

THE METEOR3M/STRATOSPHERIC AEROSOL AND GAS EXPERIMENT III (SAGE III-3M), A BRIDGE TO THE FUTURE FOR LONG-TERM RECORDS OF OZONE AND AEROSOL

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The Meteor3M/Stratospheric Aerosol and Gas Experiment III (SAGE III-3M) was the third in a series of successful space-based solar occultation instruments dating back to 1979. SAGE III-3M was launched aboard a Russian Meteor 3M space-craft on 10 December 2001 and took measurements in a sun-synchronous orbit (930 ascending node Equator crossing time) from February 2002 until April 2005. The main mission of SAGE III-3M was to continue the long-term record of vertical profiles of ozone and aerosol extinction begun by SAGE I. While SAGE III-3M shared many of the design features of its predecessors, it had two key differences. First a CCD array and a photo-diode were used as the detectors and produced spectral, atmospheric extinction profiles from 290 nm to 1020 nm, plus a broadband profile at 1550 nm. This allowed the retrieval of other trace gases (OCIO, BrO), extension of the ozone profile well into the mesosphere using absorption features in the UV, greater sensitivity to larger aerosol particles, and profiles of temperature and pressure. Second, SAGE III-3M had the ability to insert and remove a neutral density filter into the optical path, thus enabling dynamic range large enough to view the Earth's moon as a source for occultation in addition to the usual solar source. These lunar occultations provided valuable profiles of night-time NO₃ and augmented the primarily polar geographical coverage of the solar occultations with observations at middle and lower latitudes. To provide a consistent product from platform to platform, wherever possible, the solar occultation measurements of the SAGE series have been processed with a common methodology, examples of which will be shown in this talk.

The ability to view the moon also enabled SAGE III-3M to measure light scattered from the limb of the Earth. These "limb-scatter" observations have proved quite useful in designing processing algorithms for the next generation of United States space-based ozone profiling instruments, the Ozone Mapping and Profiling Suite (OMPS), to be launched on board the National Polar-orbiting Operational Satellite System (NPOESS) Preparatory Project (NPP), that will use the limb scatter technique. It is illustrated here how SAGE III-3M has served as a bridge between the long-term time series of ozone and aerosol extinction profiles assembled by past SAGE instruments and the future records from OMPS. This talk will also feature a brief discussion of the challenges and promise of the limb scatter technique in relation to the ozone and aerosol time series.