



Sensors

Sodium LIDAR for Spaceborne Missions

A remote sensing technique that enables acquisition of global sodium density.

NASA Goddard Space Flight Center has developed technology to remotely measure sodium (Na) by adapting existing LIDAR technology. This instrumentation is designed to measure Earth's mesospheric Na layer. There is a pressing need in the Ionosphere Thermosphere - Mesosphere (ITM) community for high-resolution measurements that can characterize small-scale dynamics (such as gravity waves with wavelengths smaller than a few hundred km) and their effects in the MLT on a global basis. This technology enables acquisition of global Na density, temperature, and wind measurements in the MLT with the spatial and temporal resolution required to resolve issues associated with the structure, chemistry, dynamics, and energetics of this region.

BENEFITS

- High resolution
- Enables acquisition of global Na density, temperature and wind measurements

technology solution

THE TECHNOLOGY

The instrument consists of a high-energy laser transmitter at 589 nm and highly sensitive photon counting detector that allows for range-resolved atmospheric-sodium-temperature profiles. The atmospheric temperature is deduced from the linewidth of the resonant fluorescence from the atomic sodium vapor D2 line as measured by the tunable laser. A high power energy laser allows for some daytime sodium LIDAR observations when used with a narrow bandpass filter based on etalon or atomic sodium Faraday filters with ~5 to 10 pm optical bandwidth.

APPLICATIONS

The technology has several potential applications:

- Atmospheric research, particularly in the Mesosphere-Lower-Thermosphere (MLT) region
- Meteorology
- Remote sensing
- Sodium detection

PUBLICATIONS

Patent No:

National Aeronautics and Space Administration

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