[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS04]Towards integrated understandings of cloud and precipitation processes

convener:Kentaroh Suzuki(Atmosphere and Ocean Research Institute, University of Tokyo), Yukari Takayabu(Atmosphere and Ocean Research Institute, the University of Tokyo), Hirohiko Masunaga
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Clouds and precipitation are among the largest uncertainties in weather predictions and climate projections. To overcome this difficulty, substantial progresses are required in understandings of cloud and precipitation processes and their interactions with large-scale environment. Such progresses, however, have been hampered by historical separation of the science community into two, namely, one for clouds and the other for precipitation, despite the fact that clouds and precipitation are inseparable phenomena.
This session aims to integrate various studies of clouds and precipitation across the two communities over different spatial and temporal scales. A particular focus is placed on better understandings of fundamental processes governing the cloud and precipitation phenomena and their multi-scale interactions with environment through dynamical, thermodynamical and radiative processes. A wide variety of studies with theoretical, modeling and observational approaches are solicited in this session to seek a novel way for combining different methodologies to obtain unified, holistic understandings of the cloud and precipitation systems. The solicited area of research includes but is not limited to cloud microphysics, cloud-radiation interaction, convection dynamics, meso-scale phenomena and various multi-scale interactions including tropical aggregation of clouds, by means of a breadth of approaches encompassing in-situ and satellite observations, theoretical process studies and numerical modeling. Through discussion of presented papers, the session is also intended to enhance collaborations among different disciplines and communities for substantially advancing our understandings of cloud and precipitation processes.

[AAS04-P09]Improvement of the Downburst Detection Algorithm using Single-Doppler Radar Data in South Korea

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A downburst is a density current originated from precipitation-caused dragging force and evaporative cooling at the mature stage of a convective storm. The wind shears (the rapid change in wind speed and direction) in the low altitude occurred by microburst endanger in the airplane safety during takeoffs and landings. Downburst is one of the most difficult weather phenomena to be detected and predicted considering its nature of being developed and dissipated in short time (in an hour). The algorithm of Automated Microburst Detection Algorithm (AMDA) was developed using Airport Surveillance Radar 9 (ASR-9) focusing on the microburst in the airports. AMDA was applied to Weather Surveillance Radar (WSR-88D) recently to detect downbursts in any other regions including residential areas. AMDA detects wind-shear segments out to 70 km range from single WSR-88D by combining features from reflectivity and radial velocity fields. AMDA further modified to be applied to the Korean Doppler radar network as DownBurst Detection Algorithm (DBDA).

In this work, enhanced DBDA (eDBDA) developed to improve DBDA by extracting and combining downburst characteristics in the lowest two elevation angles. The features of downburst in plan position indicators (PPIs) were overlapped to obtain the spatial confirmation. Detected downburst is expressed as probabilities. Detections can support forecasters to determine downbursts using different probabilities as thresholds. The performances of eDBDA and DBDA were evaluated by the statistical scores of Probability Of Detection (POD), False Alarm Rate (FAR), and Critical Success Index (CSI) based on 28 scans (including downbursts). The accumulated statistical results showed improved results of eDBDA compared to that of DBDA.