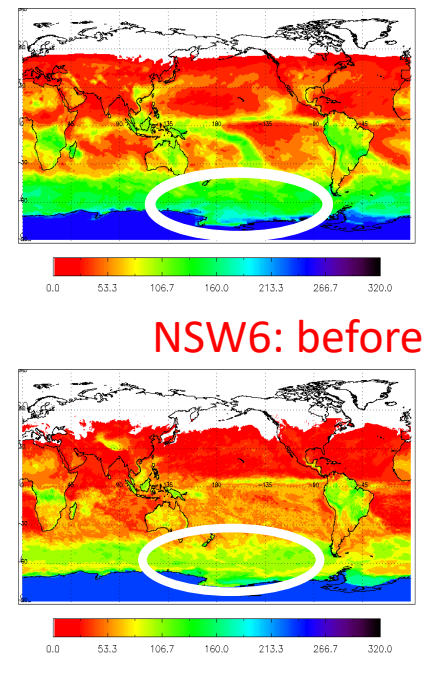
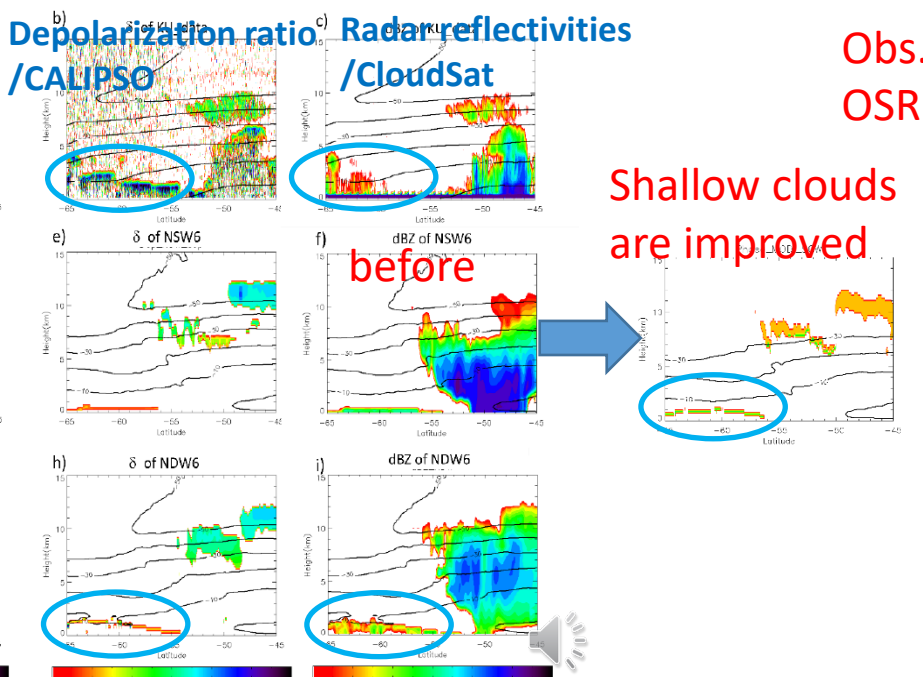
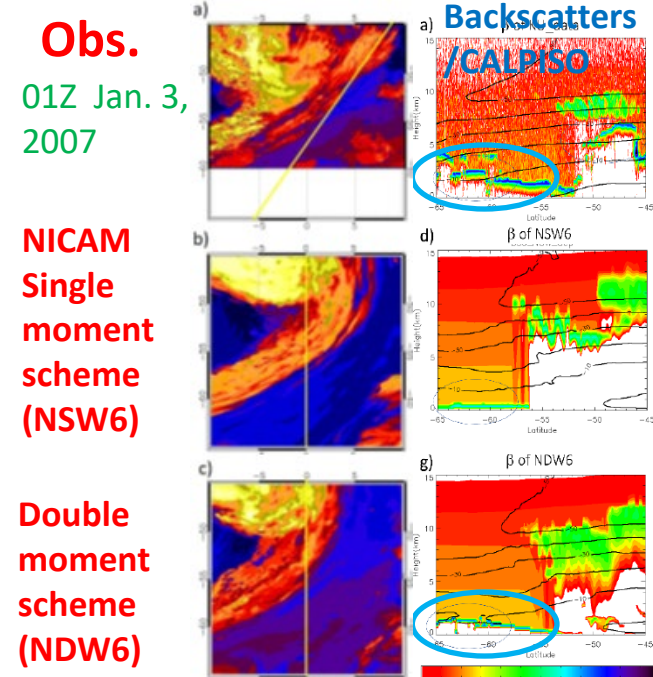
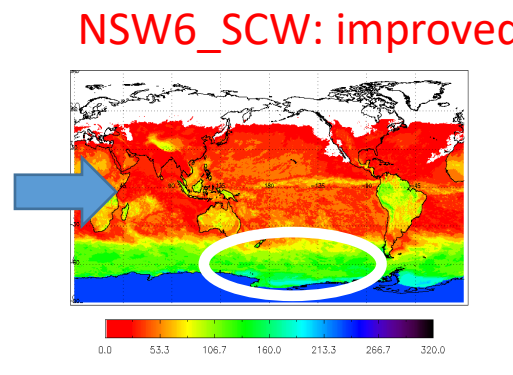


- Use of the global, the stretched, and the regional models which possess the same dynamical core and physics: **NICAM/stretch-NICAM/diamond-NICAM**
- Evaluation and improving of clouds in local domains. [Uchida et al. \(2017, MWR\)](#)
 - ✓ Use of various kinds of observations, including satellite observations and ground remote sensing data: Joint-Simulator for Satellite Sensors
- Testing the improved scheme in the global domain. [Hashino et al. \(2013, JGR\)](#)

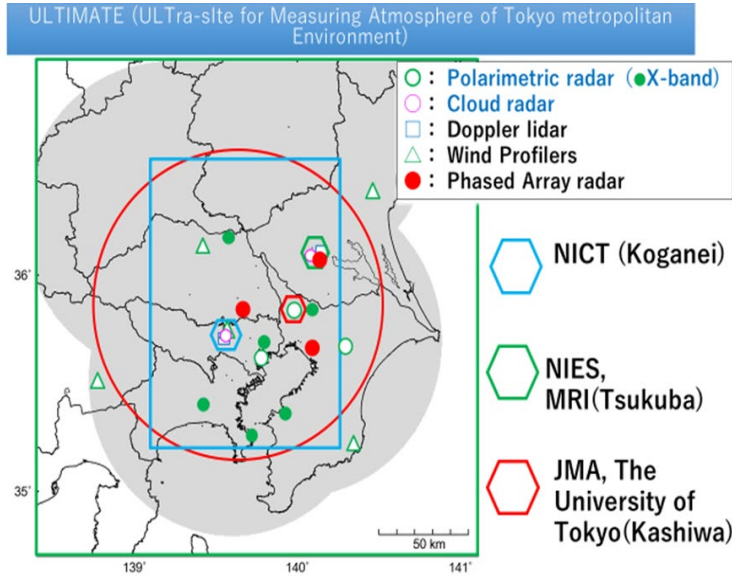
- Stretched simulation over the southern ocean [Roh et al. \(2020, JAS\)](#)
- Evaluation of cloud phase using depolarization of CALIPSO & improvements
- NSW6_SCW is developed by enhancing super cooled water. [Seiki and Roh \(2020, JAS\)](#)



Super cooled water is enhanced in the southern ocean, and OSR is improved.



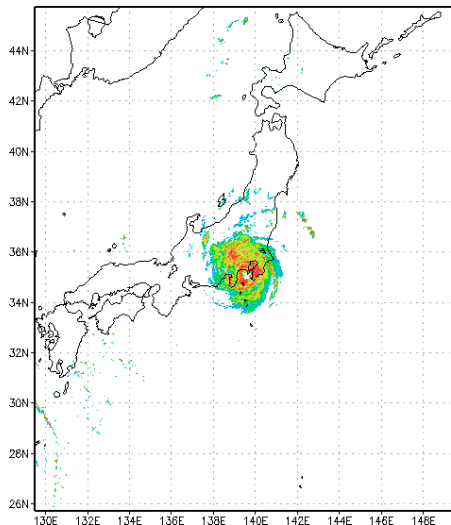
ULTIMATE (ULtra site for Measuring Atmosphere of Tokyo metropolitan Environment) project



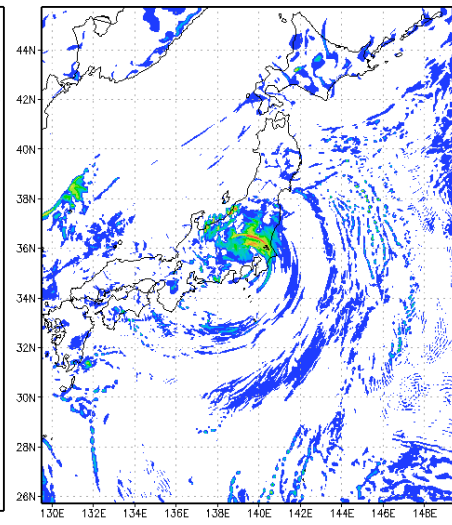
- Tokyo metropolitan area is covered by several intensive observation networks.
- The EarthCARE satellite will be launched in 2022-2023, and the ground validation site is prepared at NICT (Koganei): cloud radar (CPR), lidar observations.
- Collaboration studies: Numerical simulations (cloud and precipitation) are compared, evaluated, improved by using ground observations and satellite observations.
- NICAM: the stretched model, with the Joint simulator for satellite sensors
- The available observation data: CPR, HSRL, wind profiler, C-band polarimetric radar (JMA), X-band phased array polarimetric radar (NICT).
- Use of POLArimetric Radar Retrieval and Instrument Simulator (POLARRIS, Matsui et al. 2019) for C-band polarimetric radar.
- Cases: Typhoon FAXAI in September 2019; Severe storm in April 2020

17UTC 8th Sep. 2019 (Tropical cyclone FAXAI)
Precipitation

Radar Observation (JMA)

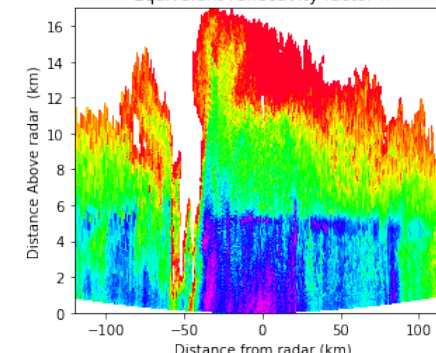
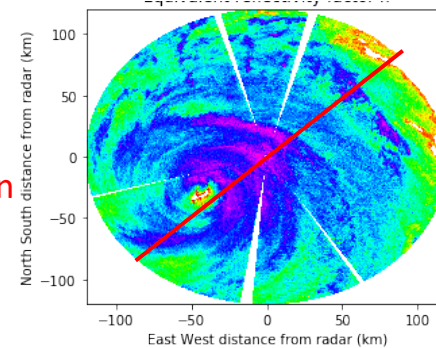


NICAM GL9 (1.4km)

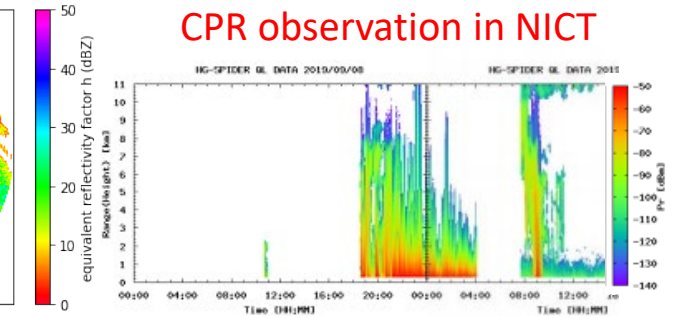


C-band
radar
observation
(JMA)

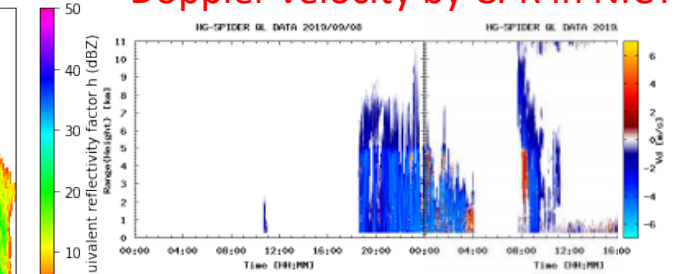
Cross-
section of
C-band
(RHI)



CPR observation in NICT



Doppler velocity by CPR in NICT



9/8

9/9

ULTIMATE: Polarimetric radar obs. vs NICAM Joint-Simulator/POLARRIS evaluation

Obs.

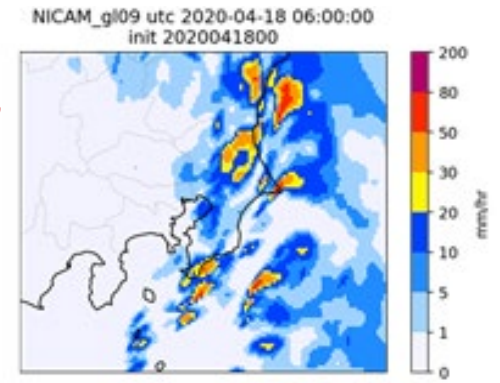
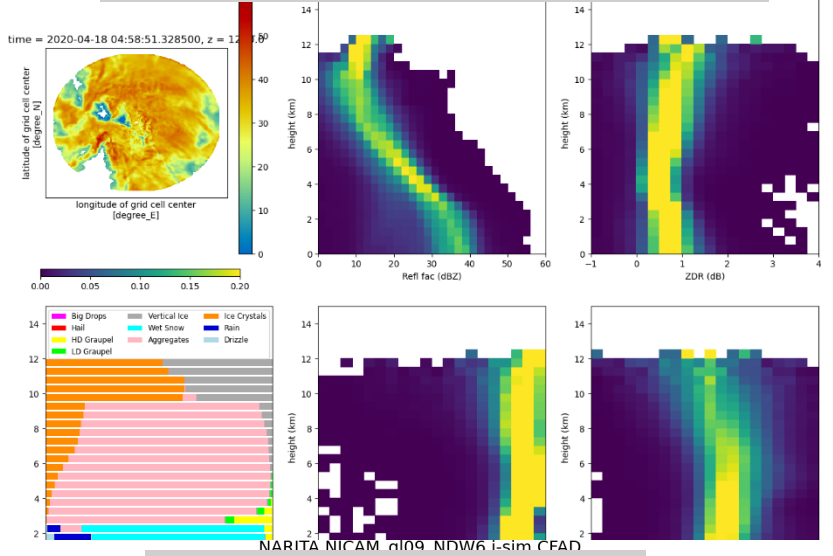
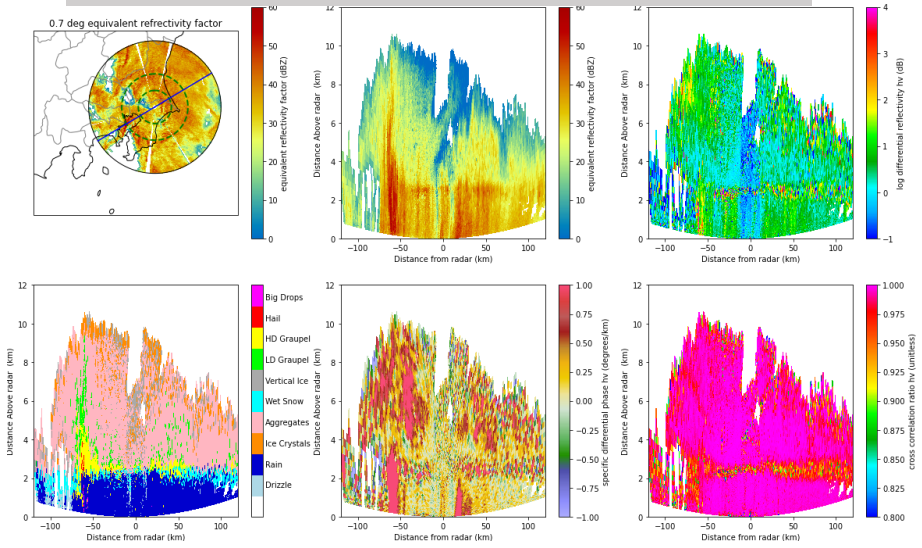
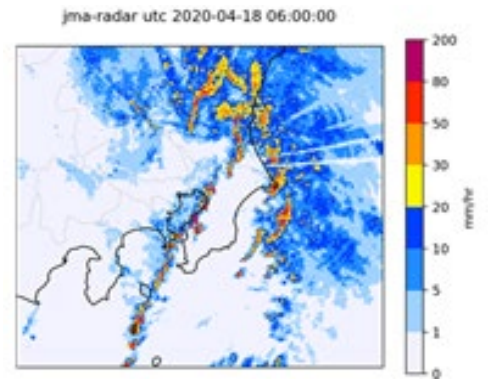
15Z Apr.
18, 2020

Stretch-
NICAM GL9,
dx=1.4km
Single
moment
scheme
(NSW6)

Double
moment
scheme
(NDW6)

Obs.: Narita Airport DRAW RHI

Narita Airport DRAW CFAD



NICAM NSW6, CFAD

NICAM NDW6, CFAD

