

SPARCLE: a space-based mission to demonstrate global monitoring of tropospheric winds with a Doppler lidar

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Abstract

NASA's New Millennium Program selected a Doppler Wind Lidar (DWL) using heterodyne detection for the EO-2 mission scheduled for launch in 2001. The SPACe Readiness of Coherent Lidar Experiment (SPARCLE) will involve a 100 mJ, pulsed 2 micron laser and a 25 cm wedge scanner. This mission represents the first time a DWL will have flown in space to make tropospheric wind measurements. In addition to demonstrating that the technology can operate in a space environment, the SPARCLE will also provide data sets that are critical to the validation of system performance models and the selection of optimal scanning patterns required for future data products. Extensive computer simulations have been conducted for SPARCLE and some of the follow-on mission concepts that would lead to a fully operational instrument. Global weather forecasting models have been used to provide realistic representations of cloud, water vapor, winds and their effects on DWL data product accuracy and coverage. Results from these simulation efforts indicate that a Coherent DWL can be built and operated to provide virtually full tropospheric coverage, clouds permitting.