SPARC’s Stratospheric Sulfur and its Role in Climate Activity (SSiRC)
Larry Thomason, NASA Langley Research Center & the SSiRC Team

What is SSiRC?
Understanding the processes that control the stratospheric sulfur & aerosol budget
Observe stratospheric sulfur and aerosol and reconciling the data sets from different instruments
Modeling the climate feedback from the stratospheric aerosol layer
Facilitating the development of an interactive aerosol layer in global chemistry climate modeling

SSiRC Activities
Reporting on stratospheric sulfur science (papers)
Activities (collaborations)
A stratospheric sulfur measurement capacity data base
SSiRC Model and Data intercomparison project
Improving the performance of climate models for volcanic events
A long-term stratospheric aerosol data base
Data Preservation
Planning the community response for the next major volcanic eruption
Community gatherings (meetings)

SSiRC Sponsored Papers
Stratospheric Sulfur Review Led by Stefanie Kreimer
Highlights include a substantially improved agreement between in situ and space-based measurements of aerosol properties
30+ coauthors, 7 countries
Manuscript is in final stages of production and submitted shortly
International Space Science Institute (Bern, Switzerland) supported effort
Stratospheric Sulfur Burden Led by Terry Deshler
Survey and compile measurements of stratospheric sulfur from instruments sensitive to gas phase sulfur (OCs and SO2) and particle phase sulfur
Instruments on satellites, aircraft, balloons, and the ground will be included.
The goal is to present a temporal and spatial estimate of stratospheric sulfur based on the measurements available.

SSiRC Capacity Data Base
SSiRC is implementing a website featuring a comprehensive collection of links to available laboratory measurements, in-situ and remote data sets from ground based, aircraft, balloon and satellite platforms
https://www.ssirc.info/MainPage
Led by Marc von Hobe

SSiRCMIP – The Stratospheric Sulfur and its Role in Climate (SSiRC)
A new international model intercomparison of global stratospheric aerosol models Led by Claudia Timmreck and Graham Mann
Background case (10 year climatology) to understand sources and sinks of stratospheric background aerosol
Transient run for the last decade (2000-2010) (MITRAR) to address the question of the observed increase in stratospheric background aerosol
Historical Eruption SO2 Emission Assessment (HERSA) to assess how much SO2 the models should emit
Pinatubo case study (POEMS) to intercompare simulated stratospheric aerosol properties and volcanic forcings and attribute process contributions to uncertainty among the different complexity models

VolMIP – Model Intercomparison Project on the climate response to Volcanic forcing
VolMIP is a CMIP 6 endorsed project focused on a multi-model assessment of climate models’ performance under strong volcanic forcing condition
Led by Davide Zanchettin, Claudia Timmreck, Myriam Khodri
http://volmip.org/
Basic Idea: Definition of a common protocol to improve comparability of results by subject them to the same set of idealized volcanic perturbations under similar background climate condition

Improving the CMIP/CCMI long-term stratospheric aerosol database
Facilitate the creation of a long term stratospheric aerosol data set (1850-present) suitable for use in chemistry/ climate models
Focus: Improve low latitudes during Pinatubo, improve high latitudes, transition to post SAGE Era
Led by Larry Thomason and Bei-Ping Luo

Data Preservation
A new activity within SPARC is to facilitate the archival and preservation of historical stratospheric aerosol measurements within national and international data centers
It is true recognizing that many valuable data sets date from the period before the archival of data sets at such was routine (or even possible)
Focused initially on crucial lidar data sets including ground-based sites and airborne missions
Led by Juan-Carlos Antuña-Marrero

Preparing for the next major volcanic eruption
Volcanic eruptions are a potential source of uncertainty in future climate projections as they cannot be predicted in advance, but eventually will occur, causing short-term climatic impacts on both local and global scales (IPCC, AR5)

Questions to consider
Do we understand the seasonal and multi decimal impact of volcanic eruption on climate (VolMIP)?
What measurements have the greatest lasting value to the modelling community?
What do we wish we knew about the Pinatubo eruption?
How can we shorten the time-to-field delay in the aftermath of an event?

SSiRMIP – Model Intercomparison Project on the climate response to Volcanic forcing
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A Quick-Response Field Mission for the February 2015 Kelud Eruption
A model for future missions?
Accomulated CALIPSO observations (14-24 May 2014)
CORBALD backscatter profiles showed the plume between ~18-22 km altitude with some variability in the vertical structure during the campaign. Flight of U. Wyoming Optical Particle Counter on May 20th showed the presence of non-volatile (ash) particles at the bottom of the plume (~18 km) while the upper part was found to be mostly volatile (sulfate) aerosol

Gathering the Sulfur Community (Meetings)
Past
1st Workshop on Stratospheric Sulfur and its Role in Climate Atlanta, GA (USA), October 28-30, 2013, 60 attendees from 6 countries
Future
2nd Workshop on Stratospheric Sulfur and its Role in Climate Potsdam, Germany, 25-28 April 2016
Focus on stratospheric sulfur burden (but not limited to)
Contact Larry Thomason (l.w.thomason@nasa.gov) or Stefanie Kreimer (Stefanie@bodekker.com)

We are also in the application process for an AGU Chapman Conference for Spring 2017 in Tenerife Spain We are considering a Summer School program in south Asia no earlier than 2018! It is a good time to indicate interest in such a program…