Nobuhiro Takahashi

Early result of 90-degree yaw experiment during the TRMM end of mission descent

ntaka@nagoya-u.jp

Authors

Nobuhiro Takahashi, Nagoya Univsersity,
Toshio Iguchi, NICT,
Hiroshi Hanado, NICT,
Kenji Nakamura, Dokkyo University,

TRMM satellite implemented special 90-degree yaw operation during the descent toward the Earth in November 2014 as one of the TRMM end of mission (EOM) experiment (Takahashi et al., 2016). This experiment was aimed to observe a single target from various incident angles from nadir to 28 degrees. During this experiment total 880 minutes of data were obtained mainly over the south eastern Pacific. Note that we can obtain all the incident angle data within a 5-km-diameter circle. In other words, we can obtain an incident angle dependency of a single target if we assume the homogeneity of 5 km area. These data are analyzed by several approaches such as main lobe clutter height evaluation with the clutter noise ratio, incident angle characteristics of the sea/land surface echo against the sea/land surface condition, and the relationship with the precipitation system with the sea surface condition. The early results indicates that the clutter height increased monotonically with the incident angle as expected while the clutter noise ratio decreases significantly larger incident angle of larger than 25 degrees. Incident angle characteristics of the sea/land surface echo are sorted by the echo power of the fixed incident angle to see the dependency of the sea/land surface echo against the sea/land surface condition. The result shows that the stronger nadir echo corresponds to the weaker echo at the wider angle. This result is consistent with the incident angle characteristics of the sea surface echo depends on the sea surface roughness. This idea is also supported by the system noise characteristics that the lower system noise appeared when the near-nadir sea surface echo is higher (smoother sea surface condition). The early result indicates that high near-surface echo area (the smoother sea surface region) sometimes locates just near the rain area.