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Cost-Effective Submm-Wave Remote Sensing for Future Global Cloud Observations

Dong L. Wu

Goddard Space Flight Center, Climate Research Lab, Greenbelt, United States (dong.l.wu@nasa.gov)

NASA continues to develop and mature cost-effective submm-wave technologies for a wide range of science applications in global environmental observations. IceCube is the latest spaceflight demonstration of submm-wave technology with a commercial 883-GHz radiometer for cloud ice remote sensing. Cloud ice plays important roles in Earth's energy budget and cloud-precipitation processes. Knowledge of global cloud ice distribution and its variations with the changing climate is a critical part of understanding about the Earth's system as a whole.
The IceCube project took advantage of emerging cubesat opportunities and achieved fast-track spaceflight demonstration for the 883-GHz cloud radiometer, to raise the technology readiness level (TRL) from 5 to 7. It was successfully delivered to ISS in April 2017, deployed from the International Space Station (ISS) in May 2017, and acquired the first global 883-GHz cloud map by July 2017. It continues to collect cloud data at present and explore potential capabilities of cubesat submm-wave observations. The maturation of commercial submm-wave up to 883 GHz opens up a host of remote sensing applications for cloud microphysical properties, atmospheric water vapor and temperature in the future.