EGU21-3799
https://doi.org/10.5194/egusphere-egu21-3799
EGU General Assembly 2021

Raindrop size distribution retrieval model from polarization radar observations using neural network techniques

Jingxuan Zhu, Enze Chen, and Qiang Dai
Key Laboratory of VGE of Ministry of Education, Nanjing Normal University, Nanjing, China (catar1213@foxmail.com)

Raindrop size distributions (DSD) information plays a significant role in many scientific fields, especially in radar meteorology. DSD has spatial and temporal variation across different storm types and climatic regimes. Since the development of polarimetric weather radar, the large-scale DSD estimation has been a long-standing goal in radar meteorology. Traditional polynomial regression algorithms for ground polarimetric radars are widely used to estimate DSD parameters due to their simple methodology and acceptable accuracy. However, a simple polynomial regression may not be able to deeply explore the intrinsic relationship using available observations. This study therefore proposes a DSD retrieval model that uses dual-polarization radar observations based on long short-term memory (LSTM) network techniques. Three schemes of a normalized gamma DSD parameters (LSTM- D_0, LSTM- N_w, and LSTM-μ) are designed with different combinations of polarimetric radar measurement inputs. Results show that all LSTM estimators exhibit better performance than the polynomial regression method. The proposed retrieval model using neural network techniques helps to improve quantitative precipitation estimation of weather radar and make sense of a better understanding of precipitation microphysics.