A new aerosol-cloud relationship deduced from observations in China has been introduced into CMA Unified Atmospheric Chemistry Environmental Forecasting System (CUACE), a unified numerical chemical weather forecasting system with sectional aerosol microphysics for BC, OC, Sulfate, Nitrate, Ammonia, Dust and Sea-Salt aerosols and their sources, gas to particle processes, SOA, microphysics and transformation. Through this aerosol-cloud relations and a mixing phases cloud physics with 7 types of hydrometers (cloud water, rain water, snow, graupel, ice, ice number concentration and graupel number concentration) and cloud droplet number concentration made predicted, the effect of the aerosol on cloud microphysics and precipitation has been online studied in a polluted episode in North China. We found that the aerosol change the distribution of different hydrometers and reduce the false prediction of the precipitation.

Key words: aerosol cloud interaction, CUACE