SPARC Project
Stratosphere-troposphere Processes
And their Role in Climate

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SPARC Approach

- Targeted activities
- Bite-sized timely goals
- Focus on deliverables

Our Annual Report summarizes 2014 accomplishments and plans

http://www.sparc-climate.org/publications/programme-plans/
Products from these Activities include SPARC Reports, published articles, reviews, and datasets.
Implementation Plan 2015

SPARC Themes

Atmospheric Dynamics & Predictability

Chemistry & Climate

Long-term Records for Climate Understanding
Map of SPARC Activities to Themes

- Gravity Waves
- CCMI
- ACAM
- SOLARIS-HEPPA
- DynVar
- Atmospheric Dynamics & Predictability
- Chemistry & Climate
- Long-term Records for Climate Understanding
- Data Assimilation
- SNAP
- S-RIP
- SSiRC
Map of SPARC Activities to Themes

- Gravity Waves & Momentum Budget
- Dynamical Variability
- Assessing Predictability
- Reanalyses Intercomparison
- Long-term Records for Climate Understanding
- Chemistry & Climate
- Atmospheric Dynamics & Predictability
- Coupled Chemistry Modeling
- Chemistry in Asian Monsoon Region
- Solar & High-Energy Particle Influences
- Stratospheric Sulfur

- Gravity Waves
- CCMi
- ACAM
- DynVar
- SOLARIS-HEPPA
- SNAP
- S-RIP
- SSiRC
- Data Assimilation
- Assessing Predictability
Emerging Activities and Links to Other Programs

- Long-term Records for Climate Understanding
- Atmospheric Dynamics & Predictability
- Chemistry & Climate
- Aerosols
- QBOi
- Gravity Waves
- CCMI
- ACAM
- DynVar
- SOLARIS-HEPPA
- SNAP
- S-RIP
- SSiRC
- Data Assimilation
- PSCs
- Tropical Composition
- Blocking & Extremes
- Storm Tracks
- CCl4

SPARC
Stratosphere-troposphere Processes And their Role in Climate

WCRP
World Climate Research Programme
Emerging Activities and Links to Other Programs

Many in SPARC contributing to CMIP6: AerChemMIP, HiResMIP, GMMIP, SolarMIP, GeoMIP, VolMIP, DynVar

SPARC: Stratosphere-troposphere Processes and their Role in Climate

Chemistry & Climate

Atmospheric Dynamics & Predictability

Gravity Waves

QBOi

Aerosols

CMI

ACAM

DynVar

S-RIP

SSiRC

Gravity Waves

Data Assimilation

SOLARIS-HEPPA

Tropical Composition

O3, H2O, Temp, & Radiation

Long-term Records for Climate Understanding

CCl4

PSCs
Some New Directions
Focused Efforts within these Topics

- Teleconnections: Robustness in observations, fidelity in models, and mechanisms
- Predictability: Across time scales (season-decade-century), absolute limits due to internal variability, current status in models, and dynamics of unprecedented events
- Aerosol/cloud/chemistry interactions
- Stratosphere-troposphere exchange of O$_3$ & H$_2$O under climate change – implications for air quality/radiative forcing.
- Quantitative methods for defining the consequences of measurement gaps

*new Implementation Plan drafted – discussions at meetings this year to finalize contents*
Model Development Needs

Overall –
1. Continued model development needed for integrated chemistry, deep atmospheric domains and associated in-line diagnostics.
2. Specific training needs: Capacity development and science community.

Specific –
• Need for development of in-line atmospheric momentum/radiation diagnostics – becomes crucial for high-resolution simulations and higher-top models.
• Continued development of Earth-system models with integrated chemistry – development of new simplified chemistry schemes?
• Definition of minimal requirements needed for radiative and photochemical schemes to adequately represent the solar signal
• Training need for more science-users of reanalyses to become familiar with the modelling aspects of assimilation systems
• Lack of technical capability to provide data to the ESGF
• Training in WRF/WRF-Chem needed for ACAM monsoon region participants
Data Needs/Requirements

Overall
1. Continued improvement in meteorological reanalyses and past records
2. Continuation of existing core measurements – real funding pressure

Specific
• Lack of planned satellite observations (esp. limb) of UTS composition
• Need up-to-date AMSU and merged SSU-AMSU climate data records
• Reanalysis diagnostics needed for momentum budget studies (MERRA example)
• Need for more reference-quality global & long-term observations, particularly for reanalysis intercomparisons
• No planned continuation of mesospheric radiance for temperatures
• 44 year stratospheric aerosol record at Laramie may stop
• Need for quick response field campaigns after volcanic eruptions
• Data sharing is a challenge in the ‘Asian Monsoon region’
For more please browse a copy of the SPARC Annual Report

www.sparc-climate.org