

Precipitation observation by small precipitation radar satellites

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Based on the heritages from TRMM/PR and GPM/DPR, a low-cost and wide swath precipitation radar constellation is proposed. With the proposed Small Precipitation Radar Constellation, it is possible to greatly improve the observation frequency of the same spot with respect to GPM/DPR. Although the number of satellites will increase, both the precipitation radar and the satellite bus will utilize already developed products and it will be mounted on relatively inexpensive small satellite to reduce the cost of the overall system. Assuming that both the precipitation radar and the satellite bus utilize already developed products, we aim to target the development cost of the first observatory to 10 billion yen or less (excluding ground equipment, launch, operation cost).

As the application of the small precipitation radar constellation, it is assumed that utilization in disaster prevention such as improving the accuracy of weather forecast, predicting the occurrence of flood caused by typhoon and severe rainfall. Scientifically, it is useful for the study of the diurnal change of precipitation by high frequency observation in tropical zone. Observation data of this precipitation radar can also be used in Southeast Asian countries (Indonesia, the Philippines, Vietnam, etc.), and it is assumed that a satellite constellation will be constructed by countries which are interested in development and launch (Realized by ODA). As a technical development, we aim increase the number of constellation satellite for further high frequent precipitation observation through further size down and cost reduction.

In addition, trade-off study against radar-equipped CubeSat satellite which can observe only nadir direction. The result indicates that the CubeSat type observation is required to have scanning capability to achieve low-cost observation with the comparable observation efficiency of GPM/DPR.

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