

SPARC: **Current and Future Science**

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GEWEX SSG, Washington,
Wed 31st Jan 2018



SPARC
Stratosphere-troposphere
Processes And their Role in Climate

Neil
Harris
Co-Chair



Judith
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Co-Chair



Boram Lee
WCRP Liaison

The SSG



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*SPARC has moved from ETH Zurich to DLR,
Oberpfaffenhofen, Germany*

Scientific Themes



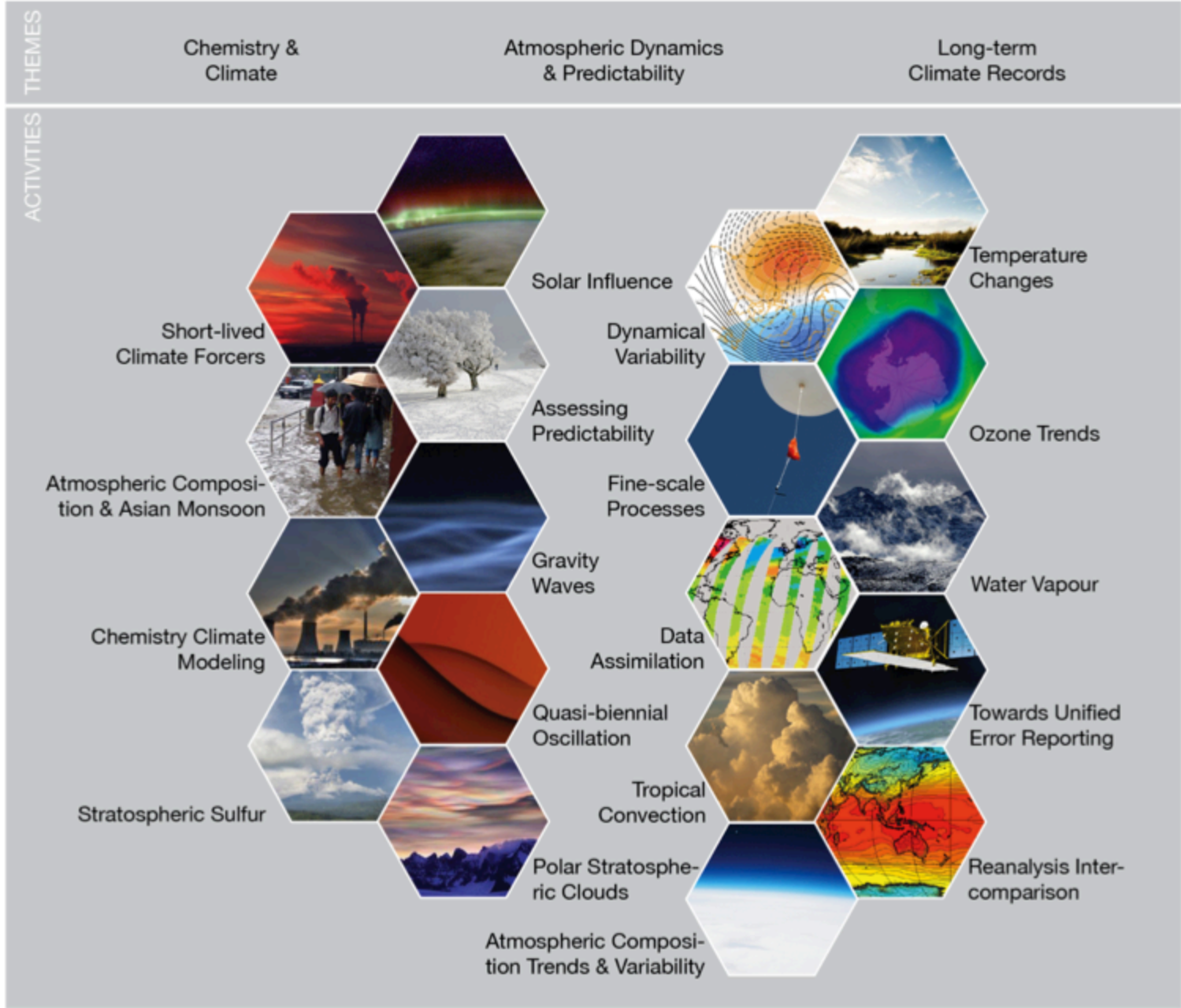
Atmospheric Dynamics + Predictability

Chemistry + Climate

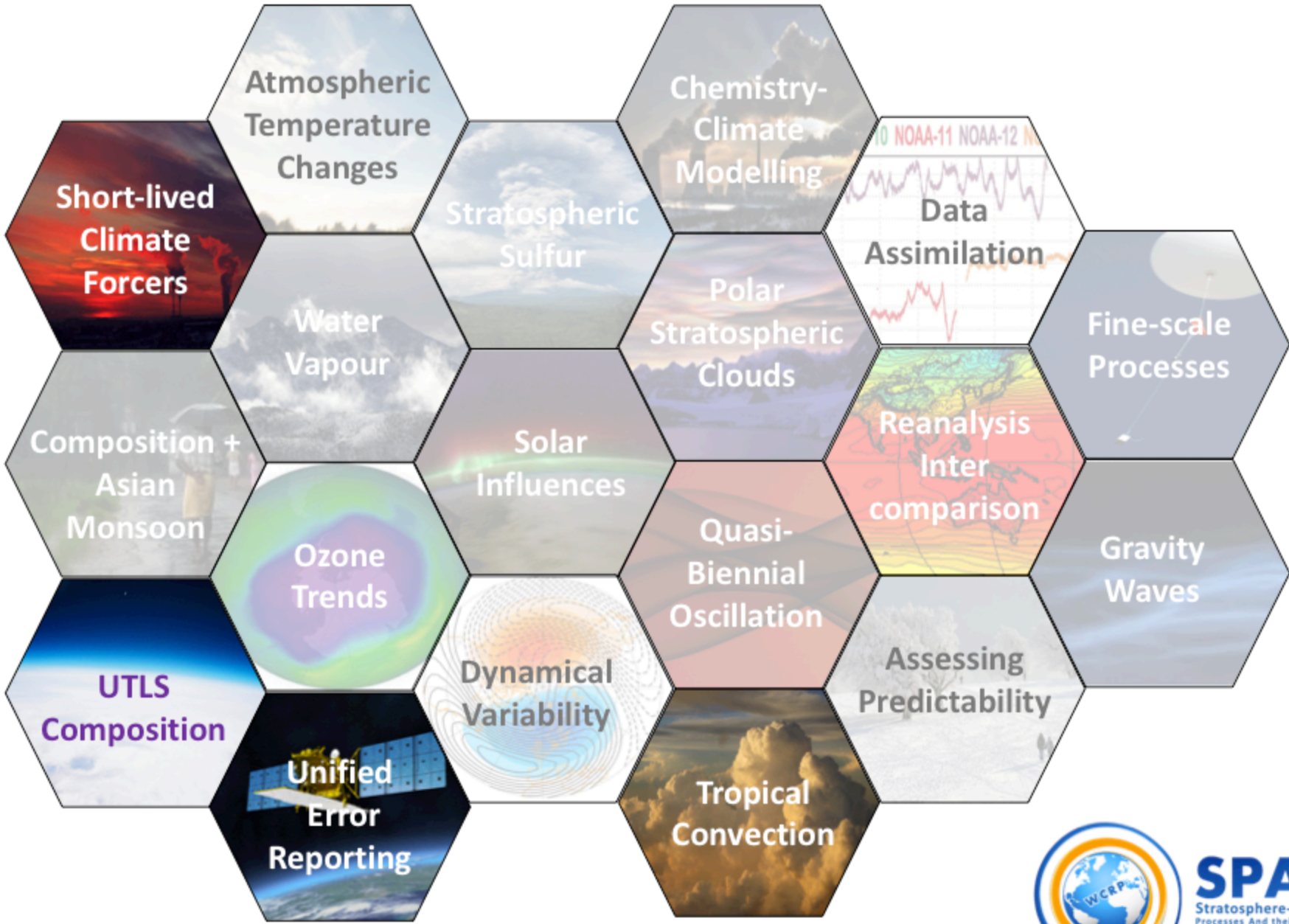


Long-term Records for Climate Understanding

Current Activities



Emerging Activities



Emerging Activities

The genesis of new activities:

- Directly laying the groundwork for a future assessment (O3, IPCC)
- An important fundamental topic for understanding the atmosphere

The format of activities:

- Fit for purpose (meeting + paper(s); report; on-going progress)
- Time-limited – science plan to be formally revised at ~4 years

Pre-requisites:

- International research community support (what does SPARC add?)
- Clear plan with outputs, including involvement of early career scientists and from countries with developing scientific base

N.B. most new activities come from **community's** ideas

SPARC's successes

- SPARC reports – critical and timely for ozone and climate assessments
- Trust in community to build scientific programme
- Agenda setting science
 - high profile papers
 - high quality, long-term data sets
 - focus on fundamental processes
 - looking ahead
- And helping to build an international community.....

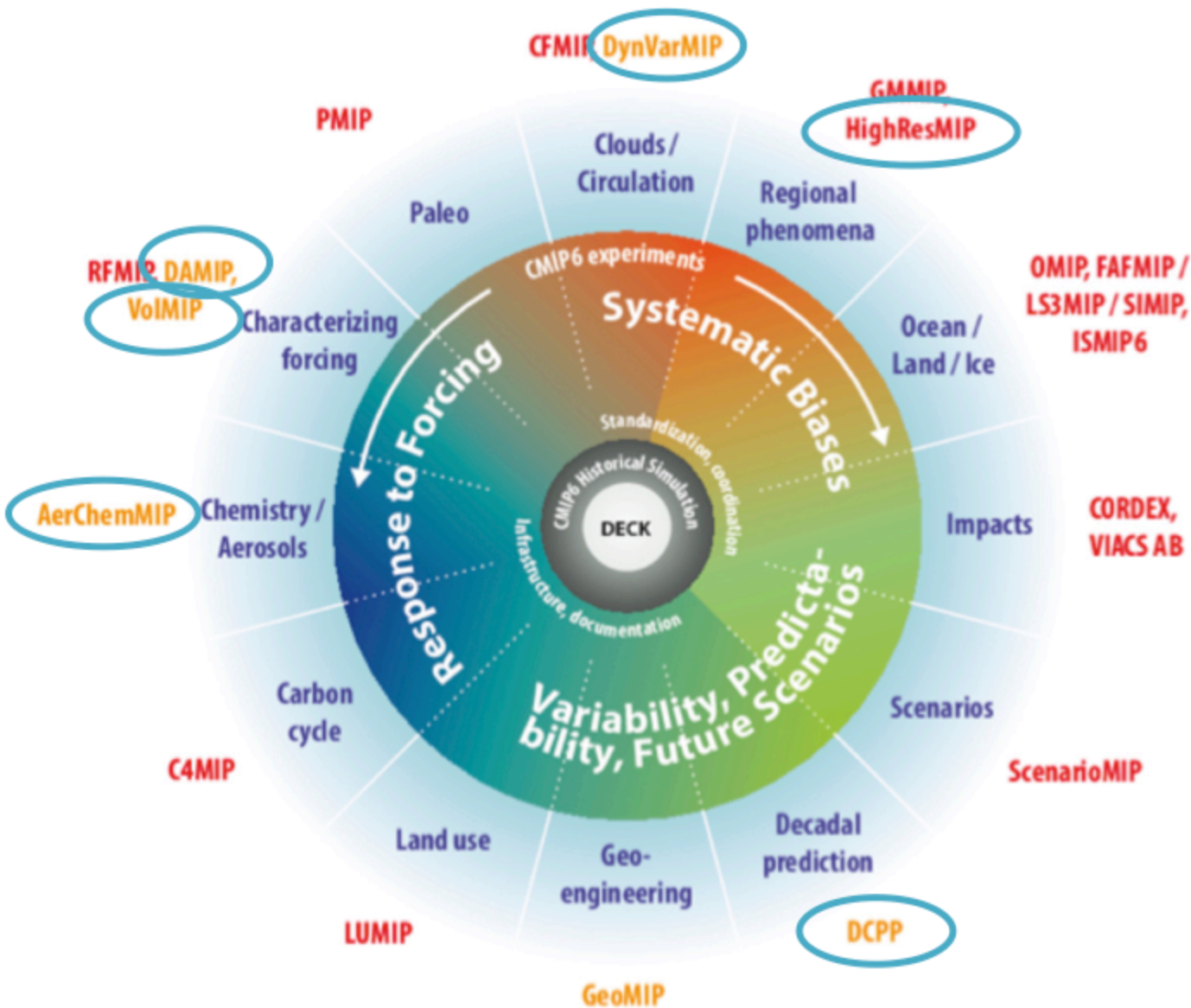
Breaking down academic silos: coupled chemistry climate model validation (CCMVal, CCMi)

- Clear historic groupings of chemists, dynamicists, and measurement people – and between chemical and climate modellers
- Integration of these groups proved very successful in evaluating (and hopefully improving) the performance of the models
- Also leads to more thoughtful planning of measurements and process-based experiments
- CCMi joint with IGAC to bring in extra expertise

Important to maintain this adaptability moving forward.

Other areas where chemistry, composition and transport are important include the Asian Monsoon, UTLS composition and Short-Lived Climate Forcers – looking to partner with IGAC and GAW where common interest

Using CMIP6 runs



Opportunities:

- Atmos. dynamics
- Coupled chemistry models
- QBO
- Solar cycle
- Volcanoes
- Predictability

SPARC General Assembly 1-5 October 2018, Kyoto

*Following IGAC Science Conference;
& in parallel with 2018 Joint Belmont forum/JPI-Climate*



LOC co-chairs: Kaoru Sato, Masato Shiotani, Shigeo Yoden
SOC co-chairs: Harry Hendon, Amanda Maycock

Themes for 2018 SPARC General Assembly



Provides an opportunity to celebrate SPARC's achievements and to look to the future while building on our traditional strength:

- Climate Prediction from Weeks to Decades
- Role of Atmospheric Dynamics for Climate Variability and Change
- Connections of Atmospheric Composition and Chemistry to Weather and Climate
- Atmospheric Impacts and Interactions related to Tropical Processes
- Advances in observation and reanalysis datasets
- SPARC Science for Society

WMO/WCRP is under Review

JOINT SCIENTIFIC COMMITTEE (JSC)

WCRP MODELLING ADVISORY COUNCIL (WMAC)

WCRP DATA ADVISORY COUNCIL (WDAC)

WORKING GROUPS ON:

SUBSEASONAL TO INTERDECADAL PREDICTION (WGSIP)
NUMERICAL EXPERIMENTATION (WGNE)

COUPLED MODELLING (WGCM)
REGIONAL CLIMATE (WGRC)

cliC



CRYOSPHERE-
CLIMATE

CLIVAR



OCEAN-
ATMOSPHERE

GEWEX



LAND-
ATMOSPHERE

SPARC



TROPOSPHERE-
STRATOSPHERE

CORDEX



REGIONAL CLIMATE
DOWNSCALING

GRAND CHALLENGES

CLOUDS, CIRCULATION AND CLIMATE SENSITIVITY

REGIONAL SEA-LEVEL CHANGE AND COASTAL IMPACTS

CARBON FEEDBACKS IN THE CLIMATE SYSTEM

UNDERSTANDING AND PREDICTING WEATHER AND CLIMATE EXTREMES

NEAR-TERM CLIMATE PREDICTION

MELTING ICE AND GLOBAL CONSEQUENCES

WATER FOR THE FOOD BASKETS OF THE WORLD

JOINT PLANNING STAFF (JPS)

The ghost at the feast

- Wide range of possible options from major reorganisation to continuing evolution
- Makes longer term planning hard
 - Any major reorganization will most likely take some years and will involve the scientific community
 - Review panel report being considered by sponsors – no outcome known yet
 - Report hopefully available soon for public comments (??)
- SSG's main view is to go steadily – involve:
 - Continuing to develop science ideas
 - Leaving some SSG seats empty
 - Plan for a community consultation, including use of the General Assembly
 - Make sure the strengths of SPARC are kept

The issues

- Complicated interactions between some frontier science areas:
 - predictability
 - composition
 - process understanding
- My concern is that a top-down structure will be imposed along meteorological agency lines
 - risk of programme being designed for organisational, not scientific reasons
 - SPARC has a time-limited, bottom-up organisation
 - most SPARC scientists are University and give time voluntarily
 - need a motivating structure – interesting & important research questions
- For example, a ‘merger’ of SPARC composition, IGAC and GAW?
 - Risks of old chemistry/dynamics barriers reappearing
 - Evolutionary process better
 - Improved collaboration being pursued

Topics of joint interest with GEWEX

- Improve S2S predictions by quantifying and understanding the role of stratosphere-troposphere coupling as source of predictability, and by understanding of systematic model errors in the stratosphere and their impacts
- Promote the science on stratosphere-troposphere coupling (upward and downward) in the tropics, focusing on its influence on moist convection and organized convective systems, and including observations, data analyses, and numerical model studies.
 - including impact of strongest convection on upward transport and ultra-thin cirrus clouds

Thank You!



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