1. INTRODUCTION

Global Precipitation Measurement (GPM) started as an international mission and follow-on mission of the Tropical Rainfall Measuring Mission (TRMM) project to obtain more accurate and frequent observations of precipitation. Japan Aerospace Exploration Agency (JAXA) is in charge of the Atmospheric Exploration Agency (JAXA) project to obtain more accurate and frequent observations of precipitation. In order to secure the quality of precipitation estimates, ground validation (GV) of satellite data and retrieval algorithms is essential.

2. TWO-WAY MEASUREMENT USING IDENTICAL KA-BAND RADARS

For validation of DPR algorithm, it is important to validate the specific attenuation (k) and the equivalent radar reflectivity factor (Ze) independently.

\[ Z_e(r) = Z_e(r) - \int k(r) dr \]  
\[ Z_e(r) = Z_e(r) - \int k(r) dr \]

From (1) + (2)

\[ Z_e(r) - Z_e(r) = \int k(r) ds \]

\[ Z_e(r) = \int k(r) ds \]

k and Ze can be directly estimated using the same total attenuation amount between the two radars with same specifications regardless of the precipitation phase.

- Two ground-based Ka-band radars is constructed for two-way measurement.
- Several observation sites are configured for the observation targets (rain, dry snow, wet snow, melting layer).

3. JAXA KA-BAND RADAR SYSTEM

Table 1. Major specifications of the Ka-band radar

<table>
<thead>
<tr>
<th>Mode</th>
<th>Frequency (GHz)</th>
<th>Number of channels</th>
<th>Observation range (km)</th>
<th>Range resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>35.25</td>
<td>1</td>
<td>30-300</td>
<td>5</td>
</tr>
<tr>
<td>Fine</td>
<td>35.25</td>
<td>2</td>
<td>15-250</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2. Observation modes for Ka radar

<table>
<thead>
<tr>
<th>Mode</th>
<th>Operation (channel)</th>
<th>Number of channels</th>
<th>Observation range (km)</th>
<th>Range resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1</td>
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4. SYSTEM EVALUATION

Comparison between Ka radar and well-calibrated radar (C-band Okinawa Bistatic Polarimetric Radar (COBRA)) of NICT and disdrometer for system evaluation.

- Similar cross sections of reflectivity between Ka radar and COBRA
- Good correlation of reflectivities on scatter diagrams with COBRA and disdrometer

Ka radar has good performance quantitatively for GV experiments.

5. PRELIMINARY RESULT OF TWO-WAY MEASUREMENT

Good correlation of reflectivities on scatter diagrams with COBRA and disdrometer

- Equivalent reflectivity factors (Ze) and specific attenuation (k) values can be calculated from the profiles of Ka radar on two-way measurements.
- These values are well correlated with those from DSD estimated by disdrometer.

The result of two-way observation is quite reasonable.

5. FUTURE PLAN

Five observation sites are prepared for the DPR algorithm validation targeted to several types of the precipitation (rain, dry snow, wet snow and melting layer).

Campaign Observation on Mt. Fuji will be conducted from next month!