Development Status of the Cloud Profiling Radar for the CloudSat Mission

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The Cloud Profiling Radar (CPR) for the CloudSat Mission is developed jointly by the National Aeronautics and Space Administration (NASA), the Jet Propulsion Laboratory (JPL), and the Canadian Space Agency (CSA). The CPR flight model built is nearly completed and the instrument is currently being integrated and tested. During flight operations, CPR will acquire a global data set of vertical cloud structure continuously over a planned two-year period. Such data set is expected to provide crucial input to the studies of cloud physics, radiation budget, water distribution in the atmosphere, and to the numerical weather prediction models

CPR is a 94-GHz nadir-looking radar that measures the power backscattered by clouds as a function of distance from the radar. These data will provide an along-track vertical profile of cloud structure at a 500-m vertical resolution and a 1.5-km horizontal resolution. The design of CPR is driven by the key CloudSat science objective of obtaining a minimum detectable cloud reflectivity of -26 dBZ at the end of the mission. Maximizing the cloud detection sensitivity requires careful tradeoff among several competing and often conflicting parameters, including the cloud backscattering sensitivity, atmospheric absorption, resolution, and radar technology.

In this paper, we will present the CPR instrument design and how such design is being optimized to meet the performance requirement. We will also discuss the various CPR subsystems and the state-of-the art millimeter-wave technologies being employed. The CPR implementation status and the test results will also be summarized.

The research described in this paper was carried out by the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.

(Topic area B11)