

# On the role of aerosol characteristics and parameterization schemes on Arctic mixed-phase clouds - Luisa Ickes<sup>1</sup> with contributions of A. M. L. Ekman and I. Bulatovic<sup>2</sup>

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## Research questions

- How does CCN composition (hygroscopicity) and size affect an Arctic mixed-phase cloud?
- Which INP type (chemical composition) can trigger freezing in a warm Arctic cloud?
- How sensitive is the result to freezing parameterisation?

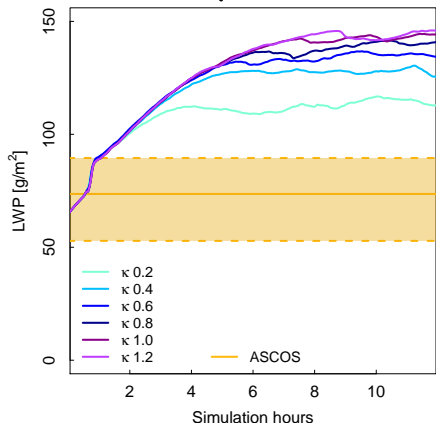
## Model details MIMICA<sup>a</sup>

- Domain size: 6x6x1.7 km
- Resolution: dx=62.5 m, dy=62.5 m, dz=25 m, dt=2 s
- Simulation time: 12 hours
- Microphysics: Two-moment microphysics
- ASCOS case study 31.08.2008
- Aerosol distribution from ASCOS

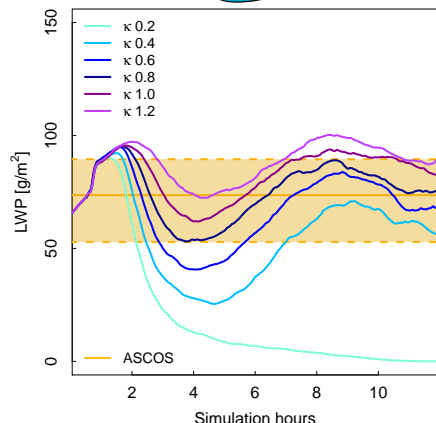
<sup>a</sup> Savre et al., JAMES, 2014

# CCN study: sensitivity to $\kappa$ and aerosol size<sup>b</sup>

hydrophobic:  $\kappa$  0.2:



hygroscopic:  $\kappa$  1.2:



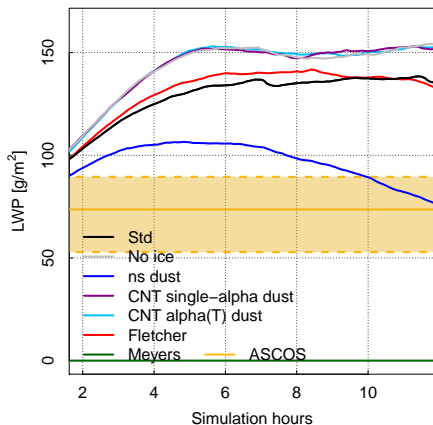
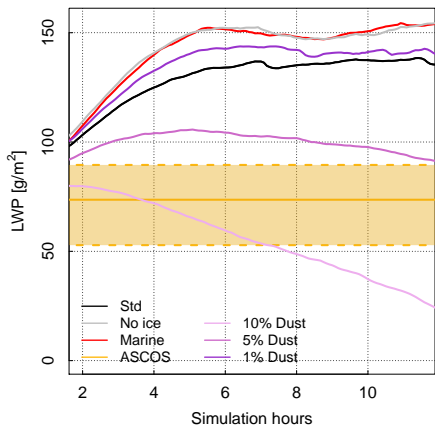
- For acc aerosols  $\kappa$  does not matter

<sup>b</sup> Christiansen et al., JGR, 2020.

- For Ait aerosols  $\kappa$  does matter

- Cloud sustained if  $\kappa \geq 0.4$

# INP study: sensitivity to aerosol type and freezing parameterisation scheme



- Really efficient dust needed to trigger freezing

- Results strongly dependent on the freezing parameterization