# Importance of satellite-based volcanic aerosol data sets for climate simulations

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The stratospheric aerosol layer is regularly affected by volcanic eruptions, which can enhance its optical depth by several orders of magnitude and lead to a subsequent cooling of the earth surface temperature for several years. The observed upward trend in stratospheric aerosol optical depth over the past decade was mainly driven by a series of small tropical and extra-tropical mid-size eruptions (Volcanic Explosivity Index <4). These played a significant role in the global earth radiative budget with a radiative cooling of as large as -0.1W/m2 which counterbalanced up to 25 percent of global warming that would have otherwise occurred. Overall, the stratospheric aerosol layer is one of the most important natural factors of climate variability at multi-years and decadal scales.

In order to simulate accurately the climate impacts of volcanic eruptions, most global climate and earth system models required a pre-calculated volcanic radiative forcing. Satellite observations have provided almost 3 decades of global stratospheric aerosol extinction measurements from which a radiative forcing term at the top of the atmosphere was derived. The Stratospheric Aerosol and Gas Experiment (SAGE) family of instruments, which represents the longest source of measurements over the last 30 years, terminated in 2005. Herein, we use stratospheric aerosol observations by space-based stellar occultation, lidar and limb-scatter instruments to assemble a continuous and coherent record for the period after the ends of the SAGE II mission. We will present here the process by which this compilation was constructed using SAGE II, GOMOS and CALIPSO observations and how this dataset is being used in climate studies.