

ACTIVITY REPORT:

SSiRC

(Stratospheric Sulfur and its Role in Climate)

Activity leads:

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28th SPARC SSG meeting

Part II: Activity reporting

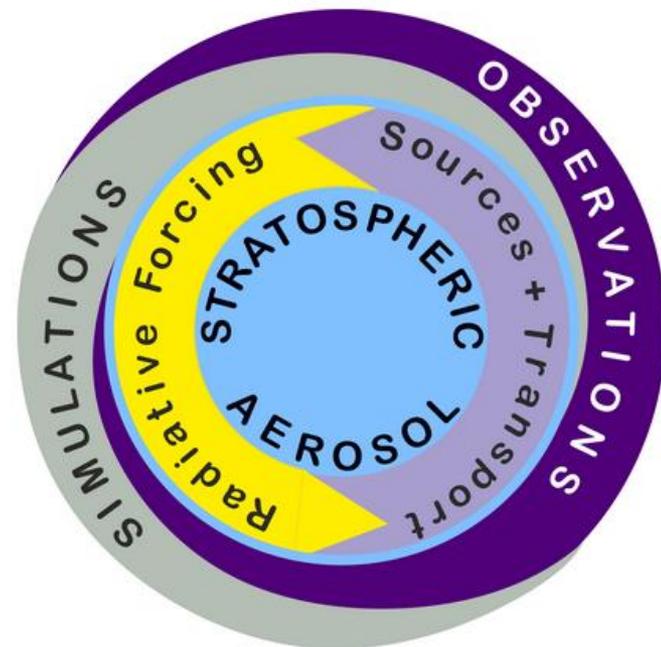
February 2021

The Stratospheric Sulfur and its Role in Climate (SSiRC) activity seeks to facilitate collaboration between observation/process modelling groups and the wider global climate modelling community to improve our understanding of the uncertainties in the role that sulfur and particularly sulfuric acid aerosol play in climate.

- GloSSAC (the Global Space-based Stratospheric Aerosol Climatology) dataset v2.0 (1979 to 2018) has been archived and an accompanying paper has been published in Earth System Science Data.
 - Kovilakam, M., Thomason, L. W., Ernest, N., Rieger, L., Bourassa, A., and Millán, L.: The Global Space-based Stratospheric Aerosol Climatology (version 2.0): 1979–2018, *Earth Syst. Sci. Data*, 12, 2607–2634, <https://doi.org/10.5194/essd-12-2607-2020>, 2020.
- Historical data recovery: Rescue and processing of the first multiyear data set (1964 to 1965) of stratospheric aerosol lidar measurements has been archived at PANGAEA and accompanying paper has been submitted to Earth System Science Data.
 - Antuña-Marrero, J.-C., Mann, G. W., Barnes, J., Rodríguez-Vega, A., Shallcross, S., Dhomse, S., Fiocco, G., and Grams, G. W.: Recovery of the first ever multi-year lidar dataset of the stratospheric aerosol layer, from Lexington, MA, and Fairbanks, AK, January 1964 to July 1965, *Earth Syst. Sci. Data Discuss.*, <https://doi.org/10.5194/essd-2020-246>, in review, 2020.

- We conducted an online survey on how to transition from traditional in-person only meetings to those with a substantial online presence and what would need to be considered to not exclude anyone by making it more challenging → results were circulated to SSiRC community.
- Workshop/Meetings:
 - The in-person SSiRC workshop scheduled for Leeds in March 2020 has been deferred to May 2022. The SSG is discussing opportunities to organize topical online workshops sometime in 2021 (TBC).
 - SSiRC SSG meetings to discuss progress on the SSiRC activities and tasks have been held online in May 2020, Dec 2020 and the next meeting is planned for Feb 2021.

SSiRC website was updated together with a new overview Figure of what SSiRC is about.



SSiRC bridges observations and models and connects scientists from different fields to gain quantitative understanding of stratospheric aerosol processes from emissions to radiative forcing.

Scientific Foci:

- Update the current version of GloSSAC to the end of 2020.
- Develop an index for rapidly relating the climate significance of a volcanic eruption. It could also play a role in defining what is meant by ‘major’ or ‘minor’ eruptions. (led by M. Toohey and L. Rieger).
- Investigate the best platform to archive measurements – this relates to the data rescue activity.

SSiRC aims to better constrain the pathways of stratospheric aerosol and its precursors from emissions to radiative forcing by addressing the following open science questions:

- What is the uncertainty associated with aerosol observations?
- What is the contribution from non-sulfate components?
- How do anthropogenic emissions of aerosol precursors affect stratospheric aerosol variability?
- How does the tropospheric sulfur cycle respond to climate change and how that that affect stratospheric aerosol?

Science Foci cont.

- How does variability in strat. aerosol affect temp & precip?
- How does ultra-fine ash influence the volcanic SO₂ radiative forcing?

Planned publications

- T. Deshler led activity to generate a stratospheric sulfur burden climatology derived from observation re-started and the plan is to submit a paper by the end of June 2021.

Workshop

- Aim to bring the SSiRC community together – we are planning one large workshop over a couple of days, most likely online.
- SSiRC SSG gets together every 6 months from now on to discuss progress and way forward.

- Online meetings:
 - More online meetings bring their own challenges, i.e.
 - What is the best tool to be used. Many institutes do not allow certain products. How best to find a common ground?
 - Different time zones make it tricky to include everyone in one meeting.
 - More consideration should be given to tools that can provide additional features so that e.g. hearing impaired participants are not left out.
- ECRs and scientists from developing countries
 - This seems to be an ongoing issue. ECRs departing research and science – maybe SPARC/WCRP can facilitate routes for ECRs to become an active part of international committees and being more involved in SPARC activities.
 - How best to engage with and include scientist from developing countries remains a challenge.
- SPARC could facilitate/encourage/enable collaboration across different SPARC activities.