

2D kinematic cloud model with κ -Köhler aerosol chemistry and Monte-Carlo coalescence scheme

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MPI-M Hamburg, October 24th 2011

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(validation with Barbados aerosol/cloud data?)

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About the model (work in progress!)



funding: project accepted for funding on Oct. 14th 2011

dynamics: 2D prescribed-flow kinematic framework
(e.g. Rasinski, Pawlowska & Grabowski 2011, Atmos. Res.)

μ -physics: aerosol/cloud/drizzle/precipitation (particle-based)

(e.g. Arabas & Pawlowska 2011, GMD)

coalescence: Monte-Carlo (aka Super-Droplet)
(Shima et al. 2009, QJ)

numerics: MPDATA for advection, CVMODE for deep growth

implem.: C++ / expression-templates / Boost/MPI/thread

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activation: method of lines / κ -Köhler

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numerics: MPDATA for advection, CVODE for deep growth

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numerics: MPDATA for advection, DVODE for deep vertical

implem.: C++ / expression templates / Boost MPI / thread

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coalescence: Monte-Carlo (aka Super-Droplet)

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numerics: MPI+OpenMP / OpenMP / OpenCL / GPU

implem.: C++ / expression templates / Boost/MP1/Thread

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Possible applications / where the Barbados data fits in?

- cloud parametrisation testbed/benchmark tool
(μ -physics decoupled from dynamics)
- aid for remote-sensing retrieval algorithms development
(arbitrary droplet spectrum moments in every grid cell)
- aerosol processing studies
(CCN properties retained in activation/growth/coalesc./evap.)

- soundings and aerosol spectra (kappas?) as input parameters
- cloud droplet spectra for validation (only cloud tops?)
- cloud-radar (reflectivities and derived products, velocities?)
- new „Barbados” simulation set-ups (who's modelling it?)

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