

Beyond the “Golden Age” – Routes to continuing and augmenting the record of spaceborne limb and occultation sounders

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The last 10–15 years arguably represent a “golden age” for spaceborne observations of the middle atmosphere, with at peak twelve limb or occultation sounding instruments operating on eight satellites. These years have also witnessed a significant increase in the number and capabilities of operational nadir sounding instruments providing radiance observations that inform meteorological reanalyses, and the emergence of new temperature profile observations from GNSS radio occultation. Although prospects for future nadir and GNSS sounders are clear and robust, the future for limb and occultation sounders is less assured, with the only confirmed upcoming instrument, from any country or agency, being the ultra violet OMPS-Limb instruments planned for the JPSS 2 and 3 missions, mainly measuring ozone and aerosol. This looming “gap” in limb sounding observations has received much attention within the community, and concerns about it have been raised in several international reports and studies.

The last decade has also seen continued advances in remote sounding technologies, such that it is now possible to construct instruments that can provide “continuity measurements” for a fraction of the costs required for earlier sensors. Alternatively, new technologies also enable new capabilities for future sensors, such as improved spatial resolution, or measurement of additional trace gases or other parameters.

This talk will review the capabilities of limb and occultation sounders with a particular focus on those currently operating or confirmed for upcoming missions. Some representative potential future instrument concepts, in various stages of development, will also be outlined. The scientific and programmatic landscape against which future concepts must be formulated will be discussed, along with the challenges associated with proposing such measurements. Potential avenues for future studies aimed at strengthening the case for measurements and defining requirements will be discussed.

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