On Numerical Broadening of Droplet-Size Spectra

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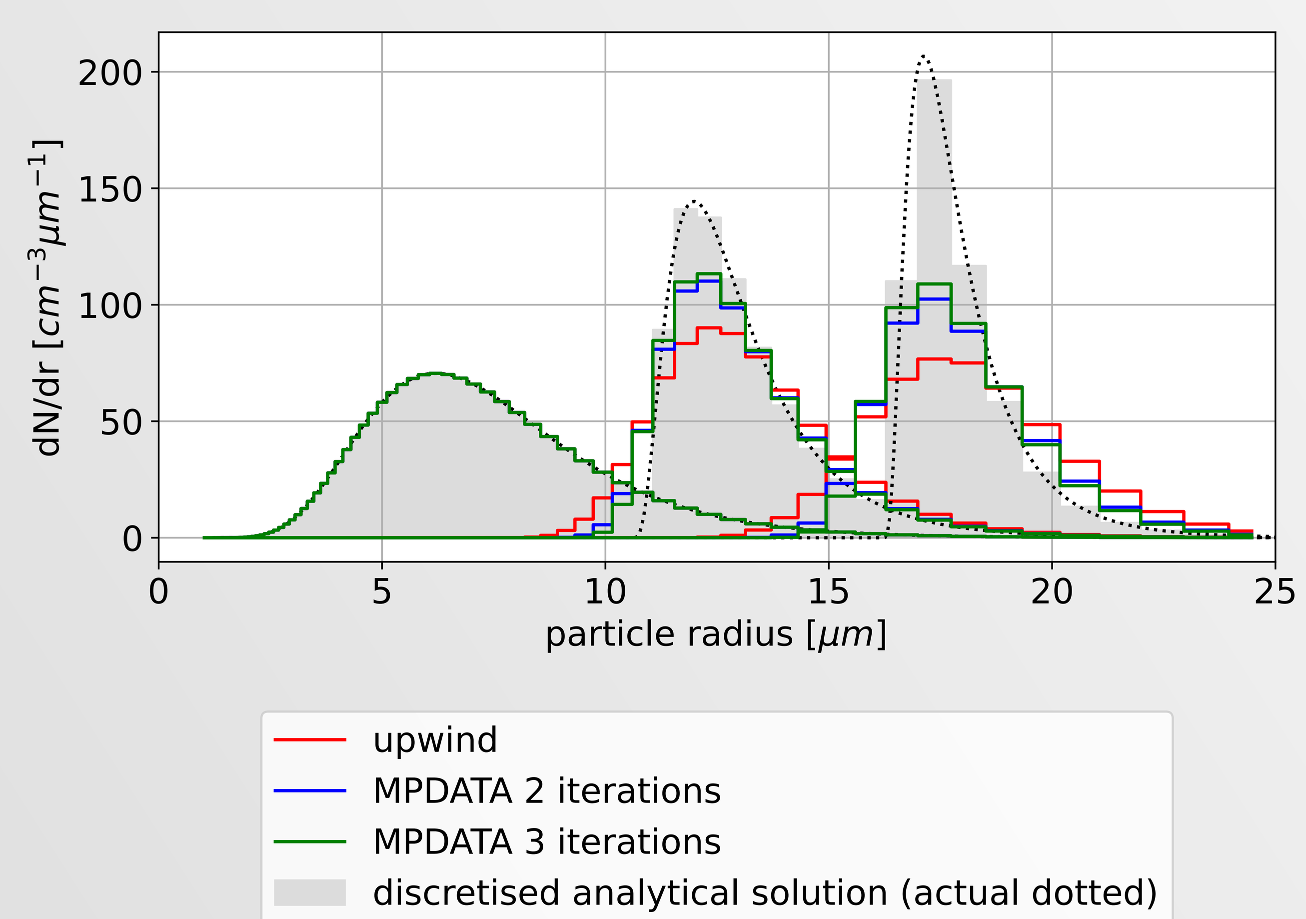
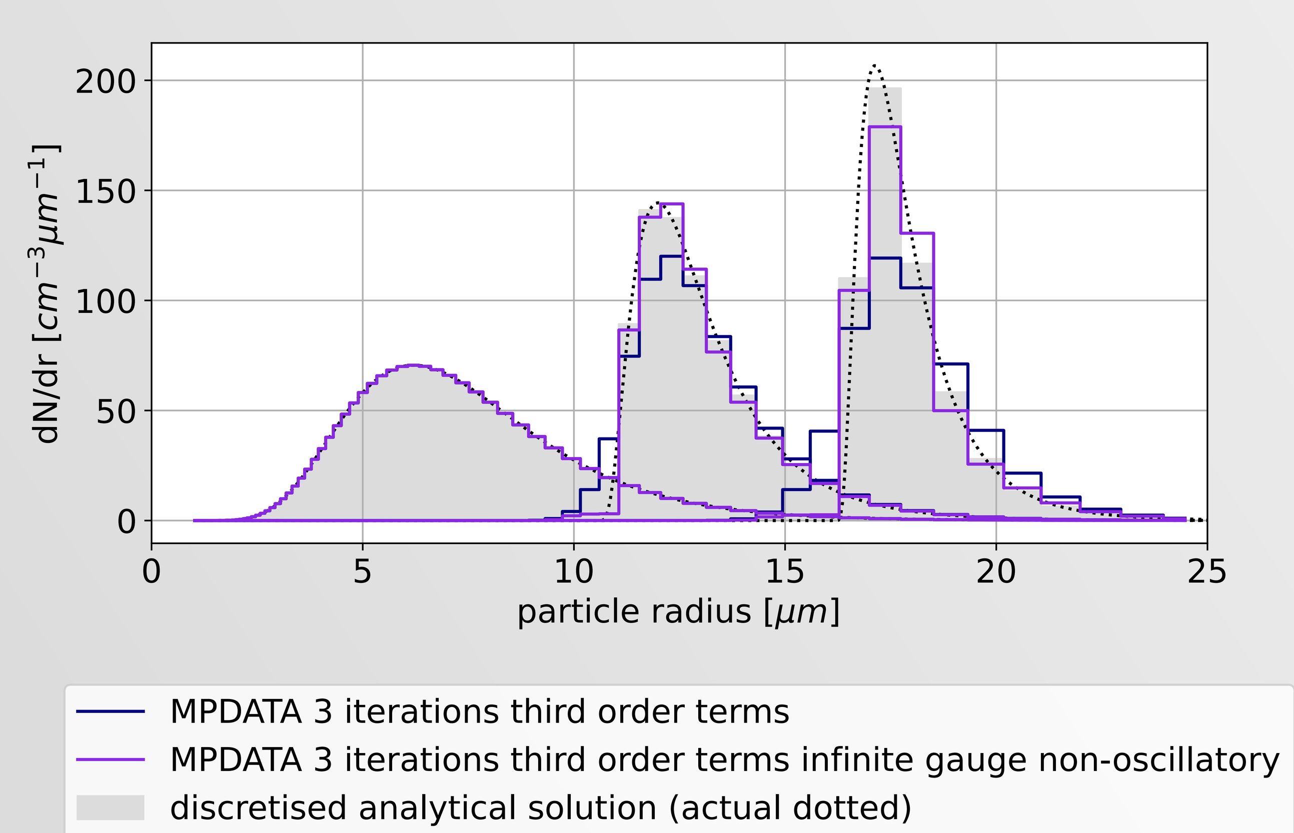
MPDATA (Smolarkiewicz 1983, ...):
- upwind-based advection scheme with corrective iterations reducing numerical diffusion
- numerous variants developed over the years
- applicable for bin-microphysics transport (both spatial and spectral advection)

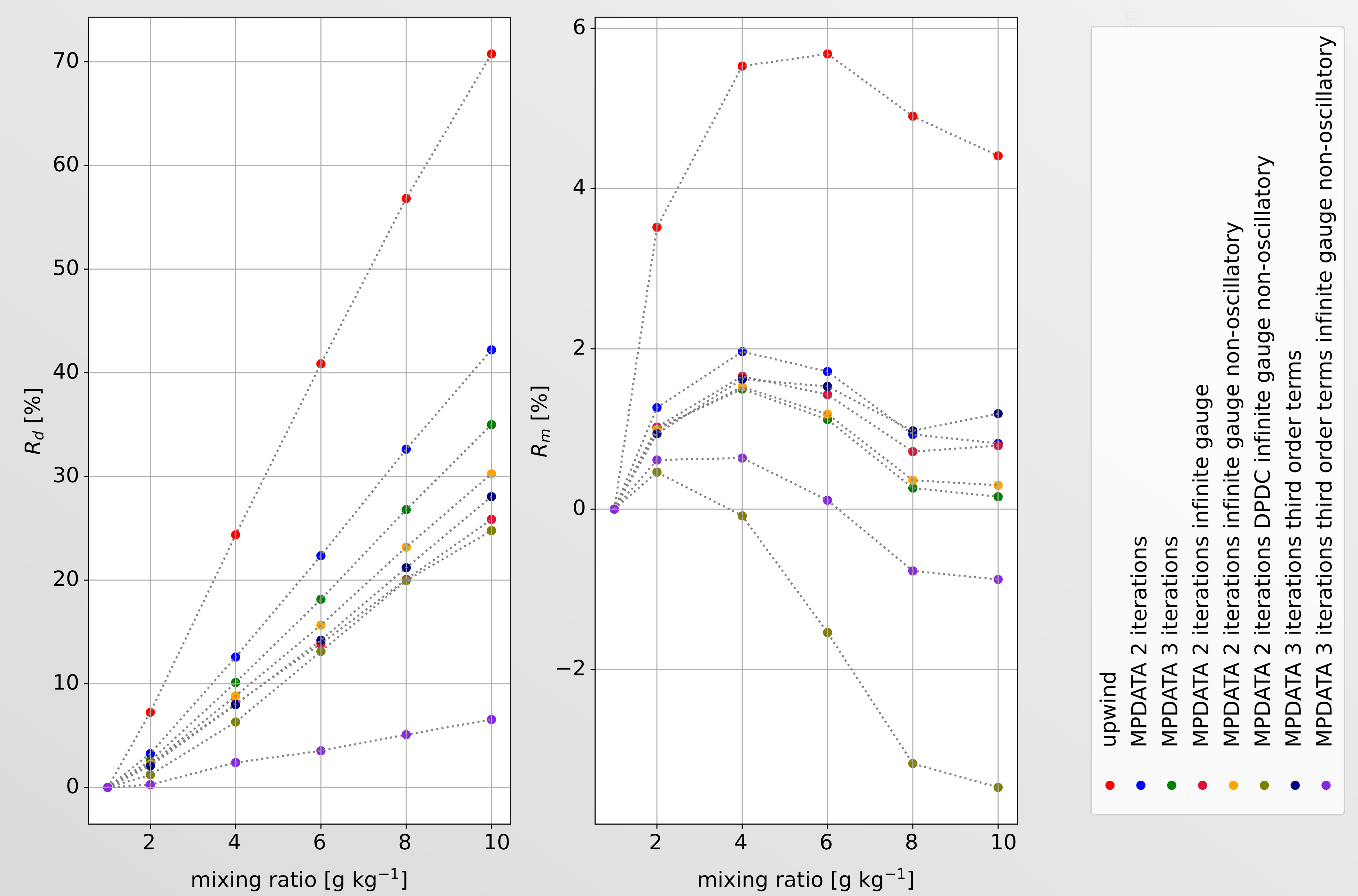
take-home messages from this study:
- MPDATA variant choice of great importance (see figure below with R_d: ratio of numerical to analytical relative dispersion minus one; R_m: ratio of num. to analyt. water mass -1)
- spatio-spectral advection solution detailed (incl. coupling with supersaturation field within MPDATA corrective iterations)
- all simulations carried out using PyMPDATA: new pure-Python (Numba) MPDATA package

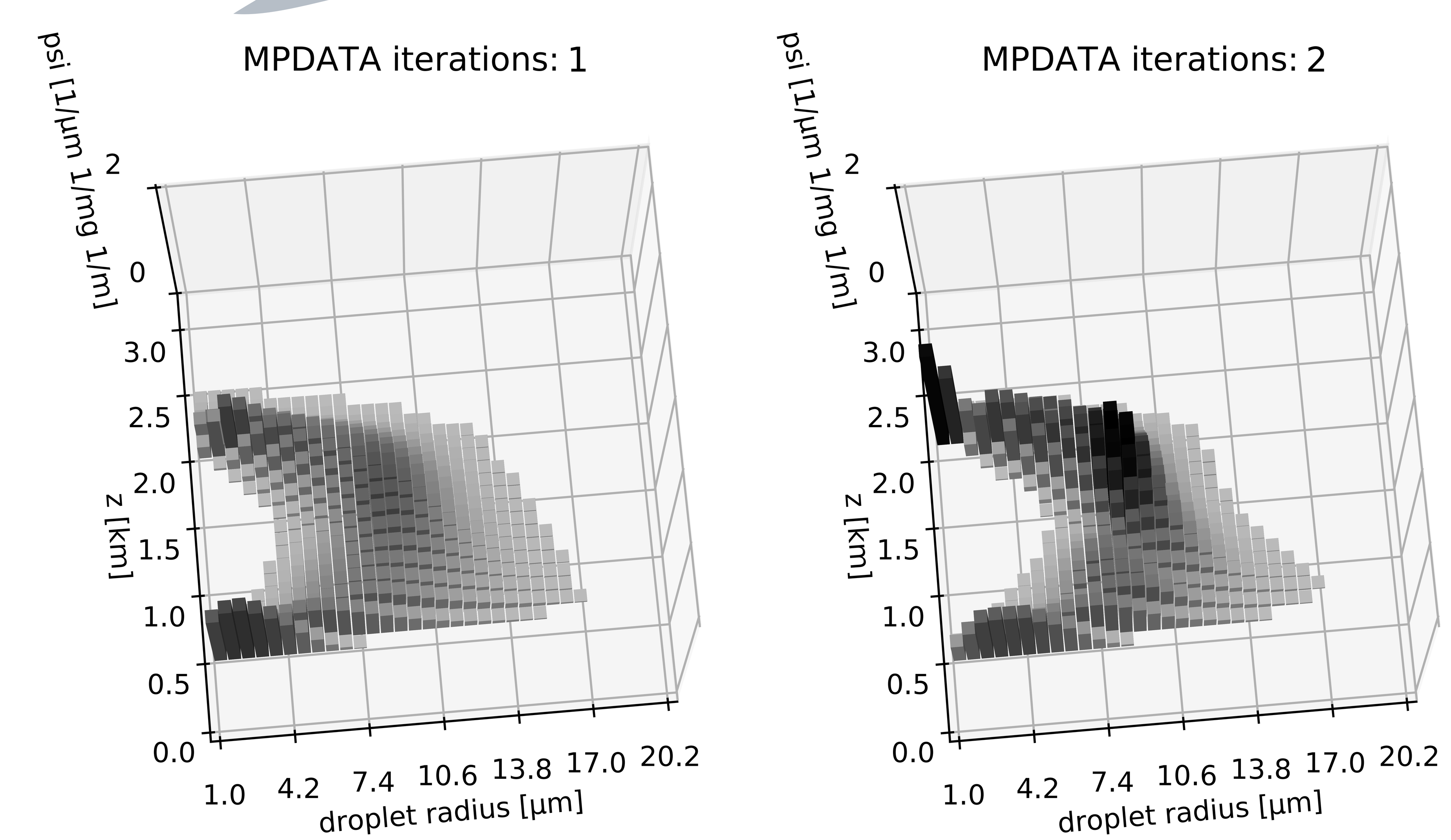
box-model setup
spectral advection only

KiD (single-column)
spatio-spectral advection









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