standing errors in climate models

Dian Seidel: Temperature trends: our evolving understanding

Robert Sausen: Impact of Aviation on Composition and Climate

Also starring:

Graeme Stephens
Bill Collins
Doug Smith
Tiffany Shaw
Ed Gerber
Nathan Gillett

Katja Matthes
Anne Smith
Gloria Manney
David Karoly
Bernard Legras
Masakazu Taguchi

Andrew Gettelman
K. Mohanakumar
John Pyle
Hauke Schmidt
Gill Compo
Mark Weber

General Assembly
Key dates

- Registrations
  - Registrations open: 1 July 2013
  - Early Bird Registrations (€500) close: 1 October 2013
  - Standard Registrations (€600) close: 8 December 2013
  - Late Registrations (€700) close online: 10 January 2014
- Abstract submission
  - Submissions open: 1 April
  - Deadline for abstract submissions for people requesting travel support: 30 June
  - Final deadline for abstract submissions without travel support: 15 July
  - Announcements sent out regarding acceptance of abstracts: 15 August
- Applicants for travel support
  - Travel support applications open: 1 April
  - Application deadline: 30 June
  - Announcement of successful travel support applicants: 1 August

General Assembly Sponsorship

We have worked hard to secure sponsorship:

- WCRP CHF 70,000
- WIGOS CHF 10,000
- WMO CHF 10,000
- CSA CAD$10,000
- COSPAR €1,000
- Aerodyne Research: US$2,000
- Tofwerk: €1,000
- ARC Centre of Excellence for Climate System Science: AUD$5,000
- Antarctica New Zealand NZ$1,000
- Many other leads are being followed up on by the SPARC Project Office

www.sparc2014.org

Sponsorship will be used almost entirely to support attendance of PhD students, early career scientists, and scientists from developing countries or countries with economies in transition.

SPARC's imperatives

Improve the models by better understanding the relevant processes and through model-measurement comparison

Improve the use of (imperfect) model information through model assessment and diagnostic analysis

Improve the reanalyses through assessment of the products

Improve the observational record through assessment of the products and development of climate data records

Serve user needs by contributing to WMO/UNEP ozone assessments and IPCC assessments. For GFCS we would expect to mainly work through the various WCRP working groups.