



Snowfall rates and their connection to cloud microphysics

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Objective

Mixed phase clouds are not well represented in GCMs.

Ice formation influences radiative effect, precipitation formation, and cloud lifetime.

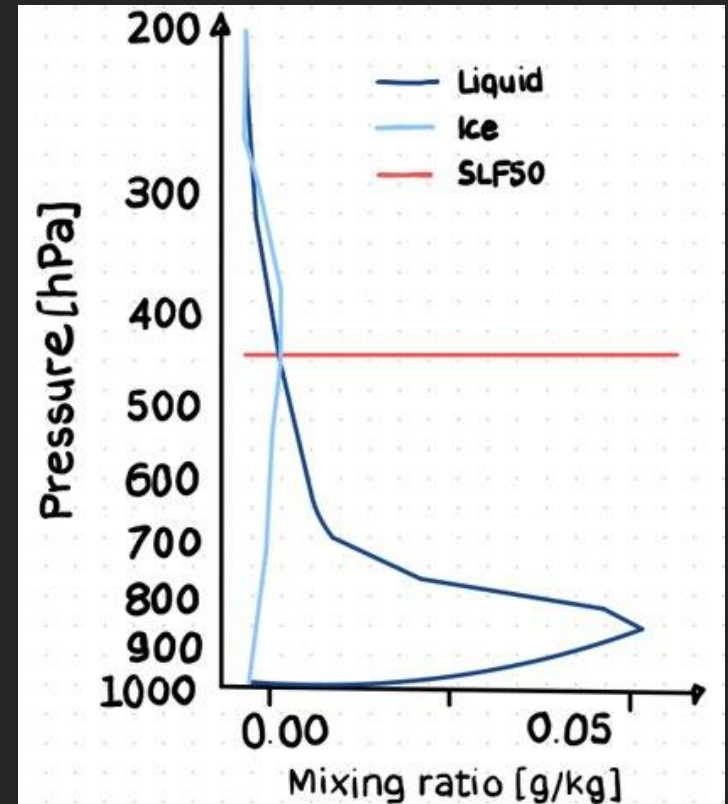


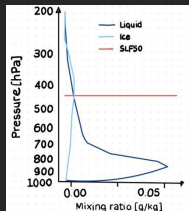
Defining a mixed-phase cloud (MPC)

Pressure level where fraction

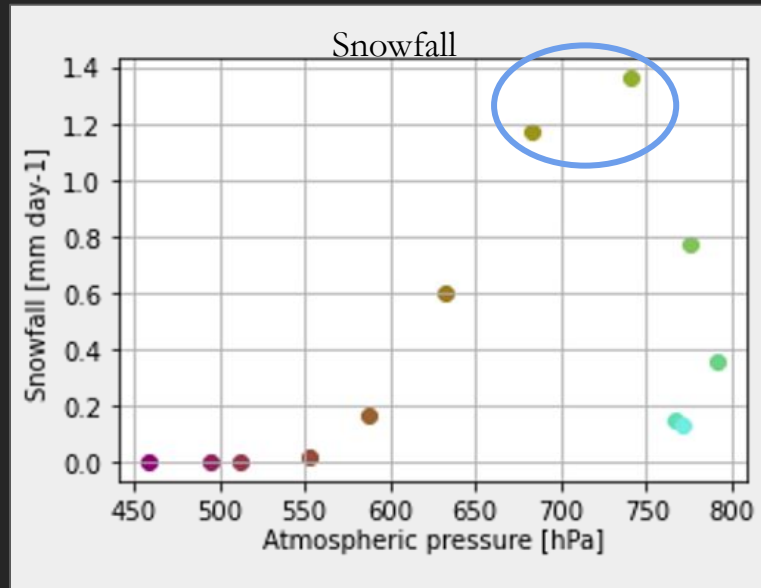
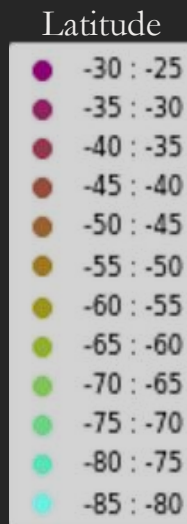
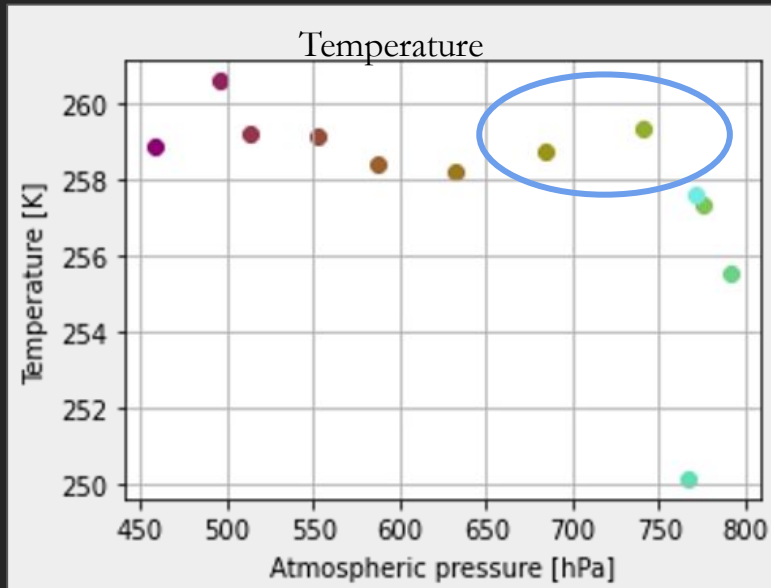
- Liquid / (Ice + Liquid) = 50%
(SLF50)

SLF: Supercooled liquid water fraction





Mixed phase-clouds (ERA5)



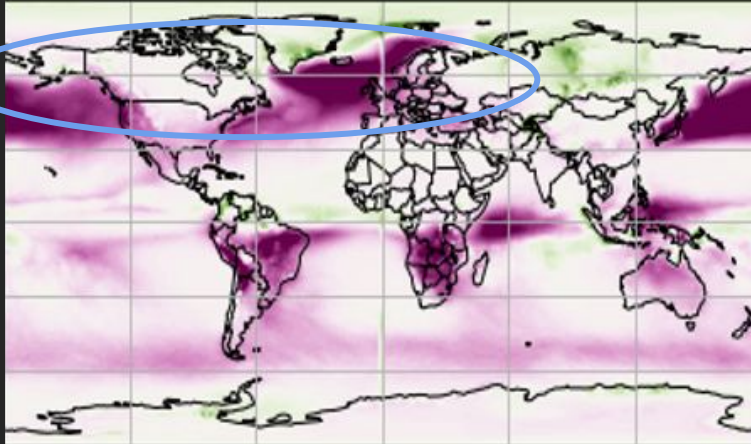
Temperature constant in all latitudes

Highest snowfall related to storm track area

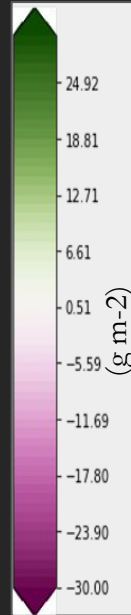
30 year, season: DJF

Ice water path/Liquid water path (ERA5 - CMIP6)

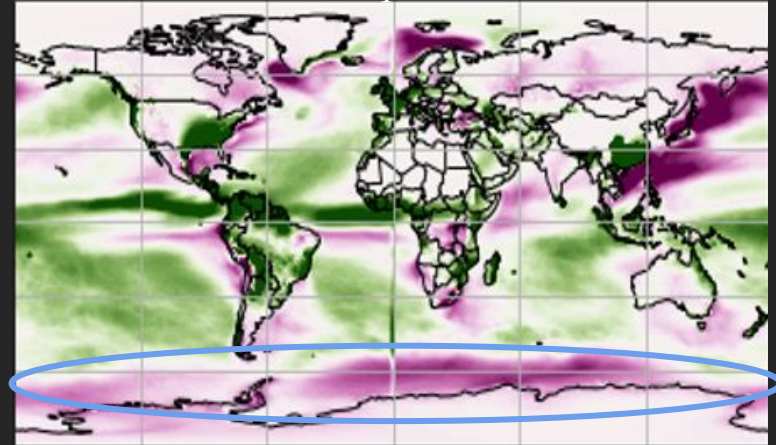
Ice



Ice water path overestimate



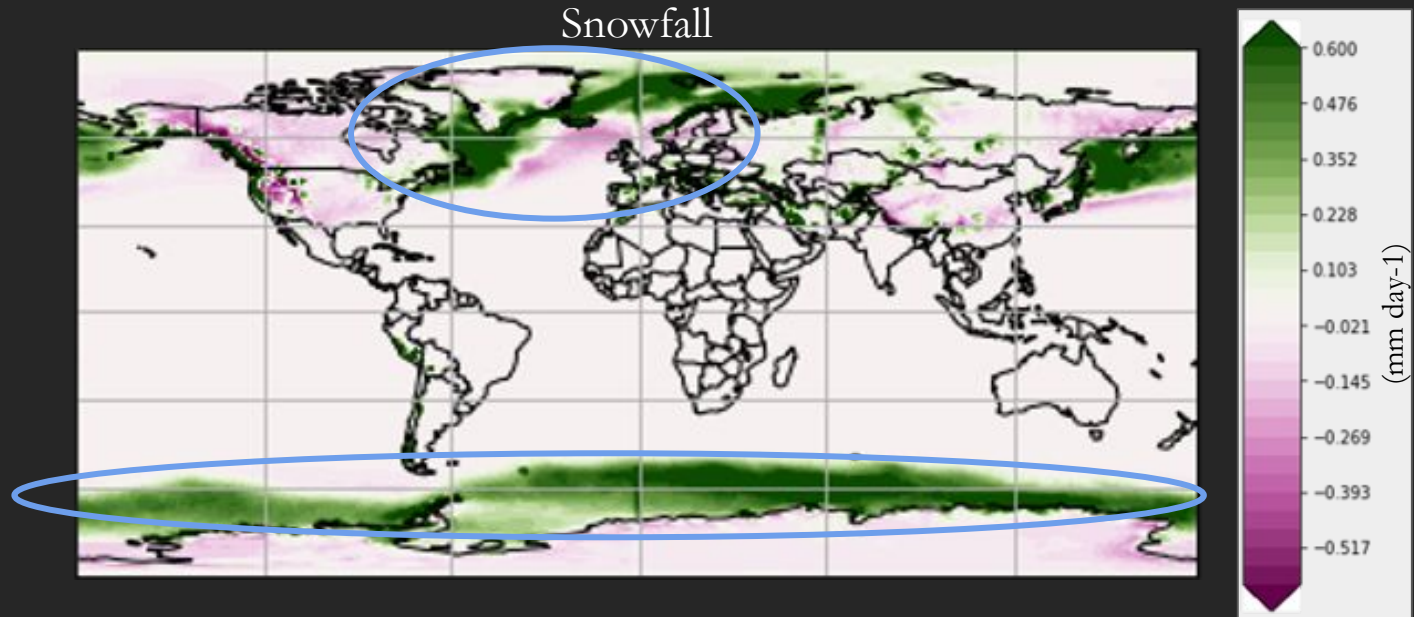
Liquid



Liquid water path underestimate

30 year, season: DJF

Snowfall (ERA5 - CMIP6)



Snowfall underestimate of ~20%

30 year, season: DJF

Key points

- Snowfall from MP clouds is highest in storm track areas
- GCM
 - cloud phase Ice **overestimated**
Liquid **underestimated**
 - Snowfall **Underestimated** especially in storm track areas

Next steps

- Find MP clouds in CMIP6
- Include satellite data (CloudSat)



My Notebooks

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OSSP

