

Initial Steps in Double-Moment Microphysics in ALARO

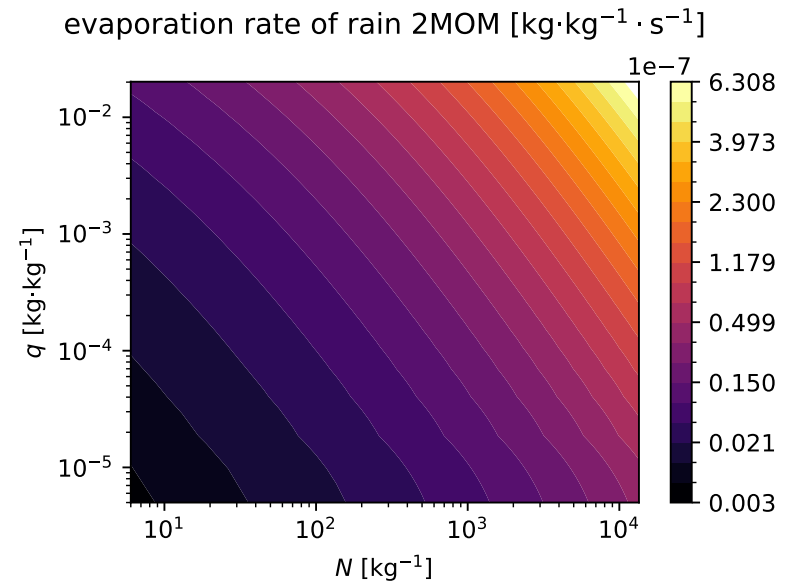
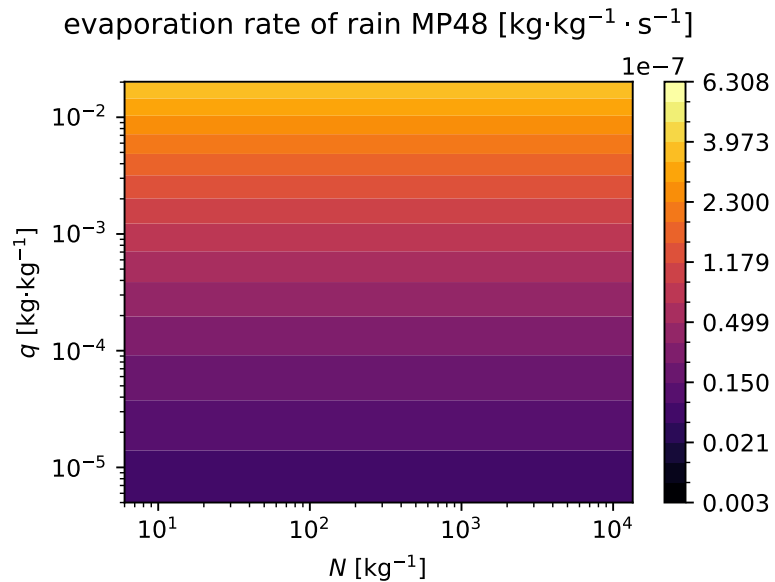
David Němec (CHMI, Prague)

Outline

- generalities and current status
- results: case 2024-11-24
- results: comparison to disdrometers

Why two-mom scheme?

- 2 prognostics: q and N
- better distinction between different weather regimes



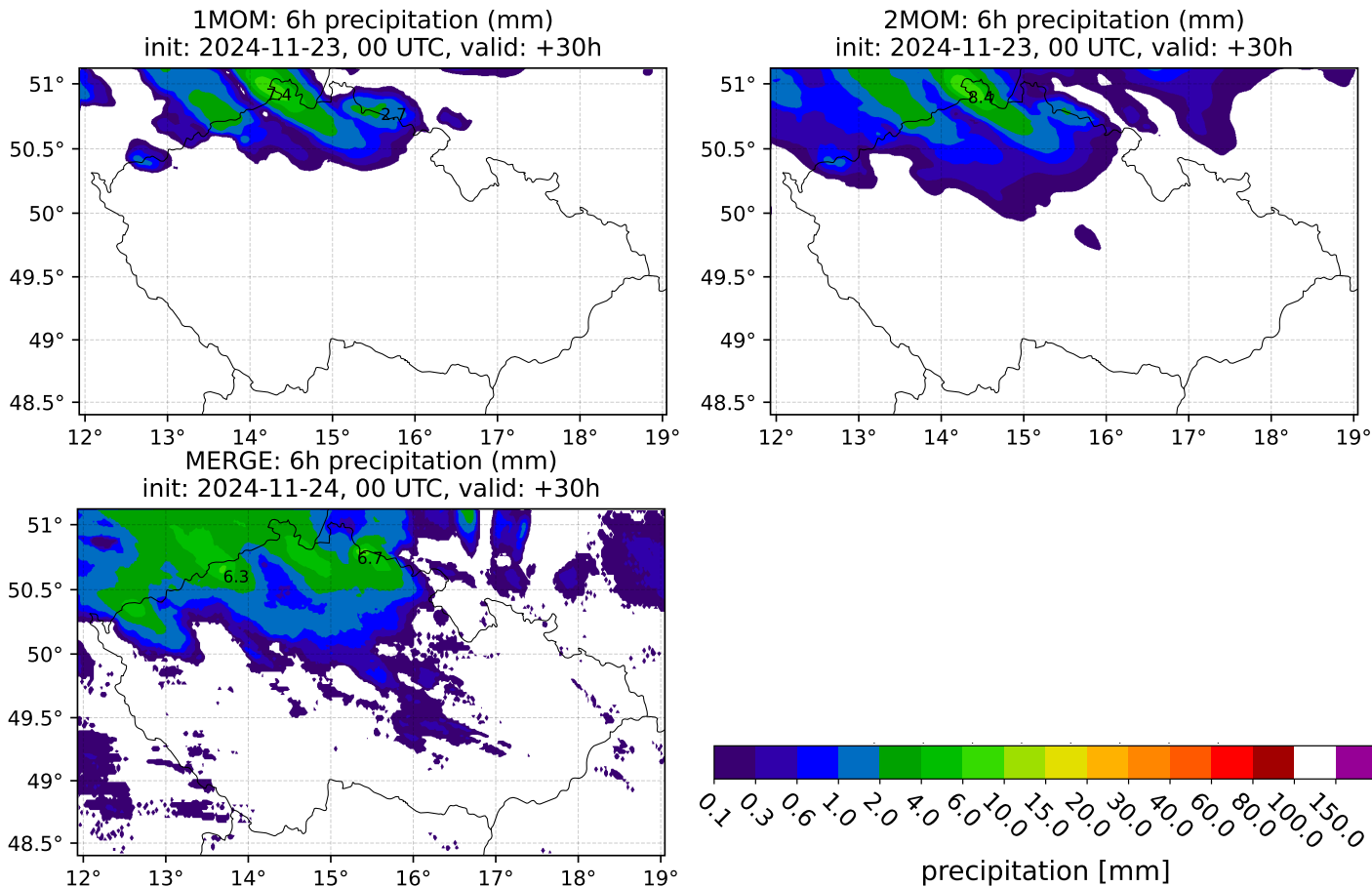
Two-mom scheme in ALARO: plans and current status

- 5 hydrometeors (not necessarily all 2-mom)
- gamma size distributions
- currently 2-mom rain and cloud water
- tests of ice phase (not in this presentation)

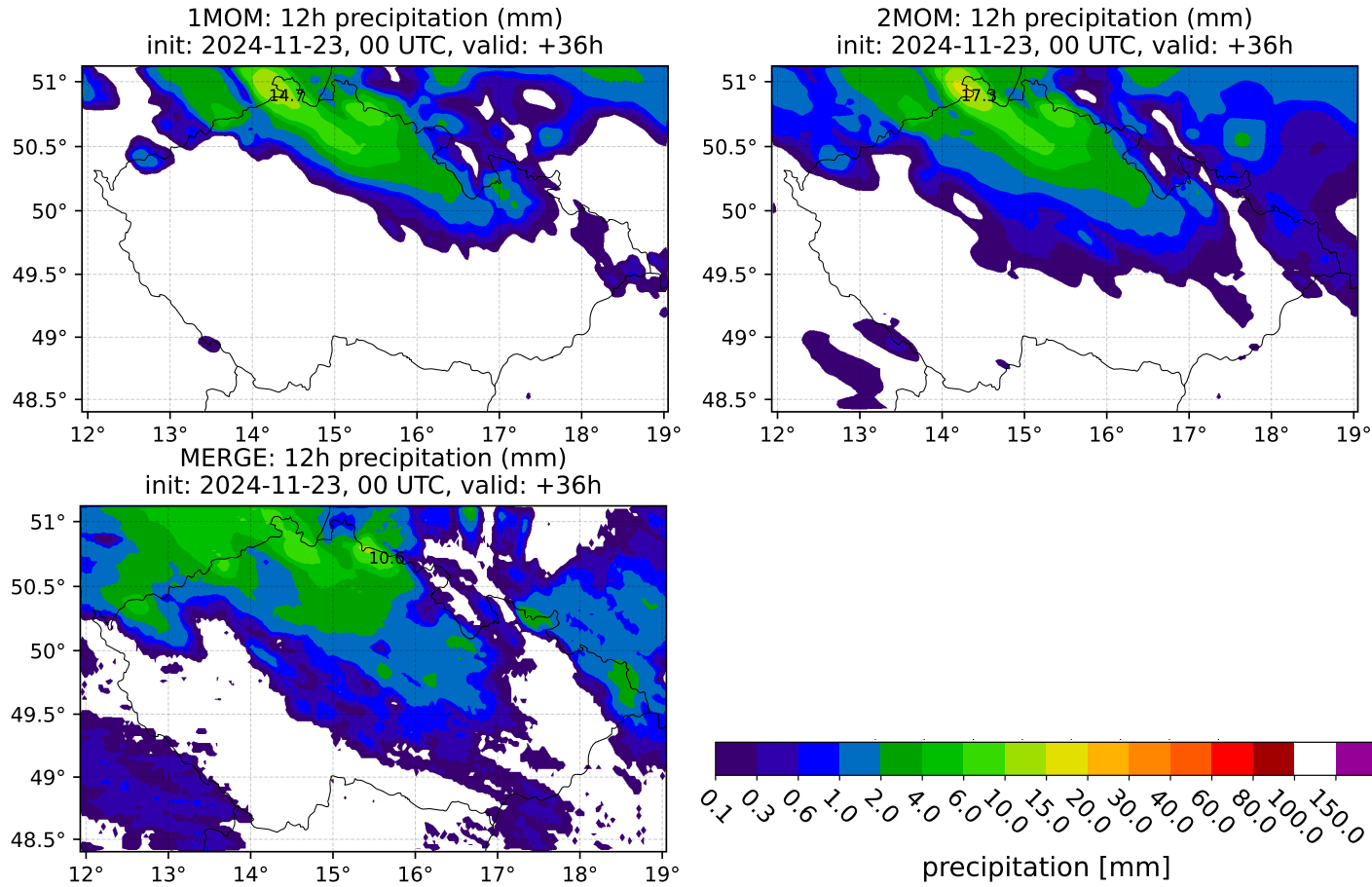
Simulated processes

- activation
- autoconversion
- collection
- self-collection + break-up
- evaporation + melting

Precipitation on 2024-11-24 (00-06 UTC)

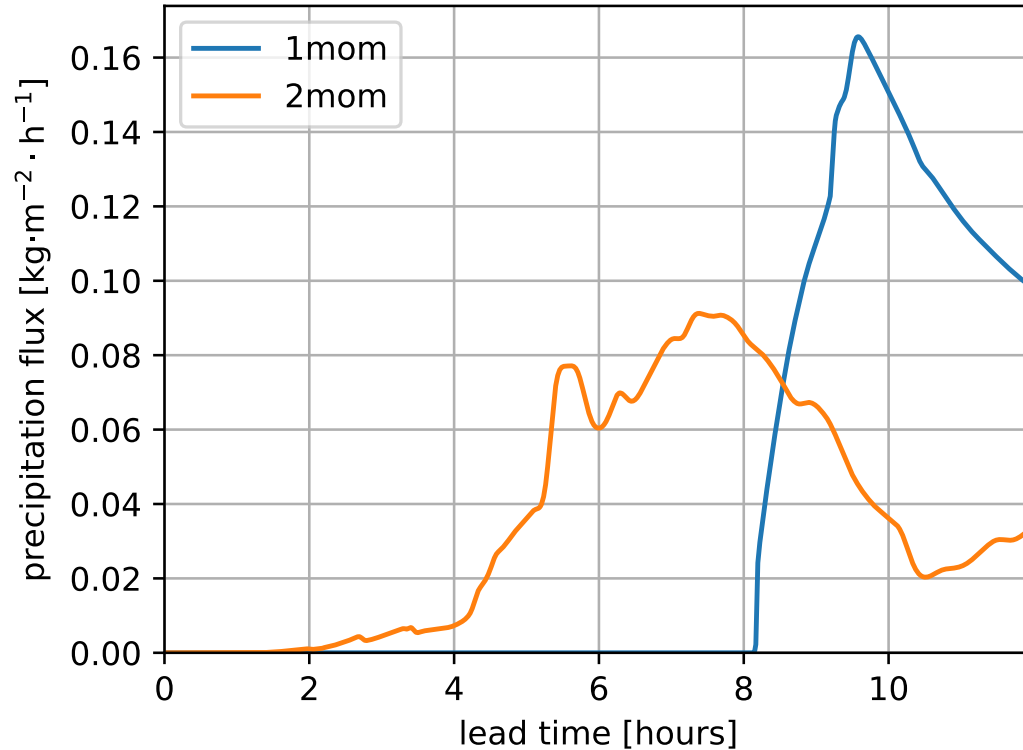


Precipitation on 2024-11-24 (00-12 UTC)

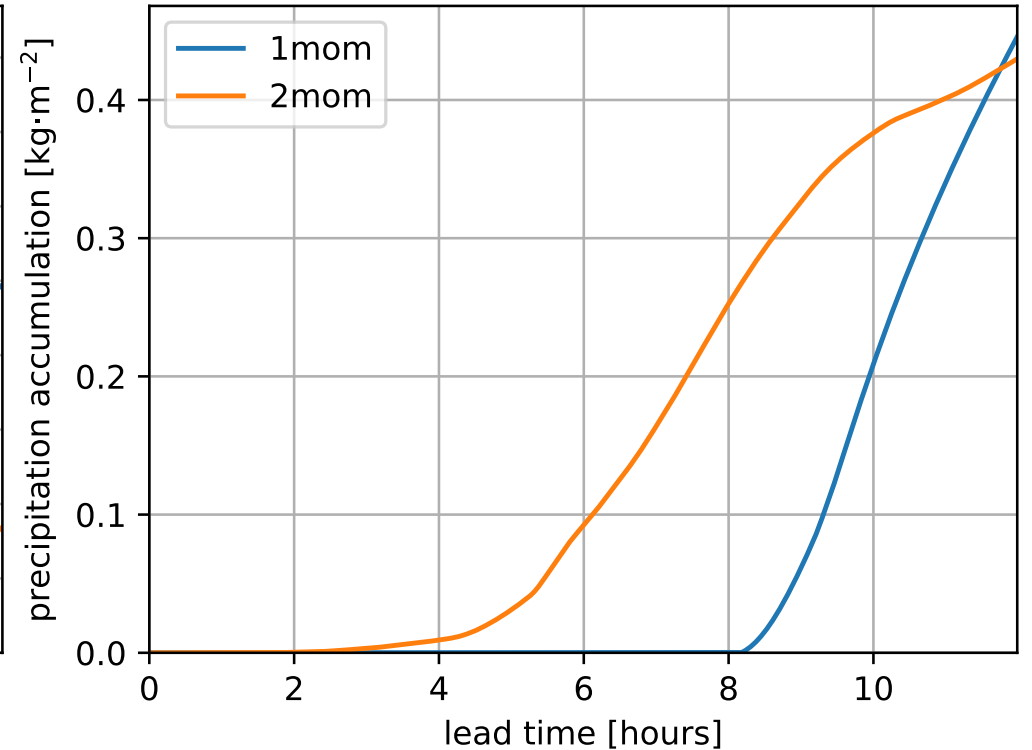


Rain flux and accumulation in 1D

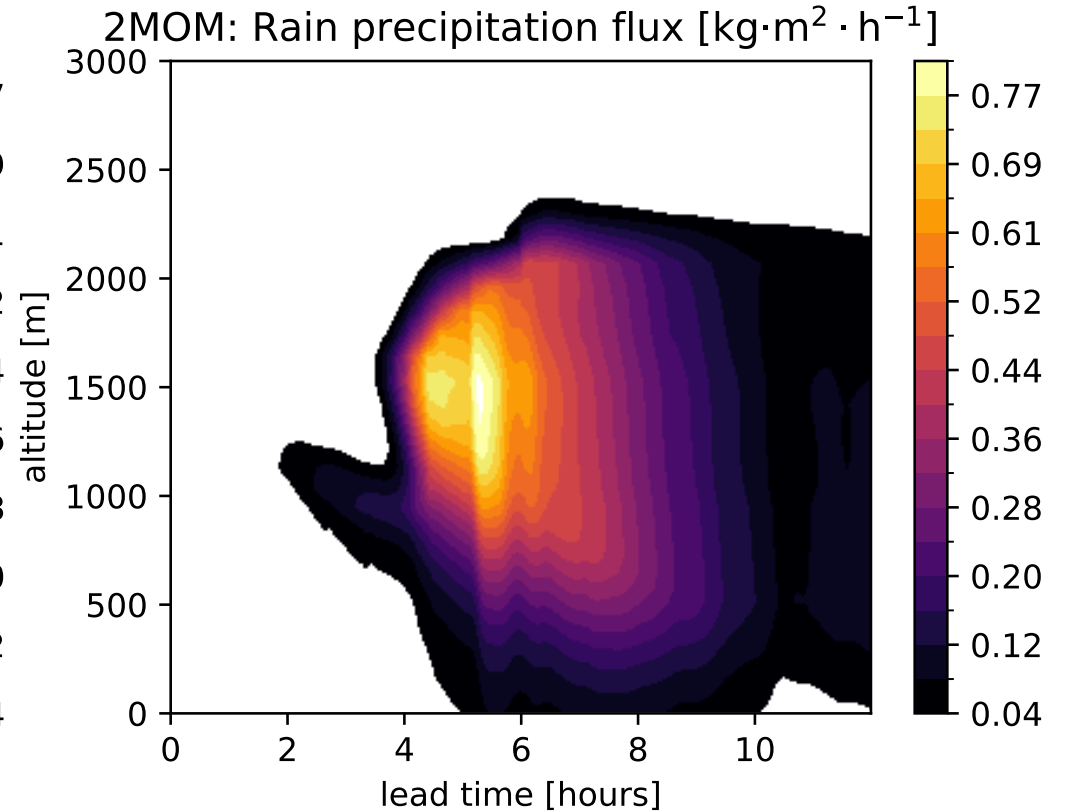
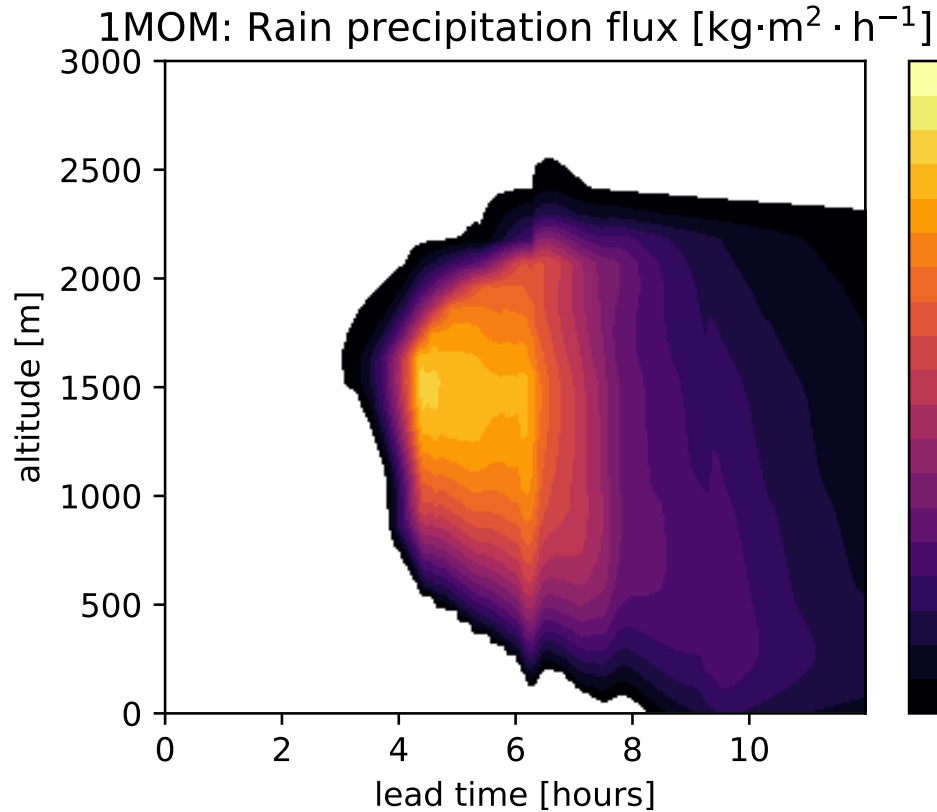
case MEME: surface precipitation flux



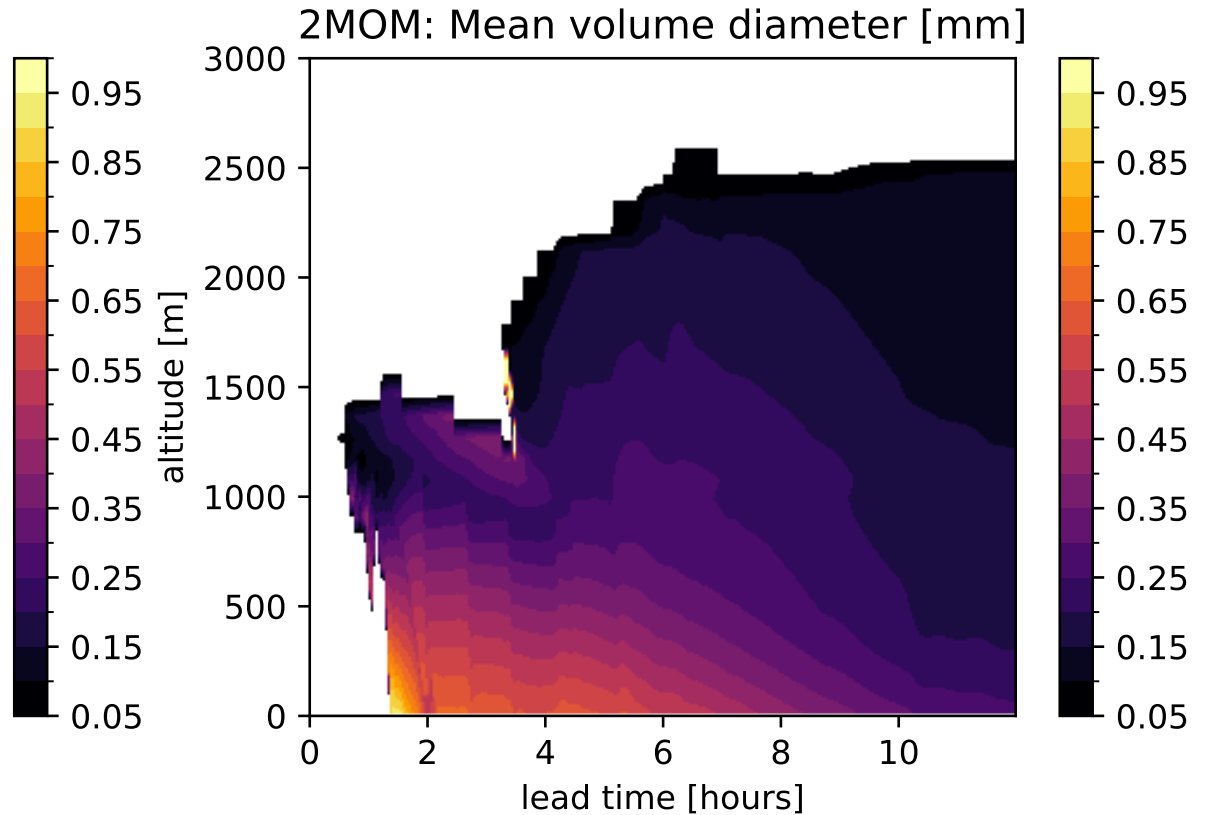
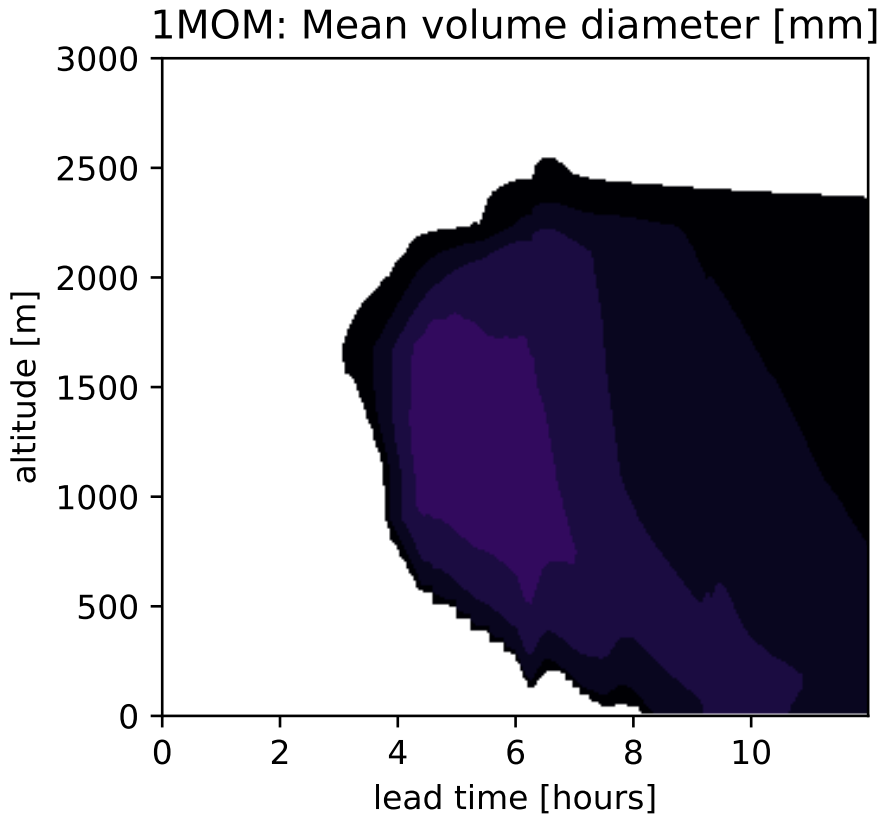
case MEME: surface precipitation accumulation



Precipitation flux

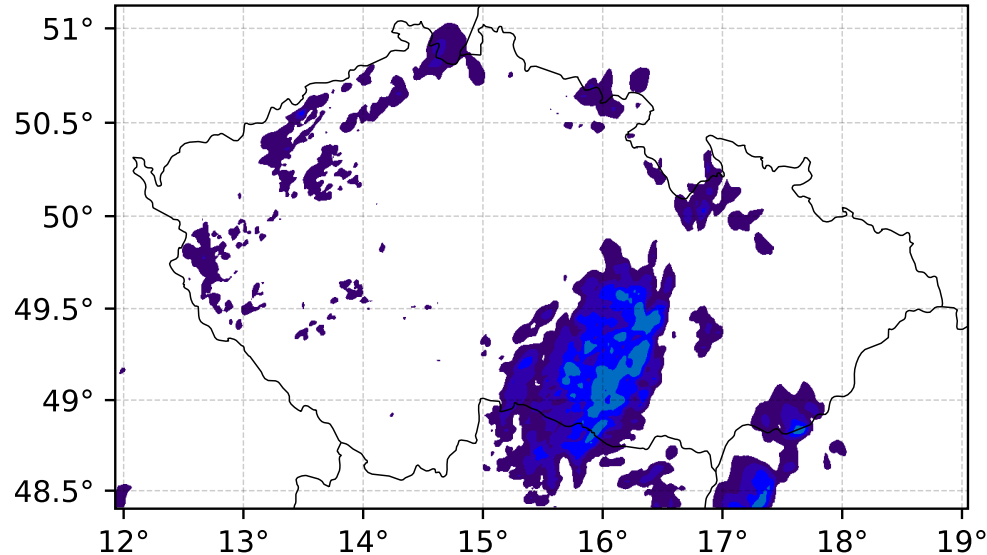


Mean volume diameter

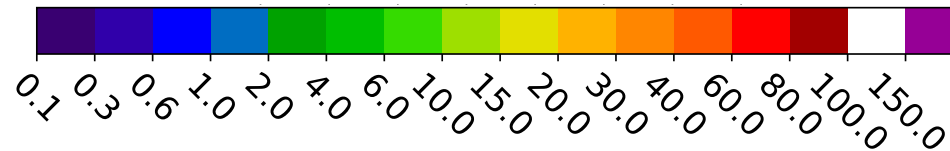
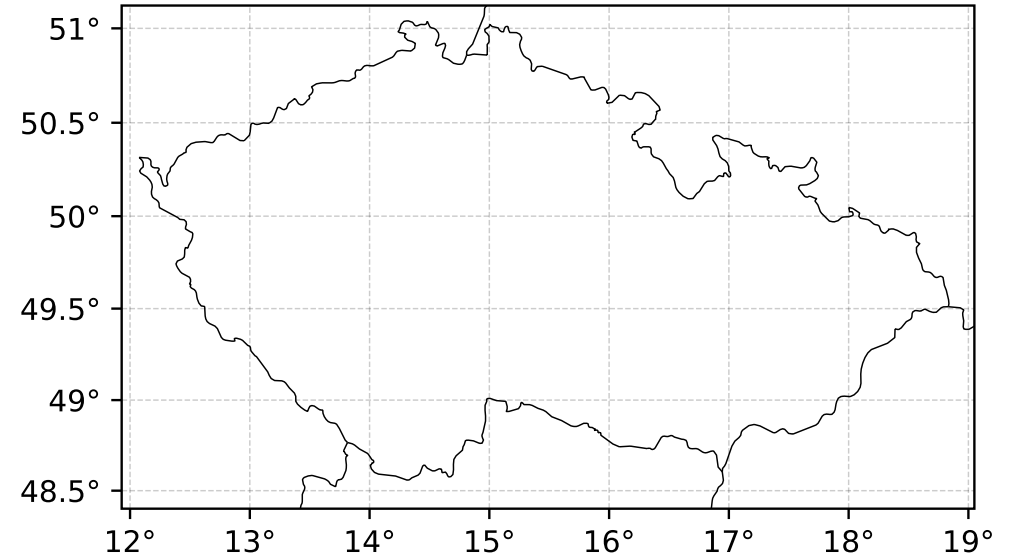


No precipitation event (2021-11-11)

1MOM: 24h precipitation (mm)
init: 2021-11-11, 00 UTC, valid: +24h

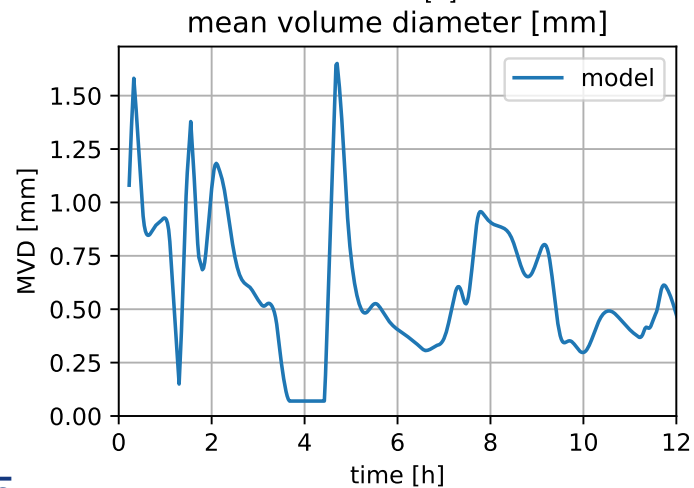
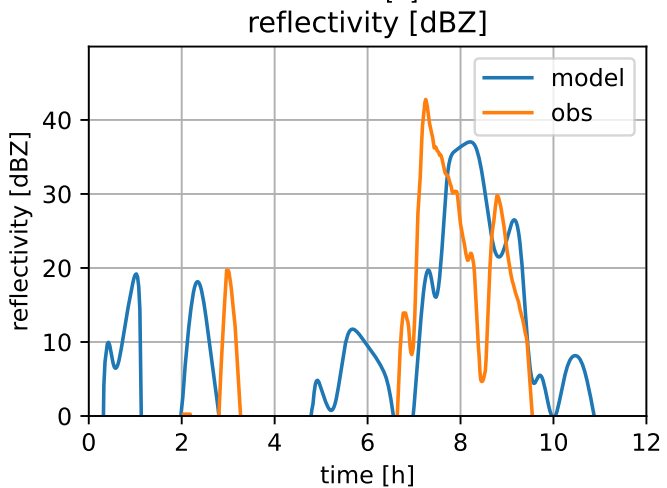
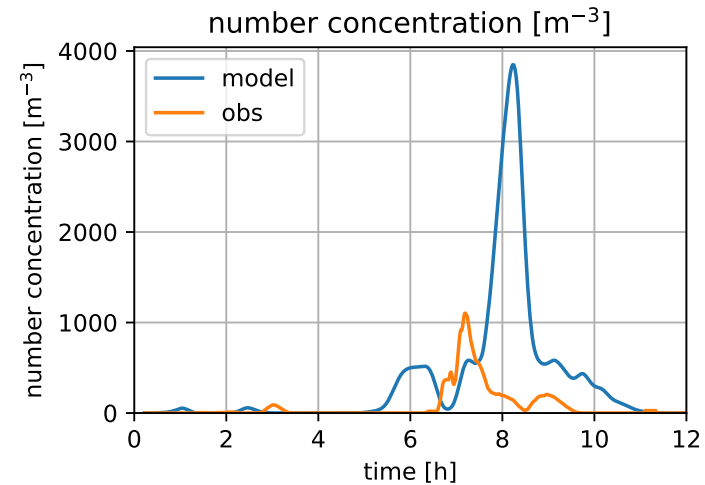
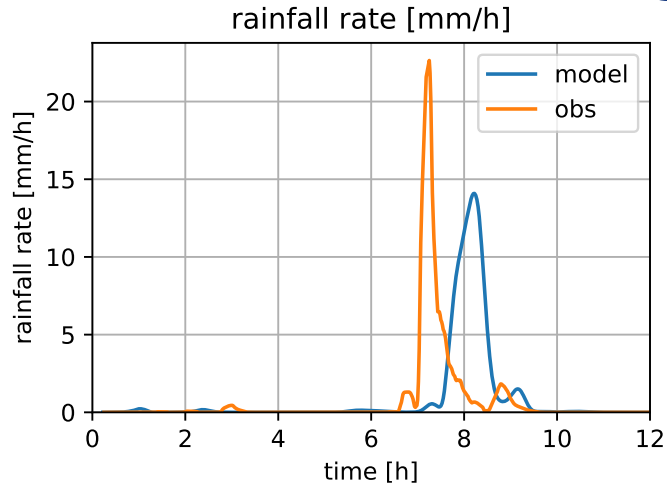


2MOM: 24h precipitation (mm)
init: 2021-11-11, 00 UTC, valid: +24h

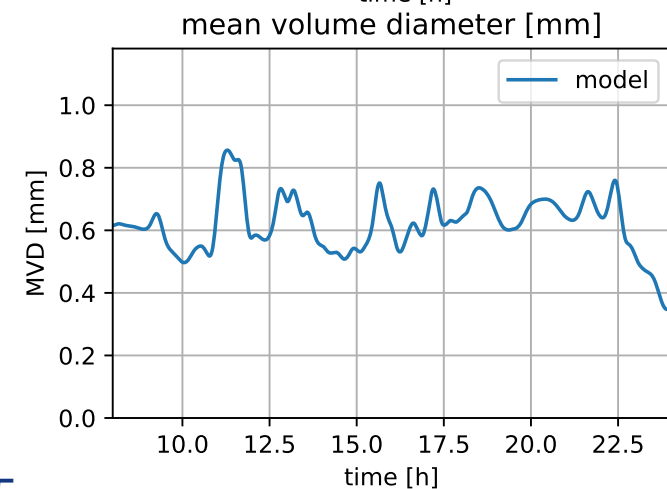
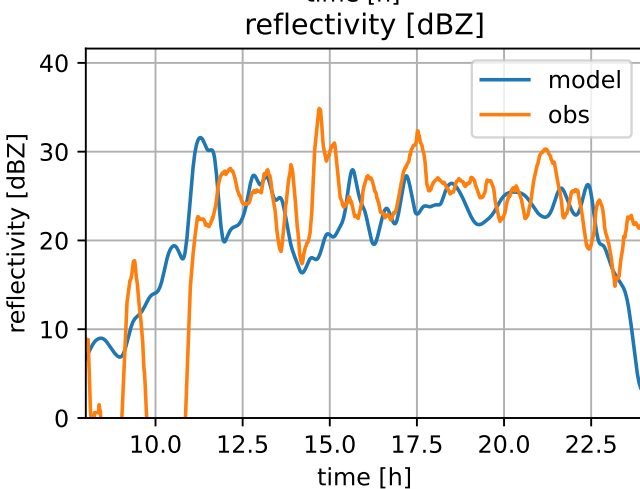
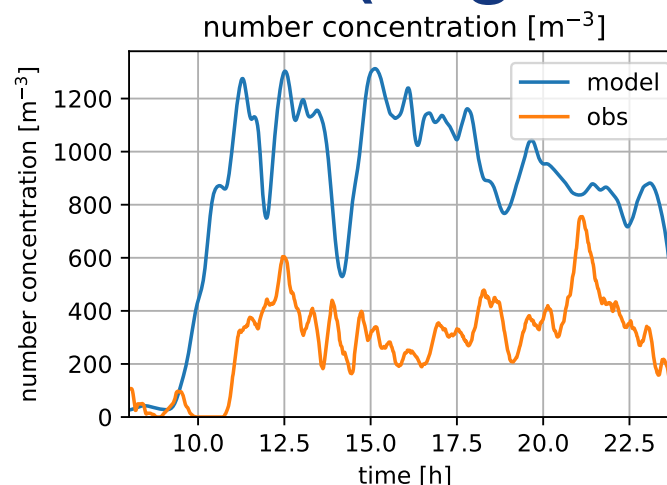
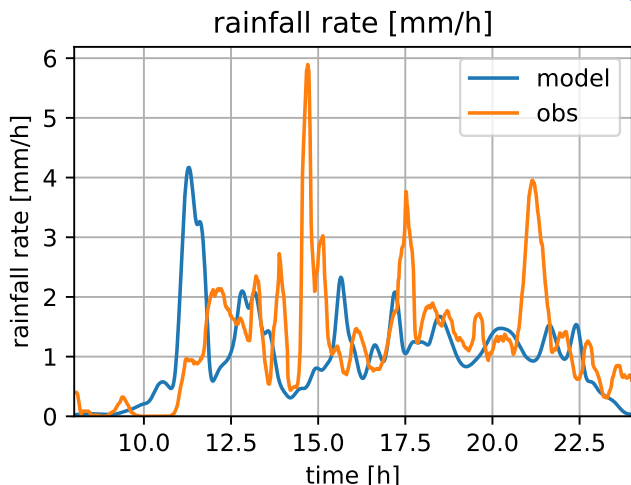


precipitation [mm]

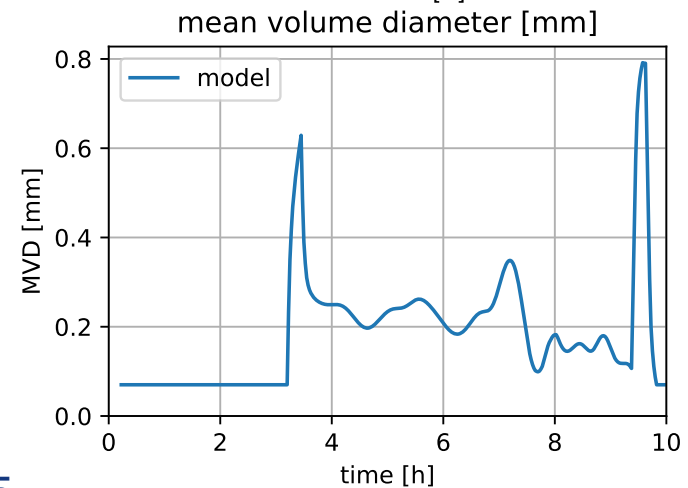
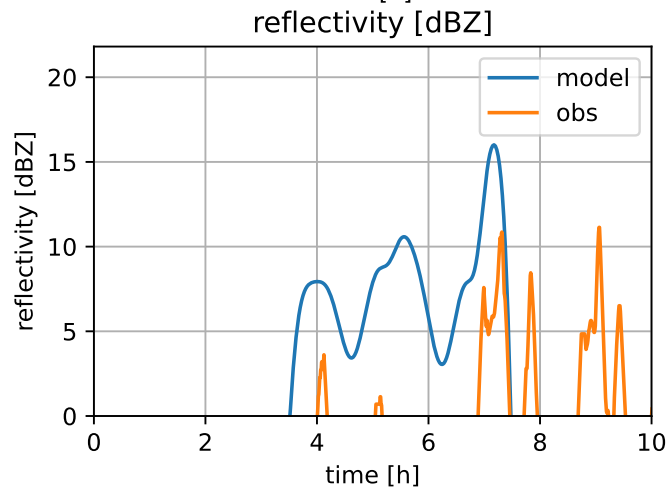
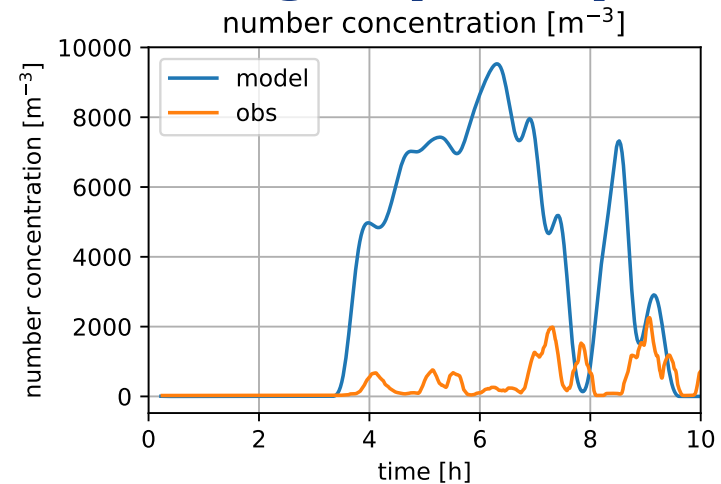
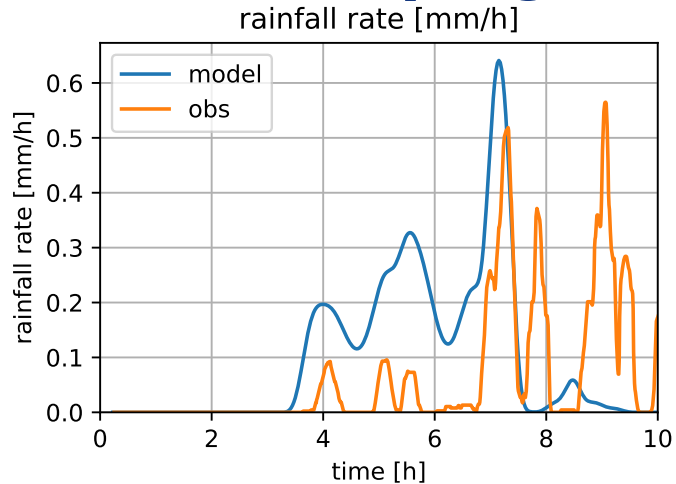
Disdrometer in Lindenberg: 2024-06-22 (convection)



Disdrometer in Lindenberg: 2024-09-13 (large-scale)



Disdrometer in Leipzig: 2024-11-14 (light precipitation)



Conclusion

- liquid phase ready for testing
- helps with precipitation in autumn
- too high number concentration of raindrops in convection
- not sure about light precipitation

References


- Görsdorf, U., & Lehmann, V. (2024). Disdrometer data from Lindenberg on 22 June 2024. ACTRIS Cloud remote sensing data centre unit (CLU). <https://hdl.handle.net/21.12132/1.6da7ab4b68eb4cfa>
- Görsdorf, U., & Lehmann, V. (2024). Disdrometer data from Lindenberg on 13 September 2024. ACTRIS Cloud remote sensing data centre unit (CLU). <https://hdl.handle.net/21.12132/1.5624c1afb0204000>
- Seifert, P. (2024). Disdrometer data from Leipzig on 14 November 2024. ACTRIS Cloud remote sensing data centre unit (CLU). <https://hdl.handle.net/21.12132/1.8235936efddc405e>
- Novák, P., & Kyznarová, H. (2016). MERGE2—the upgraded system of quantitative precipitation estimates operated at the Czech Hydrometeorological Institute. *Meteorological Bulletin*, 69(5), 137-144.

Thank you for your attention

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