THE LIDAR IN-SPACE TECHNOLOGY EXPERIMENT (LITE)

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A spaceborne lidar system is presently being constructed for flight aboard the U.S. space shuttle in early 1991. The experiment, called LITE for Lidar In-Space Technology Experiment, utilizes a neodymium:YAG laser and 0.85-meter effective diameter Cassegranian-configured telescope receiver for making elastic backscatter measurements. The laser will be frequency doubled and tripled simultaneously producing at a 10-Hz rate 200 mJ at 1064 nm, 400 mJ at 532 nm, and 150 mJ at 355 nm. The field of view of the receiver will be adjustable with a nominal 3.4 mr for nighttime measurements and 1.7 mr for daytime measurements. A turning mirror with quad-detector in the receiver system will be used for the 355-nm and 532-nm channels and a silicon avalanche photodiode will probably be used for the 1064-nm channel. The backscatter at all three wavelengths will be simultaneously recorded.

The technological objectives of LITE are to evaluate lidar system operations in space, lidar techniques in space, and to provide a test bed for new lidar techniques in later flights. The measurement objectives include the determination of cloud top and planetary boundary layer heights, the measurement of tropospheric and stratospheric aerosols, and the measurement of temperature and density between 10 to 40 km altitude. Detailed simulations will be presented showing the errors associated with each of these measurement objectives. In addition, the experiment scenario will be described including measurement times, data flow, processing and archival, and initial plans for validation of the LITE data set with correlative measurements.

*Project scientist for LITE. Many others have contributed to the material to be presented in this talk. These include but are not limited to the Project Manager, Mr. Richard Nelms, the Instrument Manager, Mr. Harold Poole, and the following engineering group leaders: Messrs. Leonard Kopia, John Cox, Richard Couch, Anthony Jalink, and William Fuller.