

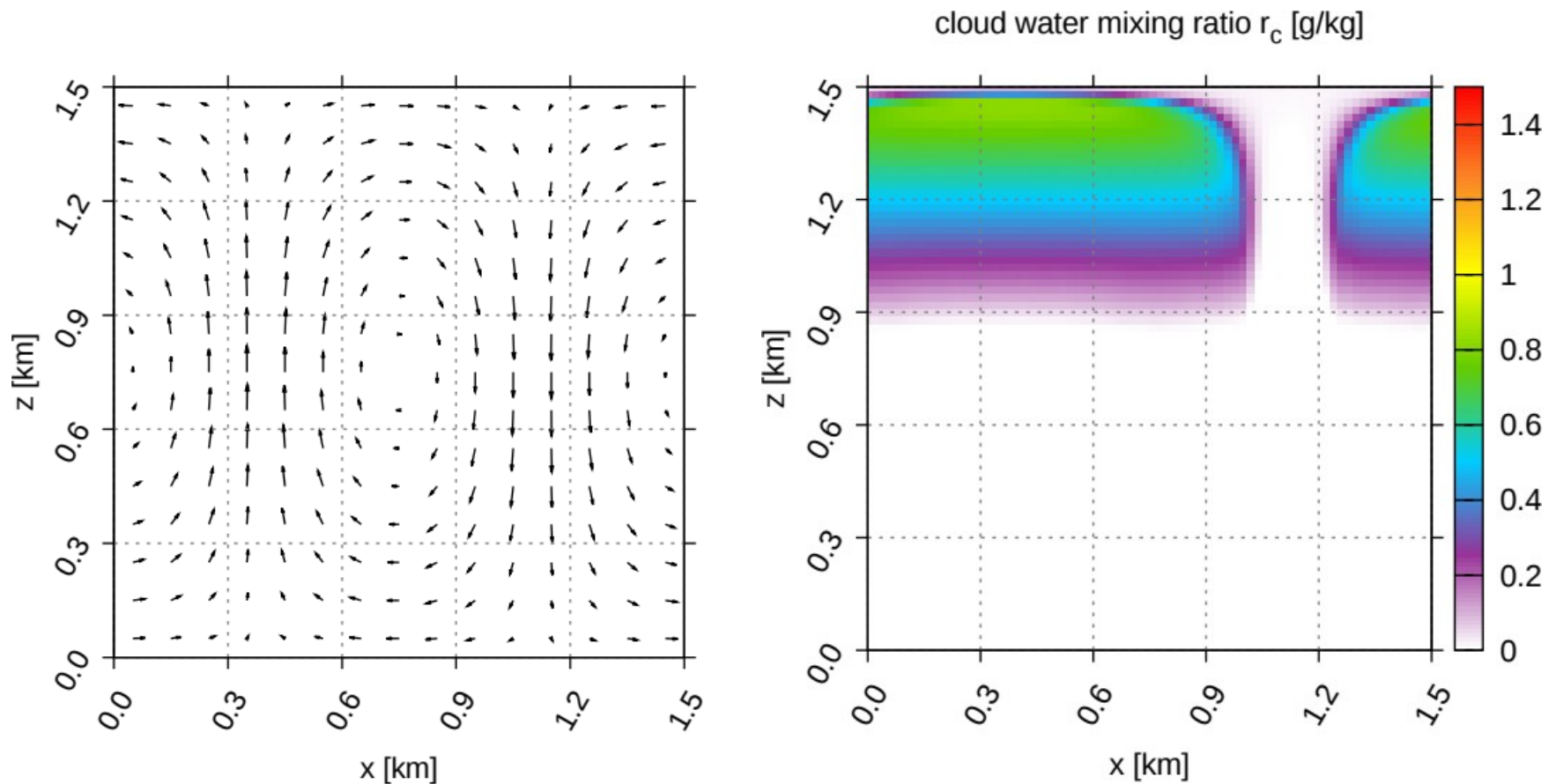


Introduction to cloud modeling

Exercise 3: kinematic model

Introduction

- 2D kinematic (fixed velocity field) model
- Stratocumulus simulation





Goal

The goal is to compare results from different microphysics models:

- Single-moment bulk
- Double-moment bulk
- Lagrangian super-droplets



Prerequisites

- Built UWLCM singularity container
- Installed libcloudpp
- Installed libmpdata++

“icicle” model

- Shipped with libcloudph++, requires libcloudph++ and libmpdata++
- Dir: <libcloudphxx>/models/kinematic_2D
- Easy way to get dependencies: run in the UWLCM singularity shell
- TODO: Configure with CMake and compile

Tasks

- 1) Run the icicle model with single-moment bulk microphysics using the following options:

```
OMP_NUM_THREADS=[1-76] /build/src/icicle --outfreq=200 --nt=9000  
--spinup=7200 --nx=76 --nz=76 --relax_th_rv=false  
--micro=blk_1m --outdir=out_blk_1m
```

- 2) Plot distribution of qc and qr each 200s. Can be done using the “plot_blk_1m” program.

Home tasks

- Do the same for double-moment bulk and Lagrangian microphysics.
- Lagrangian options:
 - `sd_conc = 64`
 - `sstp_cond = 10`
 - `sstp_coal = 10`
 - `backend = OpenMP`
- Discuss differences between single-moment, double-moment and Lagrangian microphysics