Micro Pulse Lidar (MPL) and the MPL Network (MPLNET)

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In the late 1960s, lidar (or laser radar) revolutionized observations of clouds and haze in the atmosphere; however, lidar was extremely difficult to employ. The Micro Pulse Lidar (MPL) technology was developed to fill NASA's need for a practical ground-based tool for calibrating and validating satellite-based measurements of clouds and aerosols as well as to conduct base research. Prior to MPL's development in the early 1990s, lidar systems were not eye-safe; were not reliable; and were large, complex, and costly. The MPL device offered vast improvements, providing the only means for continuous, routine lidar monitoring, particularly in remote areas. MPL offered simple, remote, and autonomous operation; long-term (>2-year) reliability; and accurate and comprehensive data gathering in an eye-safe, small, inexpensive, low-power package. Because MPL operates autonomously, personnel costs for lidar system operations decreased dramatically. MPL was first made commercially available in 1994. Sales worldwide created the possibility for a global network of systems, and in 2000 MPLNET was formed. Coordinated by NASA, MPLNET combines the MPL data gathered by the network's members and makes the data available free to scientists and researchers around the world.

For MPLNET to continue to grow, an additional commercial source for MPL devices was needed. Another license was established in October 2004, and that company (Sigma Space Corp.) refers its customers to the MPLNET, encouraging them to become members. The data being processed by MPLNET are available to researchers around the world at no cost. More than 170 researchers have registered to use the data, many of whom have published in more than two dozen articles in *Science*, the *Journal of Geophysical Research*, and the *Journal of Atmospheric and Oceanic Technology*, and other periodicals and presented at more than 50 conferences. Registration is not required to use MPLNET data, however, and the site has had more than 15,000 hits since being launched in 2000. MPL has been and continues to be one of the key cloud-monitoring instruments for the Atmospheric Radiation Measurement (ARM) Program, the largest global change research program supported by the U.S. Department of Energy (DOE). MPL also has been used in many other experiments and research projects.

The MPL device and the data made available through the MPLNET have opened the door to a previously inaccessible realm of research, allowing Earth's atmosphere to be safely studied with lidar. MPL has enabled atmospheric aerosol and cloud data to be obtained safely, continuously, and less expensively than was previously possible. And as MPLNET has demonstrated, MPL also has the potential to be used as part of a vast network of monitoring devices for environmental protection or homeland security applications.

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