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Global 3.5km-mesh NICAM experiment: cloud evaluation using J-simulator and TCgenesis analysis of Fengshen (2008) comparing PALAU field experiment

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The Nonhydrostatic Icosahedral Atmospheric Model, NICAM, is used to simulate multi-scale structure of tropical convective system. During the Year of Tropical Convection (YOTC), we chose an event related to Tropical Cyclone Fengshen (2008) and performed a global nonhydrostatic simulation with mesh size approximately 3.5 km for the period June 15-25, 2008. A weak MJO is coming near the maritime continent during this period and surface westerlies became stronger near the equatorial western Pacific; this is a favorable condition for the TC-genesis in the north-western Pacific. The simulation reproduced the TC-genesis and the track of Fengshen quite well. We found that a sequence of equatorial waves and TD-type disturbances contributed the TC-genesis (Nasuno et al.'s presentation). We also found that a coupling of middle-level and low-level vorticities associated with two different cloud systems caused a deepening of the cyclone in the genesis stage. This vorticity coupling is observed at the PALAU-2008 field experiment (Yamada et al.'s presentation). The simulation and the field experiment clarified that the TC-genesis of Fengshen is described by such a combination of multiscale disturbances related to MJO, synoptic-scale waves, and MCSs. The cloud properties of the NICAM simulations are evaluated using the J-simulator, which is integrated through the future JAXA-ESA joint satellite mission, EarthCARE. The multiple sensor signals are compared between NICAM and existing satellite observations, CloudSat/CALIPSO. This method directly quantifies the cloud properties of the simulation, and we found that effective radius of upper clouds is overestimated and ice water content is generally smaller than the reality.