Collision-coalescence theory pdf

Research article 10 Jul 2017 Research article | 10 Jul 2017 Fabian Hoffmann Fabian Hoffmann Fabian Hoffmann Institute of Meteorology and Climatology, Leibniz Universität Hannover, Hannover, Germany Institute of Meteorology and Climatology, Leibniz Universität Hannover, Hannover, Germany Correspondence: Fabian Hoffmann (hoffmann@muk.uni-hannover.de) Hide author details Received: 10 Feb 2017 – Discussion started: 15 Feb 2017 – Revised: 08 Jun 2017 – Accepted: 13 Jun 2017 – Published: 10 Jul 2017 Abstract. Activation is necessary to form a cloud droplet from an aerosol, and it is widely accepted that it occurs as soon as a wetted aerosol grows beyond its critical radius. Traditional Köhler theory assumes that this growth is driven by the diffusion of water vapor. However, if the wetted aerosols are large enough, the coalescence of two or more particles is an additional process for accumulating sufficient water for activation. This transition from diffusional to collectional growth marks the limit of traditional Köhler theory and it is studied using a Lagrangian cloud model in which aerosols and cloud droplets are represented by individually simulated particles within large-eddy simulations of shallow cumuli. It is shown that the activation of aerosols larger than 0. 1 µm in dry radius can be affected by collision and coalescence, and its contribution increases with a power-law relation toward larger radii and becomes the only process for the activation of aerosols larger than 0. 4–0. 8 µm depending on aerosol concentration. Due to the natural scarcity of the affected aerosols, the amount of aerosols that are activated by collection is small, with a maximum of 1 in 10 000 activations. The fraction increases as the aerosol concentration increases, but decreases again as the number of aerosols becomes too high and the particles too small to cause collections. Moreover, activation by collection is found to affect primarily aerosols that have been entrained above the cloud base. Page 2 04 Jul 2017 Contribution of different processes to changes in tropical lower-stratospheric water vapor in chemistry–climate models Kevin M. Smalley, Andrew E. Dessler, Slimane Bekki, Makoto Deushi, Marion Marchand, Olaf Morgenstern, David A. Plummer, Kiyotaka Shibata, Yousuke Yamashita, and Guang Zeng Atmos. Chem. Phys., 17, 8031–8044, 2017 Short summary 04 Jul 2017 Intercomparison of meteorological analyses and trajectories in the Antarctic lower stratosphere with Concordiasi superpressure balloon observations Lars Hoffmann, Albert Hertzog, Thomas Rößler, Olaf Stein, and Xue Wu Atmos. Chem. Phys., 17, 8045–8061, 2017 Short summary 04 Jul 2017 Effect of volcanic aerosol on stratospheric NO2 and N2O5 from 2002–2014 as measured by Odin-OSIRIS and Envisat-MIPAS Cristen Adams, Adam E. Bourassa, Chris A. McLinden, Chris E. 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Phys., 17, 8577–8598, 2017 Short summary 14 Jul 2017 Lidar ratios of stratospheric volcanic ash and sulfate aerosols retrieved from CALIOP measurements Andrew T. Prata, Stuart A. Young, Steven T. Siems, and Michael J. Manton Atmos. Chem. Phys., 17, 8599–8618, 2017 Short summary 14 Jul 2017 Arctic regional methane fluxes by ecotope as derived using eddy covariance from a low-flying aircraft David S. Sayres, Ronald Dobosy, Claire Healy, Edward Dumas, John Kochendorfer, Jason Munster, Jordan Wilkerson, Bruce Baker, and James G. Anderson Atmos. Chem. Phys., 17, 8619–8633, 2017 Short summary CC BY 4.0 collision-coalescence theory pdf. collision coalescence theory upsc. collision coalescence theory of precipitation. collision coalescence theory of cloud precipitation. collision-coalescence process theory

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