Passive Microwave Rainfall Retrieval Algorithm in the oceans of East Asia

Eun-Kyoung Seo[1], Geun-Hyeok Ryu[2] and Svetla Hristova-Veleva[3]

[1] Kongju National University(Korea), [2] KMA National Meteorological Satellite Center(Korea), and [3] JIFRESSE(UCLA)

Background and Purpose

According to the CFADs of radar reflectivity for 5-year summer (JJA) seasons, the region near the Korean Peninsula produces stronger, deeper convective clouds and more intense rain than the tropical and subtropical oceans in the East Asia, although the other regions are located in warmer environments (Seo 2011). Also, shallow convective clouds producing very strong rain intensity and highly variable radar reflectivity at lower rain layers are frequently observed by the PR instrument near the Korean Peninsula (e.g., Seo 2011; Sohn et al. 2013). Hence, those regional rainfall features need to be reflected by rainfall retrieval algorithms around the Korean Peninsula.

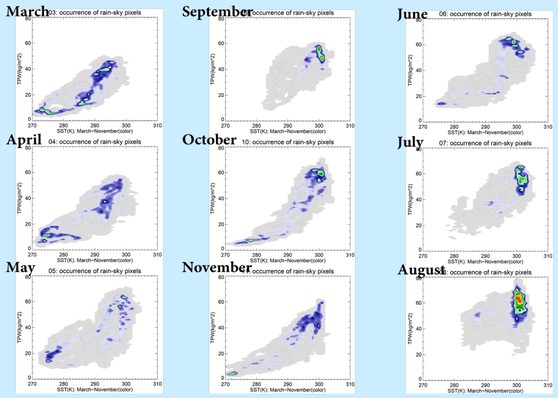
We designed and developed the Korean GPM (KGPM) rainfall retrieval algorithm which is suitable for the Korean Peninsula and its surrounding region. In particular, the database consisting of raining clouds and their corresponding brightness temperatures at GMI frequencies is built for rainfall systems occurring in East Asia using 1-d variational approach in EOF space to reconcile model simulations with radar/radiometer observations.

Features of the KGPM Algorithm

The KGPM rainfall retrieval algorithm is to employ the following features:

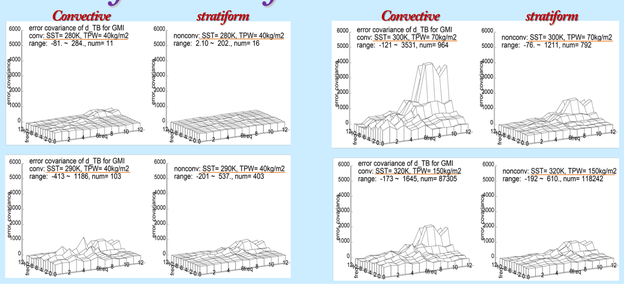
(1) rain detection algorithm (Hristova-Veleva 2018)
(2) rain-type classification algorithm (Hristova-Veleva 2018)
(3) the difference vector, between observed TBs and background (or clear-sky) TBs, which is inverted into rainfall rate
(4) the 1dVAR-EOF optimized cloud-radiation database for East Asia (Seo et al. 2016)
(5) the variable error covariance TB matrix for Bayesian inversion

Monthly evolution of SST and TPW environments

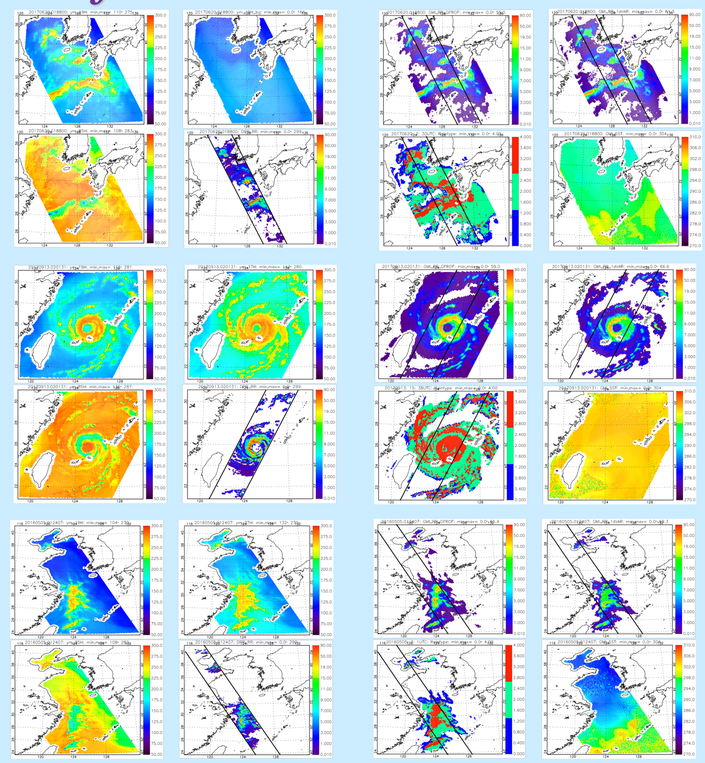


error covariance as a function of

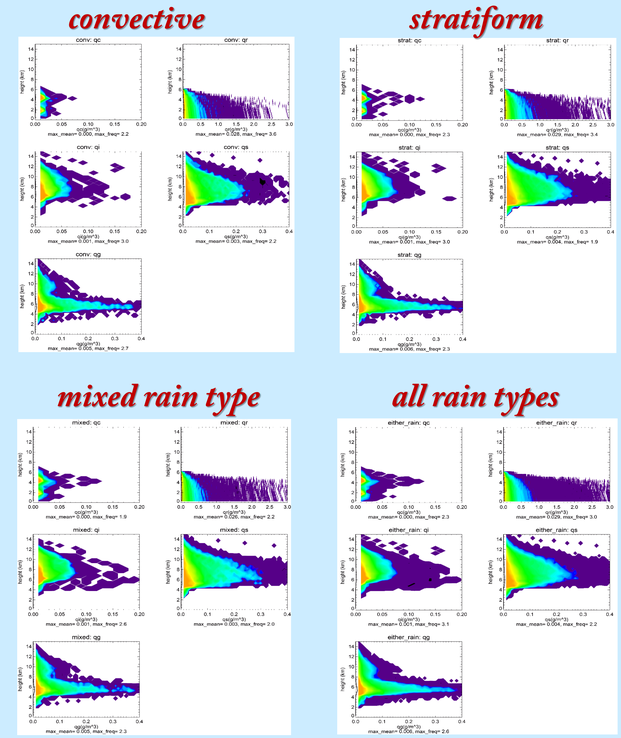
(1) Seasons
(2) Rain types
(3) SST
(4) TPW



Rainfall Retrieval



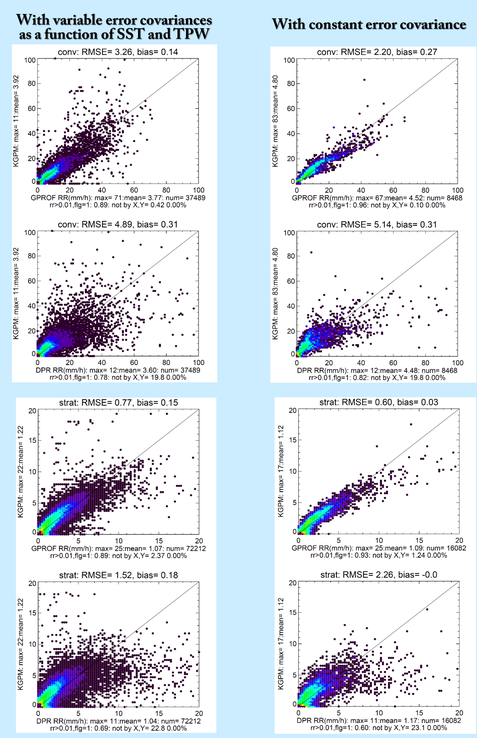
Hydrometeor Retrieval



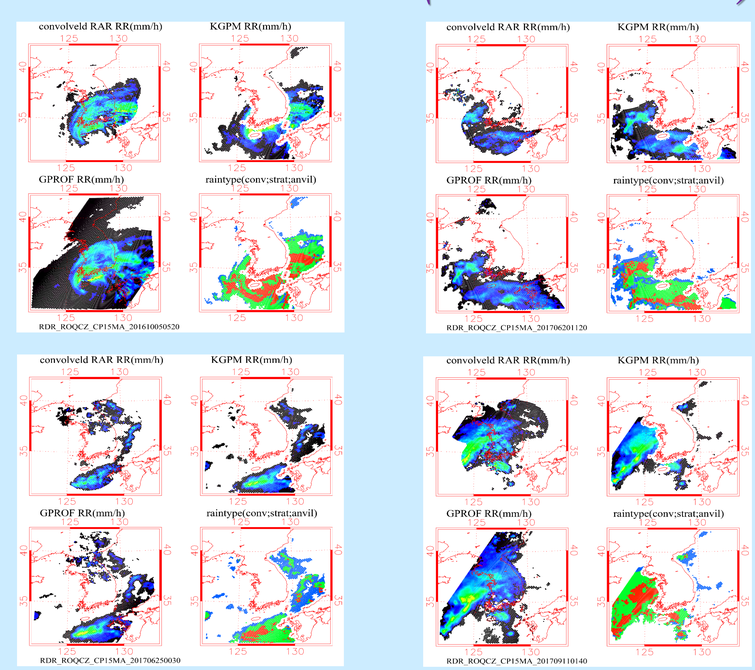
Comparison of rain retrieval with GPROF & DPR

convective

stratiform



Comparison of rain retrieval with RAR (Radar-AWS rainrate)



Acknowledgement This study has been supported by the National Meteorological Satellite Center (NMSC) of the Korea Meteorological Administration (KMA)