**Atmospheric Limb Sounding: Accomplishments, the looming “gap”, and possibilities for filling it.**

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The recent decade has been characterized as a “golden age” for space-borne atmospheric observations, with an extensive suite of atmospheric parameters observed from multiple vantage points. For example, the unparalleled insights derived from the “A-Train” constellation’s collocated observations of multiple atmospheric (as well as land and ocean) variables has underscored the benefits that accrue from a comprehensive multi-sensor, multi-disciplinary approach to Earth observation. Although many of the current generation of measurement records, including from the A-Train, will be extended by future missions (e.g., those in the European Metop and/or US JPSS programs), a notable and very critical “gap” (arguably a cessation) is looming in the established long-term record of limb sounding observations of atmospheric composition, temperature and humidity from the upper troposphere (~10 km) through the mesosphere (90+ km). This gap in limb sounding and its implications are heavily stressed in the recent GCOS “Status of the Global Observing System for Climate” report.

We [1] review the existing record of limb observations and highlight some of the scientific findings these measurements have enabled; [2] describe the impending void in the limb observation record – with only two sensors, measuring a limited number of species and, in one case, with sparse spatial sampling, planned for launch in the coming decade (compared to a peak of 12 instruments operational during the 2000s); and [3] outline a new range of possible sensors, including some low-cost options that simply fill the gap, as well as others that also augment the record with measurements having significantly improved spatial and temporal resolution.