The SPARC Data Initiative - Stratospheric Aerosol Climatologies (T97B)

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Abstract

The SPARC Data Initiative includes climatologies of stratospheric aerosols made from satellite based measurements that date back to the start of the SAGE II time series. Also included within the initiatives are climatolgies produced by other satellite experiments including SAGE III, GOMOS, SCIAMACHY and OSIRIS on Odin. This poster highlights and compares the available aerosol climatologies produced within the SPARC DI and illustrates many interesting features including the volcanic sources associated with the recent increase in the sulphate aerosol level within the stratosphere. The sulphate aerosol component within the SPARC DI reinforces the important contribution this data initiative will make for those who need to know how the data they are using for their analysis compare and contrast to other satellite based data.

Comparison with the Historical Records

The historical satellite based stratospheric aerosol records date back to 1985 with the launch of SAGE II. One of the goals of the aerosol component of the SPARC DI is to provide a comparison of the current measurements in order to best extend the historical record through to the present.

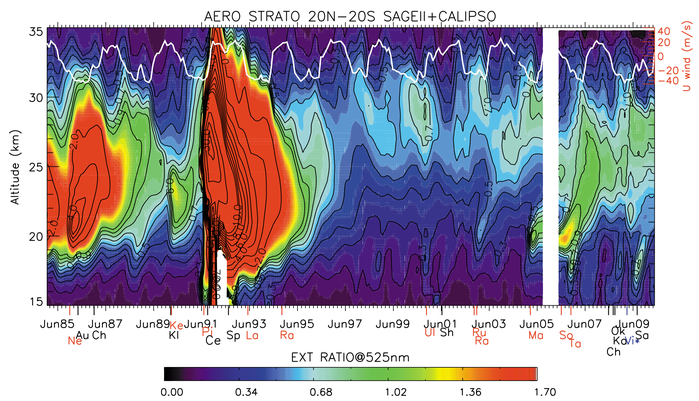


Figure 1: The SAGE II and CALIPSO aerosol extinction ratio data record dating back to pre-1985. This plot illustrates the altitude dependent average of all measurements made within a latitude bin that extends from 20 degrees south to 20 degrees north. Note the measurement gap that occurs after SAGE II was shut off and before CALIPSO was launched. From *Vernier et al. (2011)*, Figure 1.

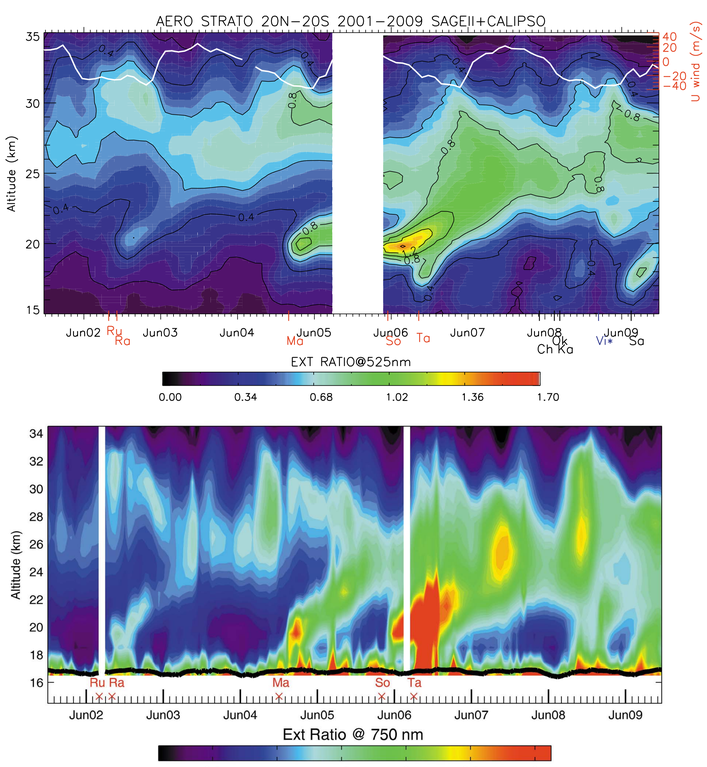


Figure 2: The upper panel is a subset of the figure above that includes the times since OSIRIS was launched. The lower panel is similar OSIRIS measurements for the same time period. Note the extinction ratio for these two panels are defined slightly differently so should not agree in absolute value. What is evident from these plots is the consistency between the three data sets. From *Vernier et al. (2011)*, Figure 2.

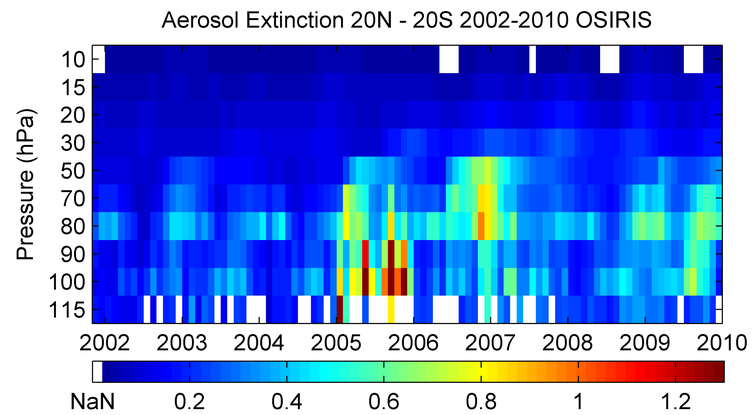
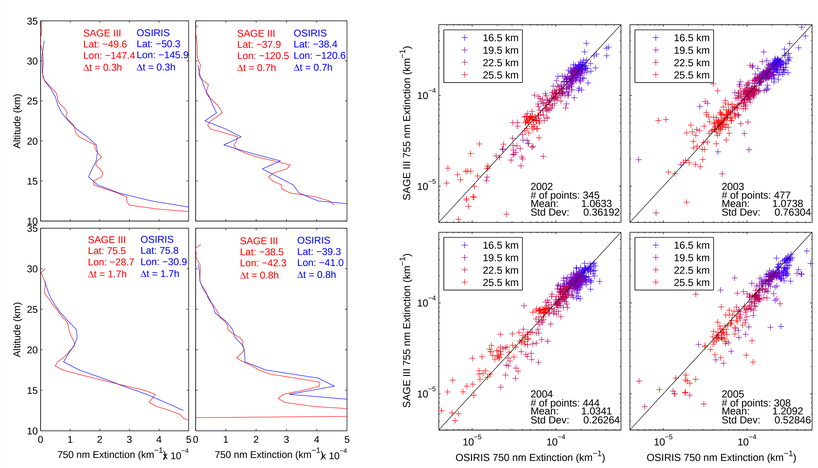


Figure 3: A zonal average SPARC DI look at the OSIRIS data from the same time period. The SPARC DI climatologies are monthly mean zonal averages on predefined pressure levels. The colour scale is extinction per kilometer times 10^{-3}.

OSIRIS / SAGE III Comparisons

Two of the data sets included within the SPARC DI are the OSIRIS and the SAGE III extinction data. These two data records overlap from 2002 to 2005. During the period of overlap the extinction ratio near 750 nm as retrieved by both instruments agrees extremely well. Images taken from *Bourassa et al. (2011)*.



Figures 4&5: Individual coincident comparisons between OSIRIS and SAGE III; scatter plots of multiple comparisons.

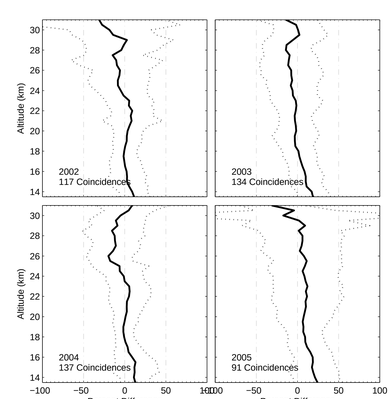


Figure 6: Coincidence statistics.

References:

Vernier, J. P., L. W. Thomason, J. P. Pommereau, A. Bourassa, J. Pelon, A. Garnier, A. Hauchecorne, L. Blanot, C. Trepte, D. Degenstein, and F. Vargas (2011), Major influence of tropical volcanic eruptions on the stratospheric aerosol layer during the last decade, Geophys. Res. Lett., 38, L12,807, doi:10.1029/2011GL047563.

Bourassa, A. E., L. A. Rieger, N. D. Lloyd, and D. A. Degenstein (2011), Odin-osiris stratospheric aerosol data product and sage III intercomparison, Atmospheric Chemistry and Physics Discussions, 11, 25,785–25,811, doi:10.5194/acpd-11-25785-2011.

Further OSIRIS / SAGE III Comparisons

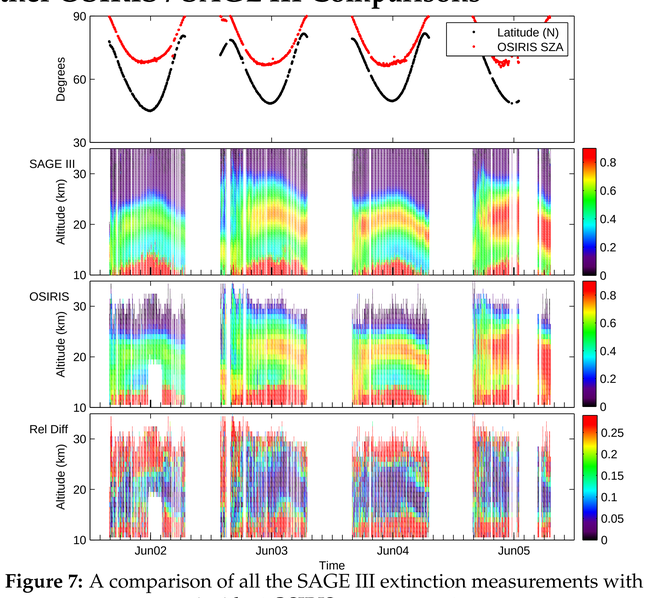


Figure 7: A comparison of all the SAGE III extinction measurements with coincident OSIRIS measurements.

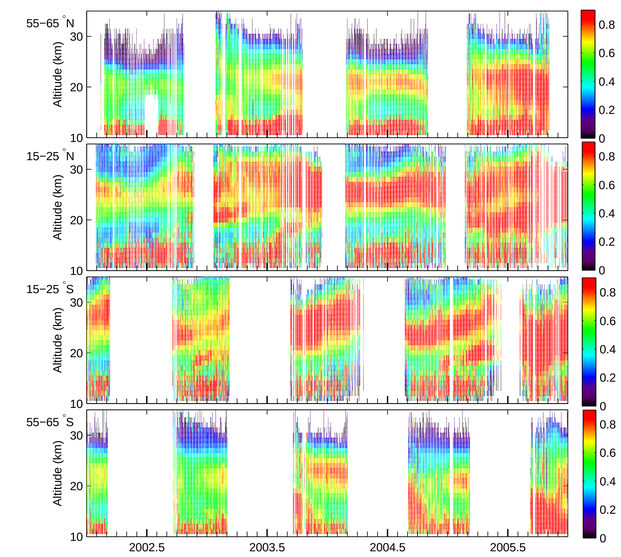


Figure 8: Additional OSIRIS measurements.

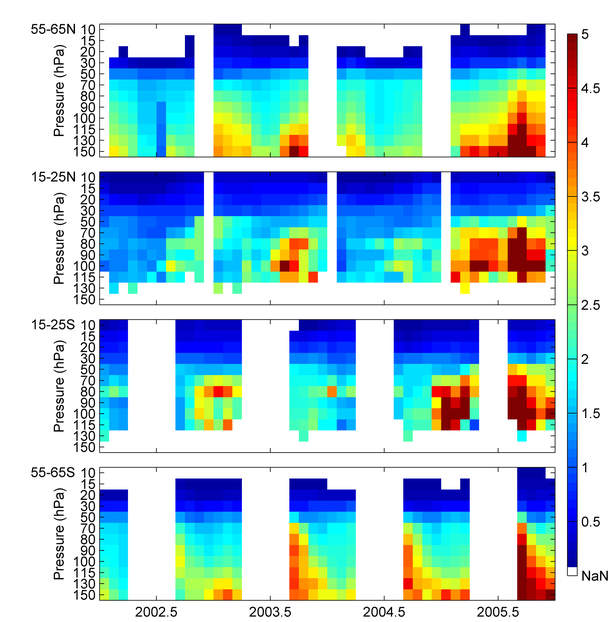


Figure 9: The SPARC DI climatologies that correspond to the OSIRIS measurements seen above.

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for hosting team meetings and providing generous travel support.