EGU21-3369, updated on 01 Dec 2022
https://doi.org/10.5194/egusphere-egu21-3369
EGU General Assembly 2021

The impact of Secondary Ice Processes on a stratocumulus-to-cumulus transition during a Cold-Air Outbreak

Michail Karalis[1], Georgia Sotiropoulou[2,3], Steven J. Abel[4], Elissavet Bossioli[1], Paraskevi Georgakaki[3], Georgia Methymaki[1], Athanasios Nenes[3,5], and Maria Tombrou[1]

[1]Divis. of Environmental Physics and Meteorology, Dept. of Physics, University of Athens, Athens, Greece
[2]Department of Meteorology, Stockholm University, Stockholm, Sweden
[3]Laboratory of Atmospheric Processes and their Impacts, ENAC, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland
[4]Met Office, Exeter, United Kingdom
[5]Institute of Chemical Engineering Sciences, Foundation for Research and Technology Hellas, Patras, Greece

The representation of boundary layer clouds during marine Cold-Air Outbreaks (CAO) remains a great challenge for weather prediction models. Recent studies have shown that the representation of the transition from stratocumulus clouds to convective cumulus open cells largely depends on microphysical and precipitation processes, while Abel et al. (2017) further suggested that Secondary Ice Processes (SIP) may play a crucial role in the evolution of the cloud fields. In this study we use the Weather Research Forecasting model to investigate the impact of the most well-known SIP mechanisms (rime-splintering or Hallet-Mossop, mechanical break-up upon collisions between ice particles and drop-shattering) on a CAO case observed north of UK in 2013. While Hallet-Mossop is the only SIP process extensively implemented in atmospheric models, our results indicate that collisional break-up is also important in these conditions.

Abel, S. J., Boutle, I. A., Waite, K., Fox, S., Brown, P. R. A., Cotton, R., Lloyd, G., Choularton, T. W., & Bower, K. N. (2017). The Role of Precipitation in Controlling the Transition from Stratocumulus to Cumulus Clouds in a Northern Hemisphere Cold-Air Outbreak, Journal of the Atmospheric Sciences, 74(7), 2293-2314. Retrieved Jan 9, 2021, from https://journals.ametsoc.org/view/journals/atsc/74/7/jas-d-16-0362.1.xml