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Challenges to producing a long-term stratospheric aerosol climatology for chemistry and climate

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Stratospheric aerosol data sets are key inputs for climate models (GCMs, CCMs) particularly for understanding the role of volcanoes on climate and as a surrogate for understanding the potential of human-derived stratospheric aerosol as mitigation for global warming. In addition to supporting activities of individual climate models, the data sets also act as a historical input to the activities of SPARC's Chemistry-Climate Model Initiative (CCMI) and the World Climate Research Programme's Coupled Model Intercomparison Project (CMIP). One such data set was produced in 2004 as a part of the SPARC Assessment of Stratospheric Aerosol Properties (ASAP), extending from 1979 and 2004. It was primarily constructed from the Stratospheric Aerosol and Gas Experiment series of instruments but supplemented by data from other space-based sources and a number of ground-based and airborne instruments. Updates to this data set have expanded the timeframe to span from 1850 through 2014 through the inclusion of data from additional sources, such as photometer data and ice core analyses. Fundamentally, there are limitations to the reliability of the optical properties of aerosol inferred from even the most complete single instrument data sets. At the same time, the heterogeneous nature of the underlying data to this historical data set produces considerable challenges to the production of a climate data set which is both homogeneous and reliable throughout its timespan. In this presentation, we will discuss the impact of this heterogeneity showing specific examples such as the SAGE II to OSIRIS/CALIPSO transition in 2005. Potential solutions to these issues will also be discussed.