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TITLE: The Next Generation of Spaceborne Rain Radars: Science Rationales and Technology Status

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BRIEF BIOGRAPHY: Eastwood Im is the Supervisor of the Atmospheric Radar Science and Engineering Group at JPL, and the Radar Instrument Manager of NASA's CloudSat Mission. He has extensive experience in spaceborne meteorological radar remote sensing and advanced radar system studies. Dr. Im is the Principal Investigator on several NASA's atmospheric science and technology research tasks.

ABSTRACT

Global rainfall is the primary distributor of latent heat through atmospheric circulation. This important atmospheric parameter can only be measured reliably from space. The on-going Tropical Rainfall Measuring Mission (TRMM) is the first space based mission dedicated to advance our understanding of tropical precipitation patterns and their implications on global climate and its change. The Precipitation Radar (PR) aboard the satellite is the first radar ever flown in space and has provided exciting, new data on the 3-D rain structures for a variety of scientific applications. The continuous success of TRMM has led to new development of the next generation of spaceborne satellites and sensors for global rainfall and hydrological parameter measurements. From science and cost efficiency prospective, these new sensing instruments are expected to provide enhanced capabilities and reduced consumption on the spacecraft resources. At NASA, the Earth Science Enterprise has strengthened its investment on instrument technologies to help achieving these two main goals and to obtain the best science values from the new earth science instruments. It is with this spirit that a notional instrument concept, using a dual-frequency rain radar with a deployable 5-meter electronically-scanned membrane antenna and real-time digital signal processing, is developed. This new system, the Second Generation Precipitation Radar (PR-2), has the potential of offering greatly enhanced performance accuracy while using only a fraction of the mass of the current TRMM PR. During the last two years, several of the technology items associated with this notional instrument have also been prototyped. In this paper, the science rationales, the instrument design concept, and the technology status for the PR-2 notional system will be presented.

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