



Recovered measurements of the 1960s stratospheric aerosol layer for new constraints for volcanic forcing in the years after 1963 Agung

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The WCRP-SPARC initiative on stratospheric sulphur (SSiRC) has begun a new activity to recover past observational datasets of the stratospheric aerosol layer.

The data rescue activity aims to provide additional constraints for volcanic impacts on climate and is organised into three time-periods:

- The quiescent period prior to the major eruption 1963 Agung eruption,
- The period of strong volcanic activity during 1963-1969,
- The Jul-Dec 1991 period after Pinatubo when the SAGE-II signal was saturated.

A new page within the SSiRC website gives further information on the datasets within this activity (<http://www.sparc-ssirc.org> --> Activities --> Data Rescue).

In this presentation, we explain the 1963-1969 component of the data rescue, and compare the CMIP5 and CMIP6 volcanic aerosol datasets during this period, post-Agung interactive stratospheric aerosol model simulations and a preliminary analysis of 15-year global-mean surface temperature trends from CMIP6 historical integrations for 1950-1980.

The 1960s was a strongly volcanically active decade, with the major 1963 Agung eruption and tropical stratosphere-injecting eruptions in 1965 (Taal), 1966 (Awu) and 1968 (Fernandina) generating a prolonged period of strong natural surface cooling.

Less than a year after the Agung eruption, the first in-situ measurements of a major volcanic aerosol cloud were made with dust-sondes from Minneapolis measuring aerosol particle concentrations with 10 soundings between 1963 and 1965 (6 in 1963-4).

Global surveys with the U-2 aircraft were equipped with impactors to measure stratospheric aerosol particle size distribution and composition, for example detecting the presence of volcanic ash within the Agung volcanic plume.

Early ground-based active remote sensing measurements (lidar, searchlight) also measured the vertical profile of the Agung-enhanced stratospheric aerosol layer.

The main purpose of the SSiRC data rescue is to provide constraints for interactive stratospheric aerosol models, aligning with the ISA-MIP activity, which could potentially lead to new volcanic forcing datasets for climate models, ultimately thereby aiming to improve attribution of anthropogenic change and future projections.