

Scaling of MCS precipitation extremes with surface dew-point temperature in Germany



N. Da Silva¹ & J. O. Haerter^{1,2,3,4}

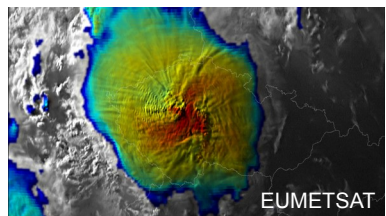


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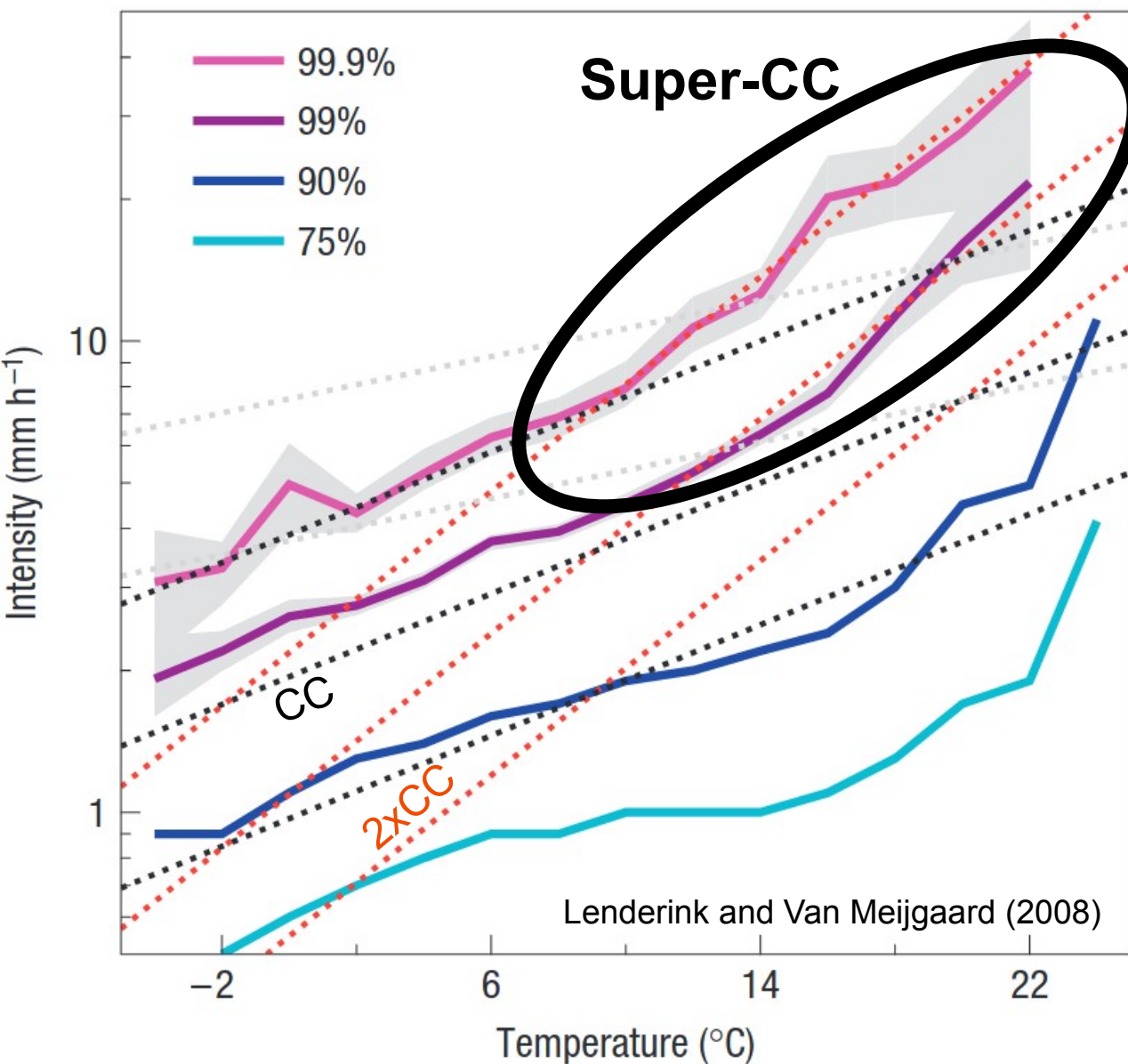
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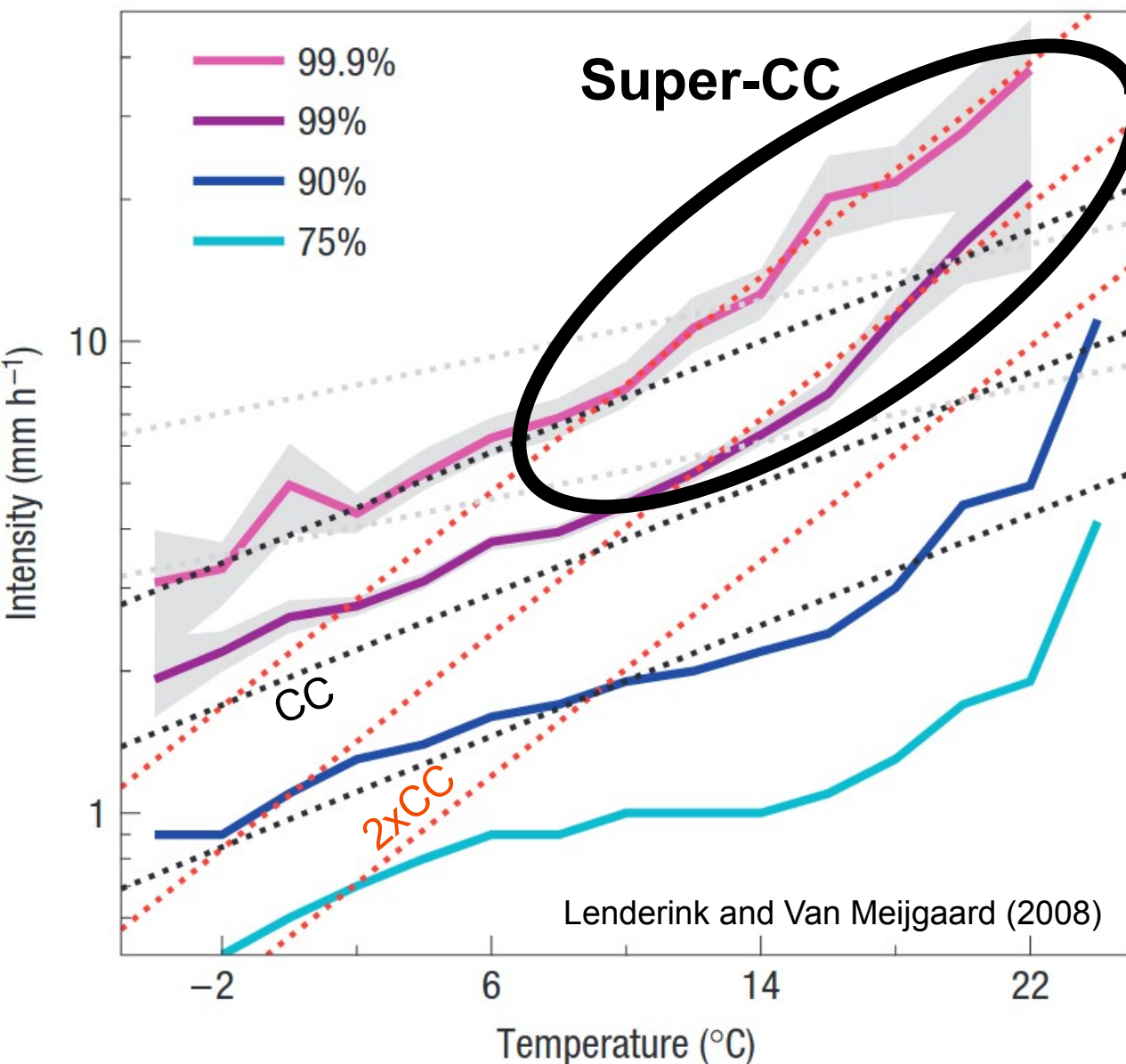
⁴University of Potsdam, Am Neuen Palais 10, 14469 Potsdam, Germany



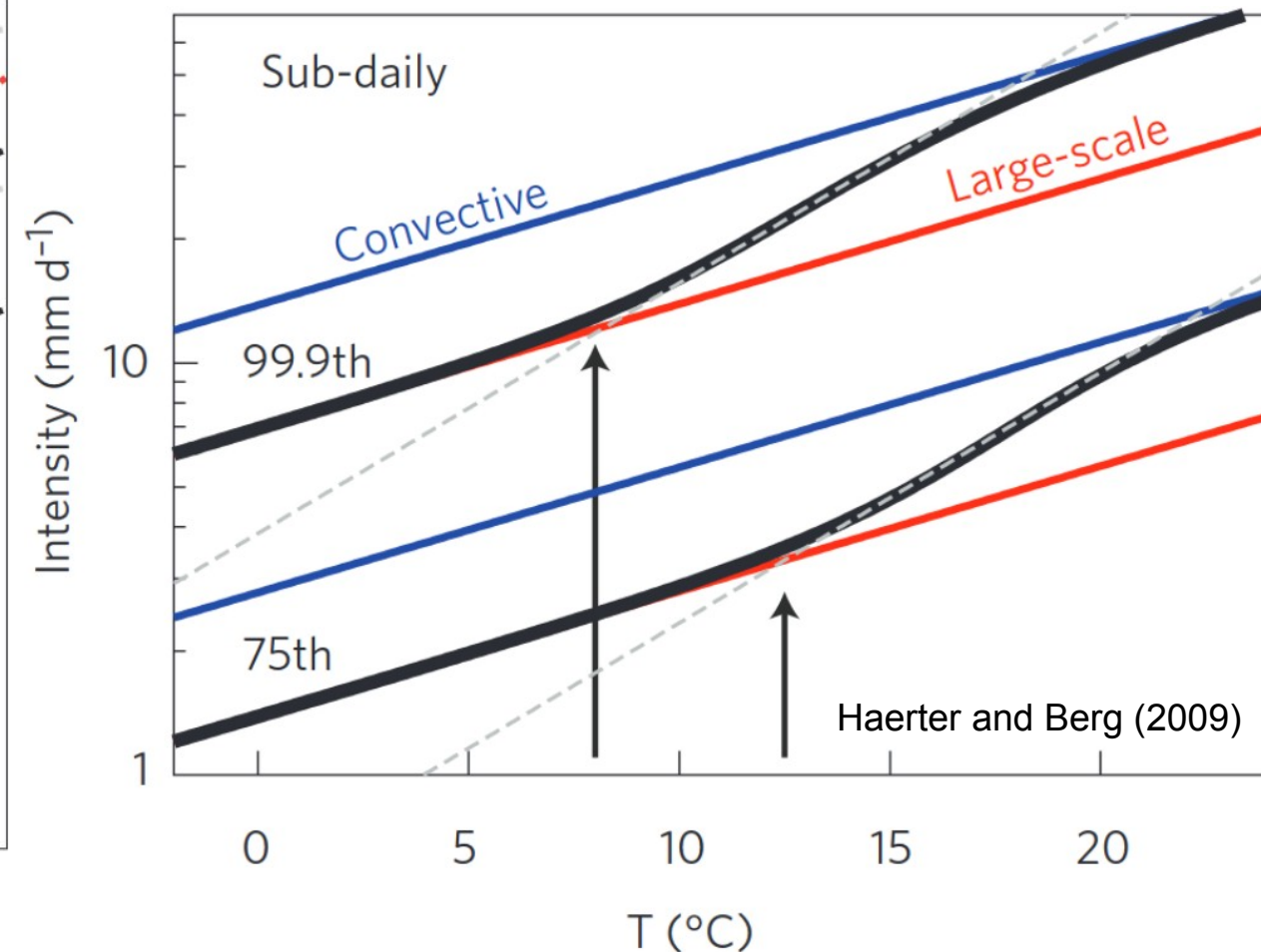
Unexplained super-CC scaling of sub-daily extreme precipitation in the mid-latitudes



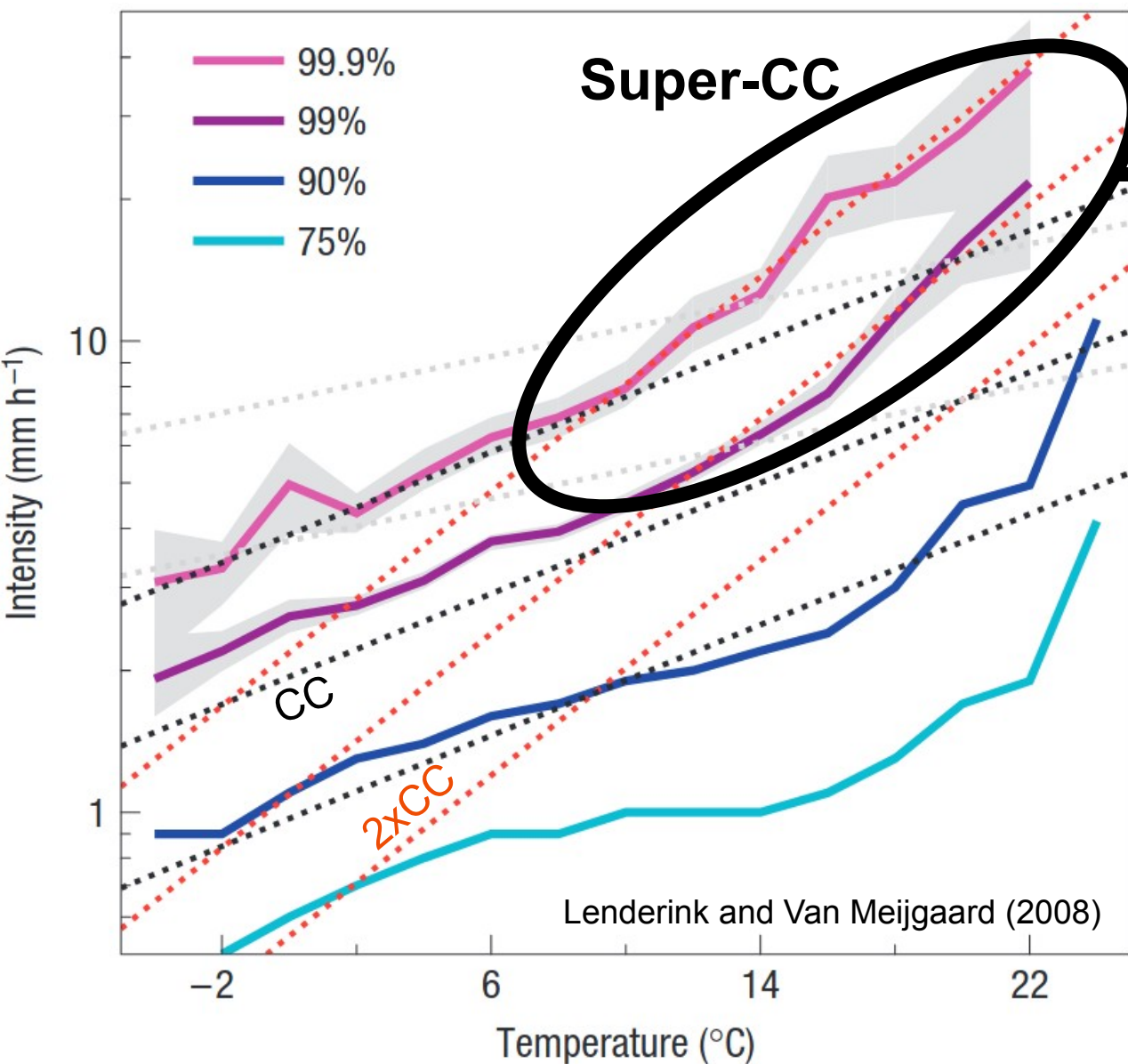
Unexplained super-CC scaling of sub-daily extreme precipitation in the mid-latitudes



a shift in rain type?

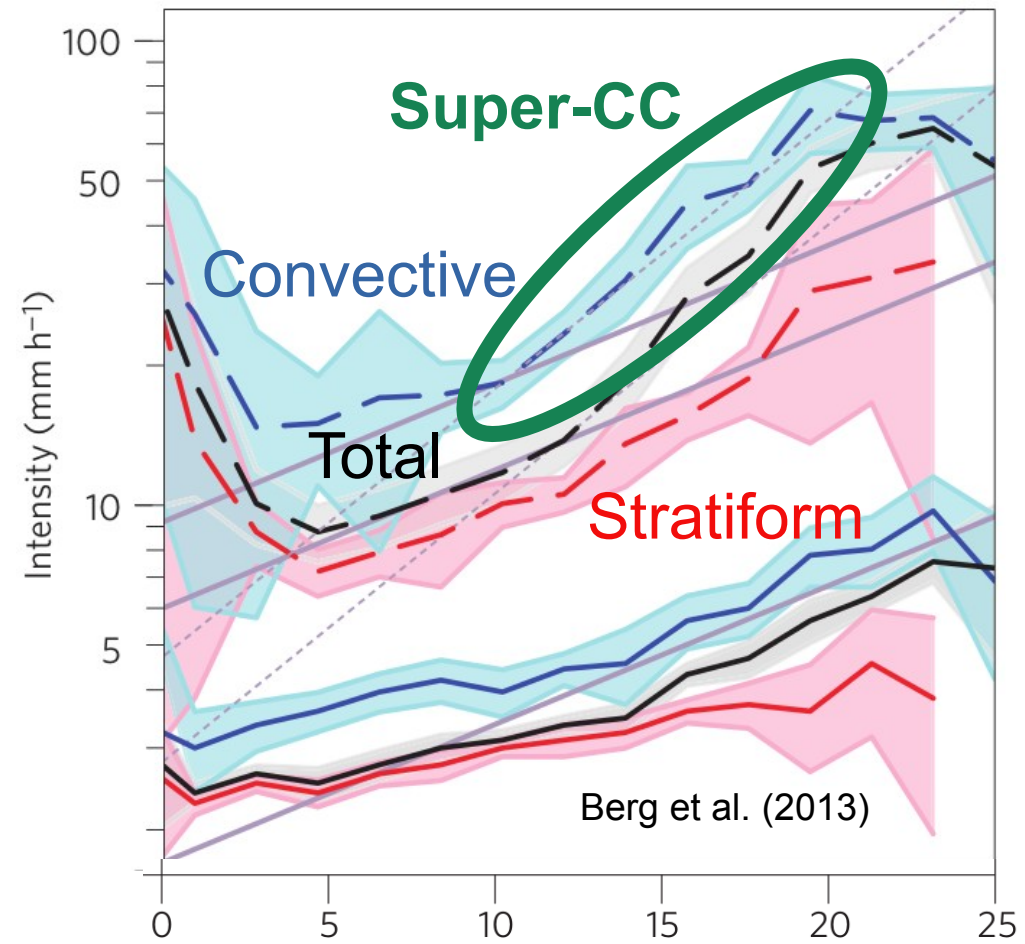


Unexplained super-CC scaling of sub-daily extreme precipitation in the mid-latitudes

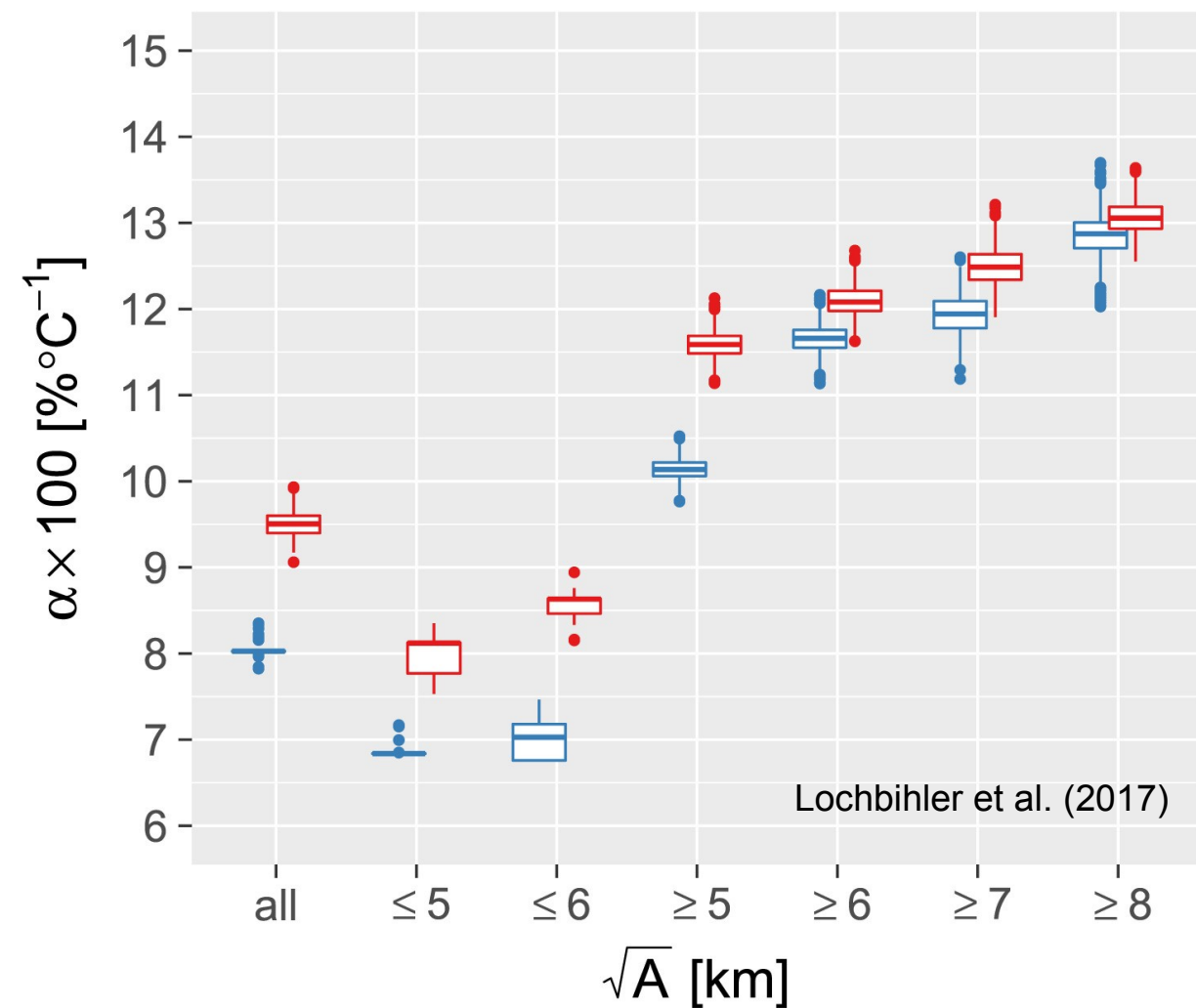


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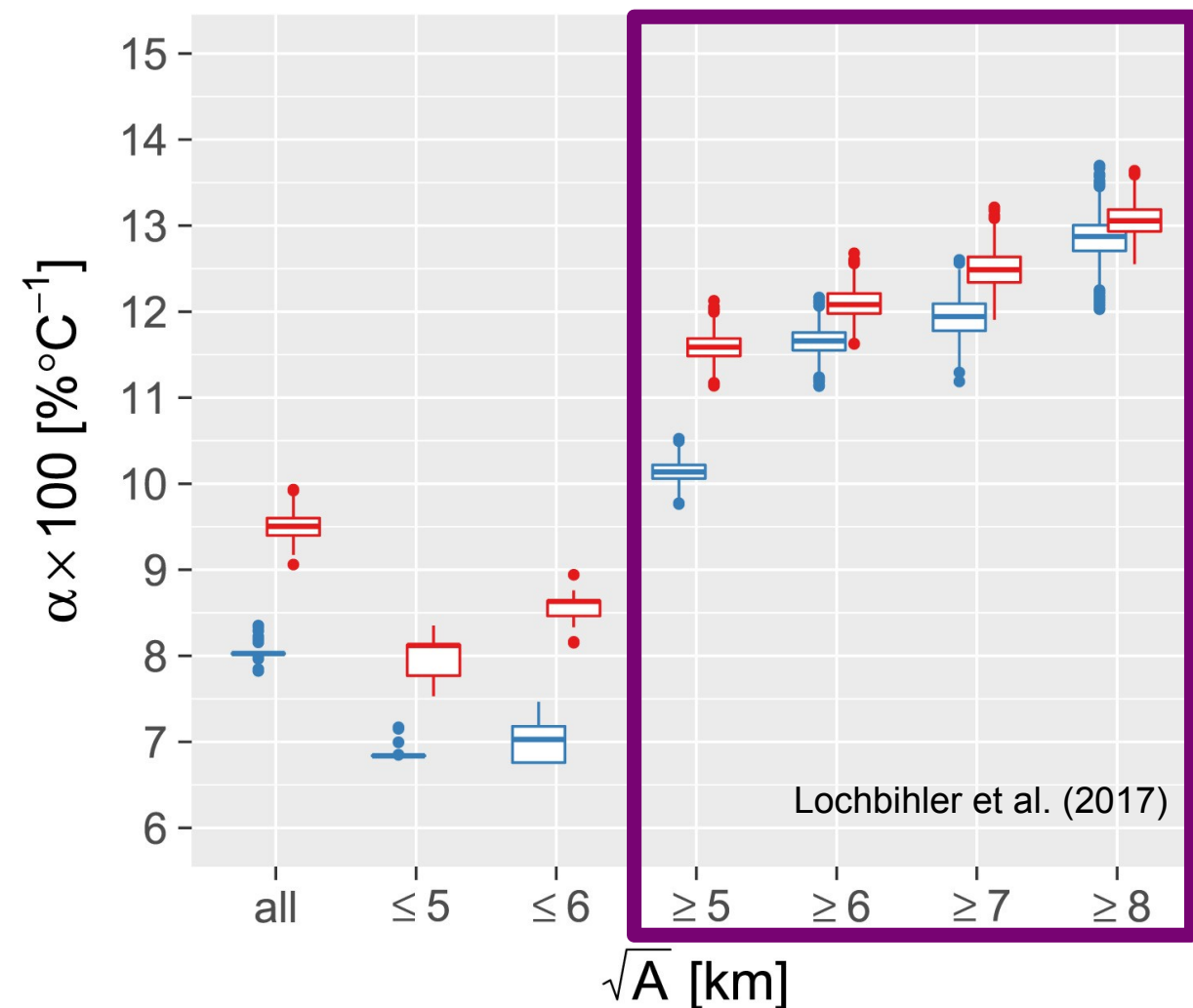
dynamical mechanisms?



A potential role of large precipitation systems ...



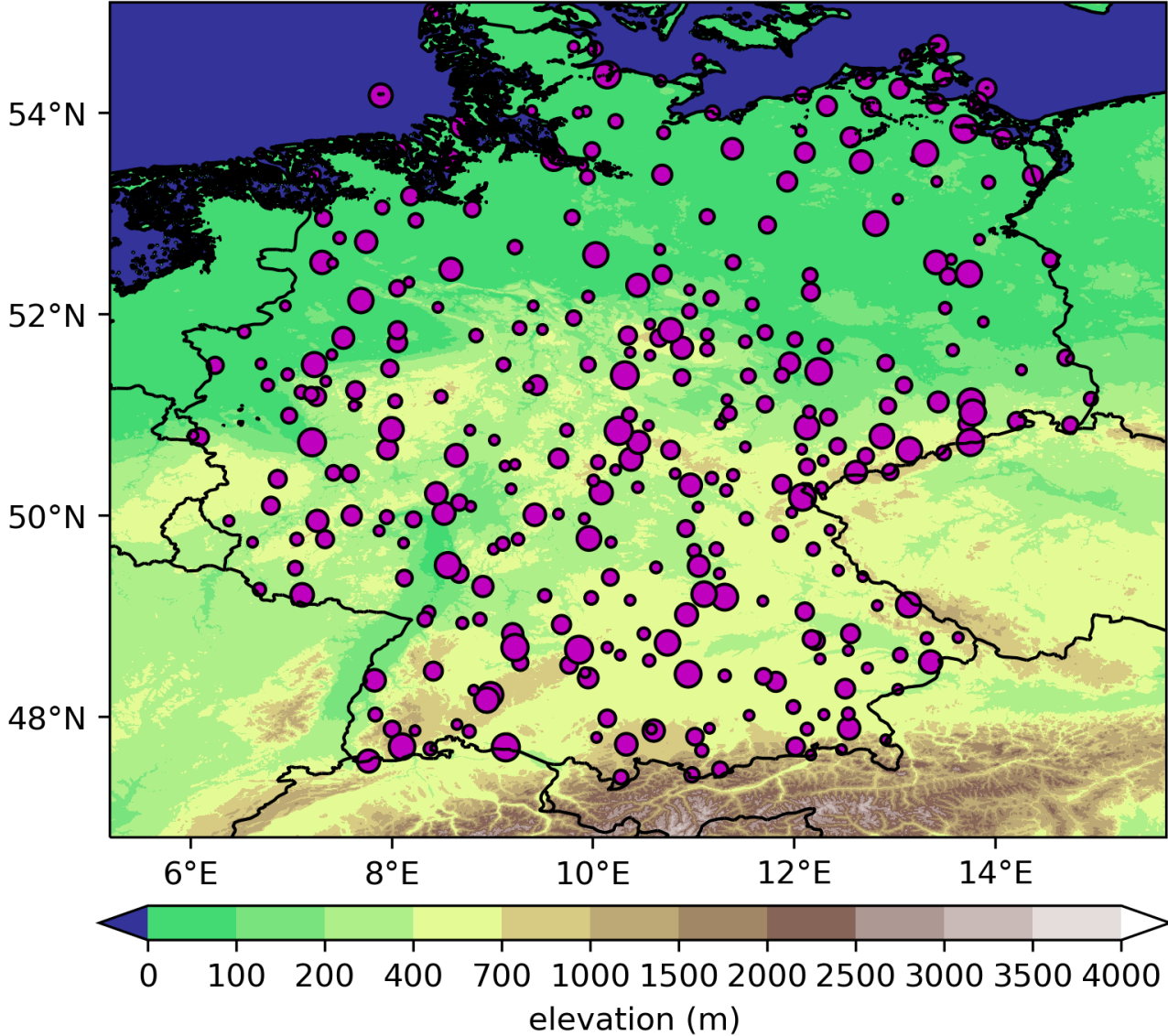
A potential role of large precipitation systems ...



... → Scaling of **MCS** precipitation extremes with dew-point temperature?

Dataset	Resolutions	Variables
DWD in-situ weather stations (331)	Pointwise 10-minute	Pr, Td
Tracking (IMERG + EUCLID)	~ 7 km 30-minute	PF type
EUCLID	~ 4 km 30-minute	Lightning

Station map



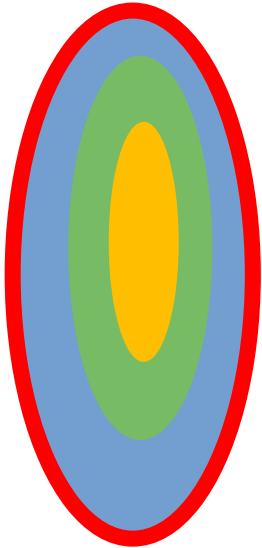
PF types

Stratiform

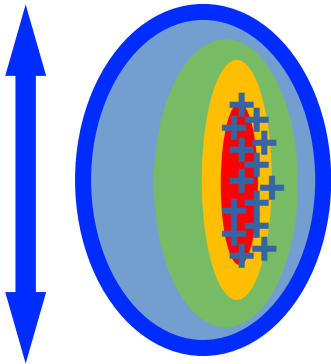
Isolated
convective

MCS

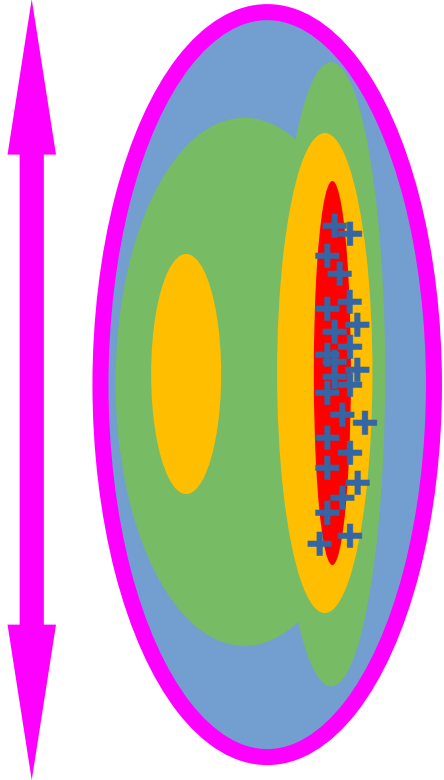
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< 100 km

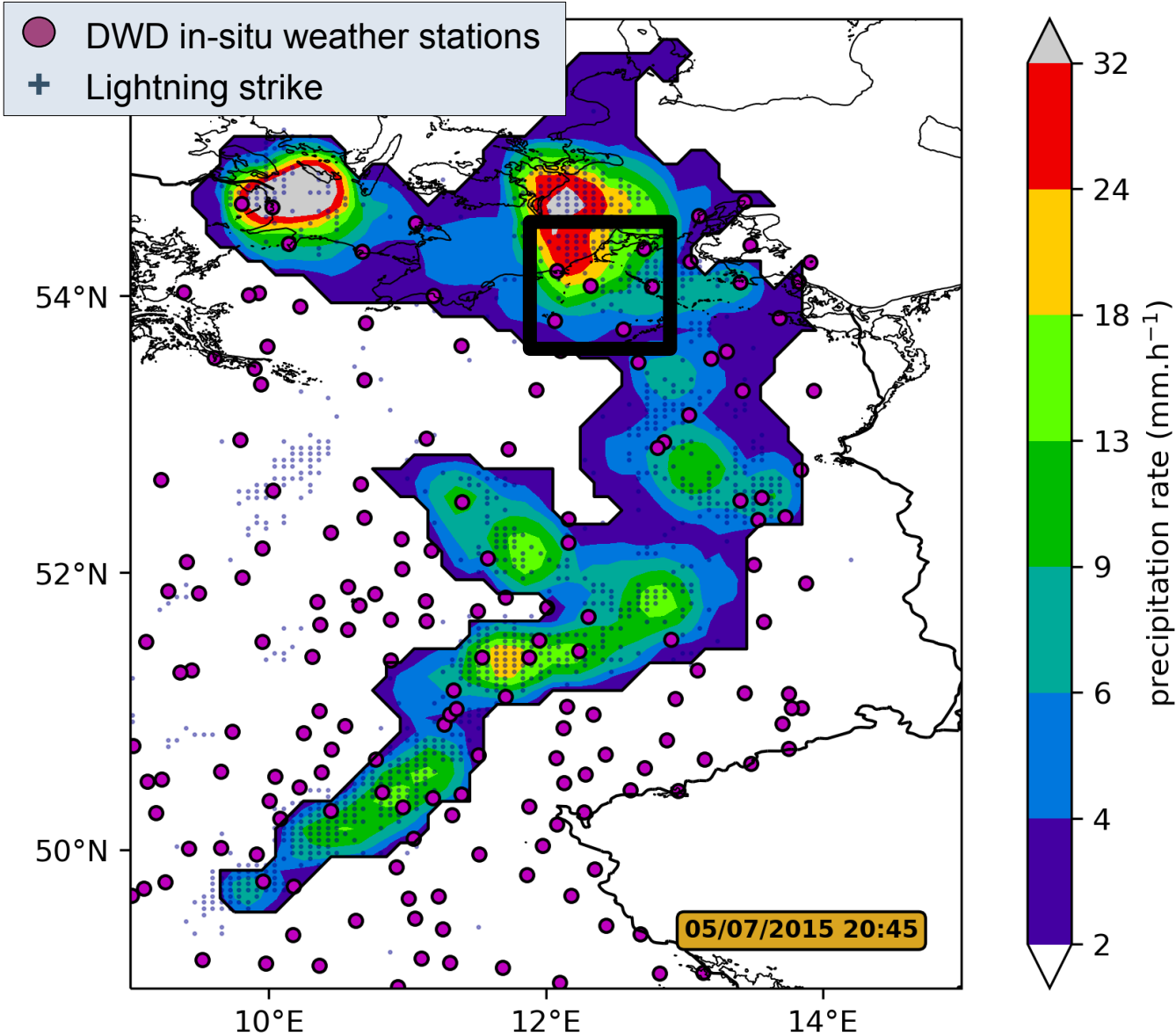


> 100 km



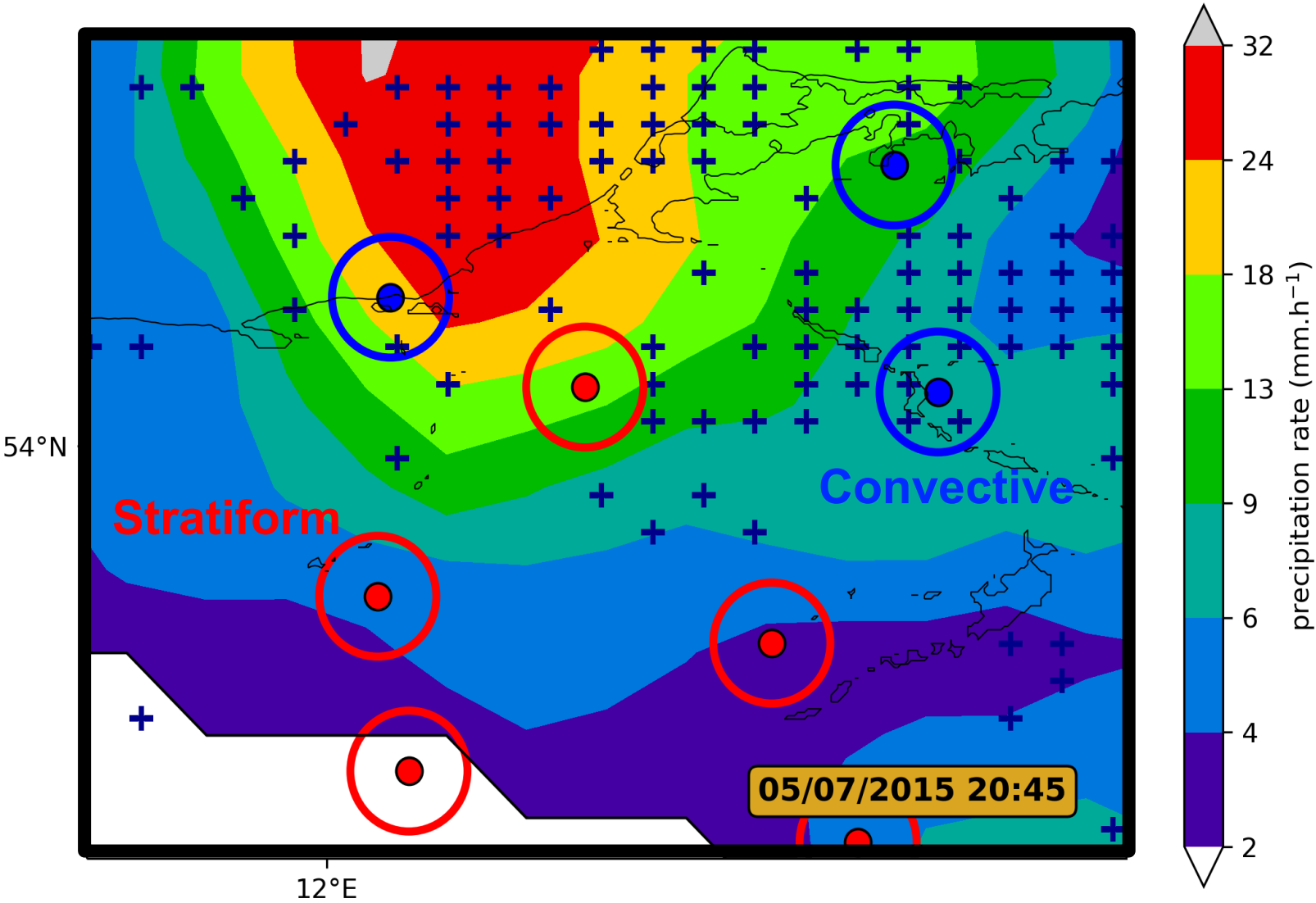
Data and method

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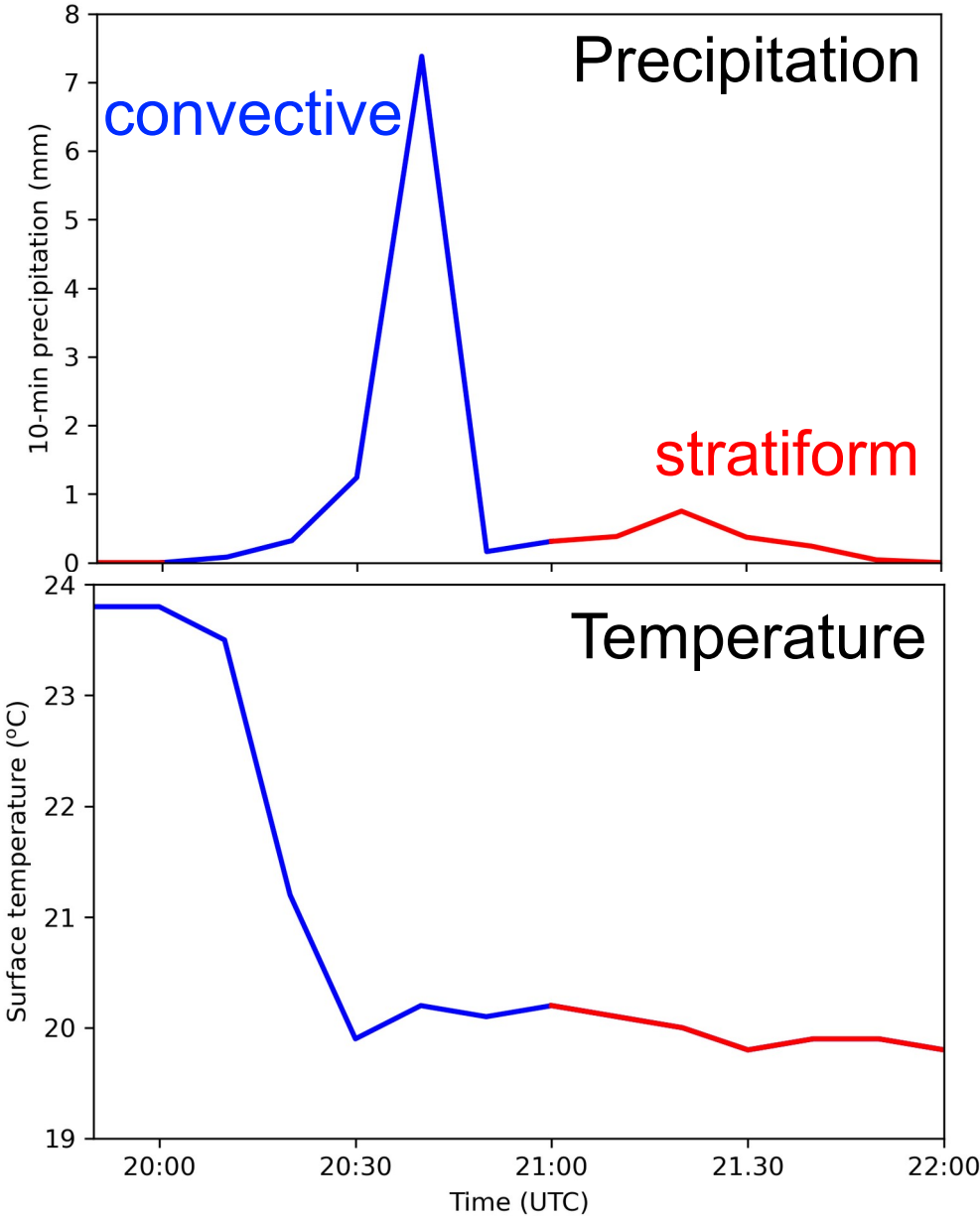
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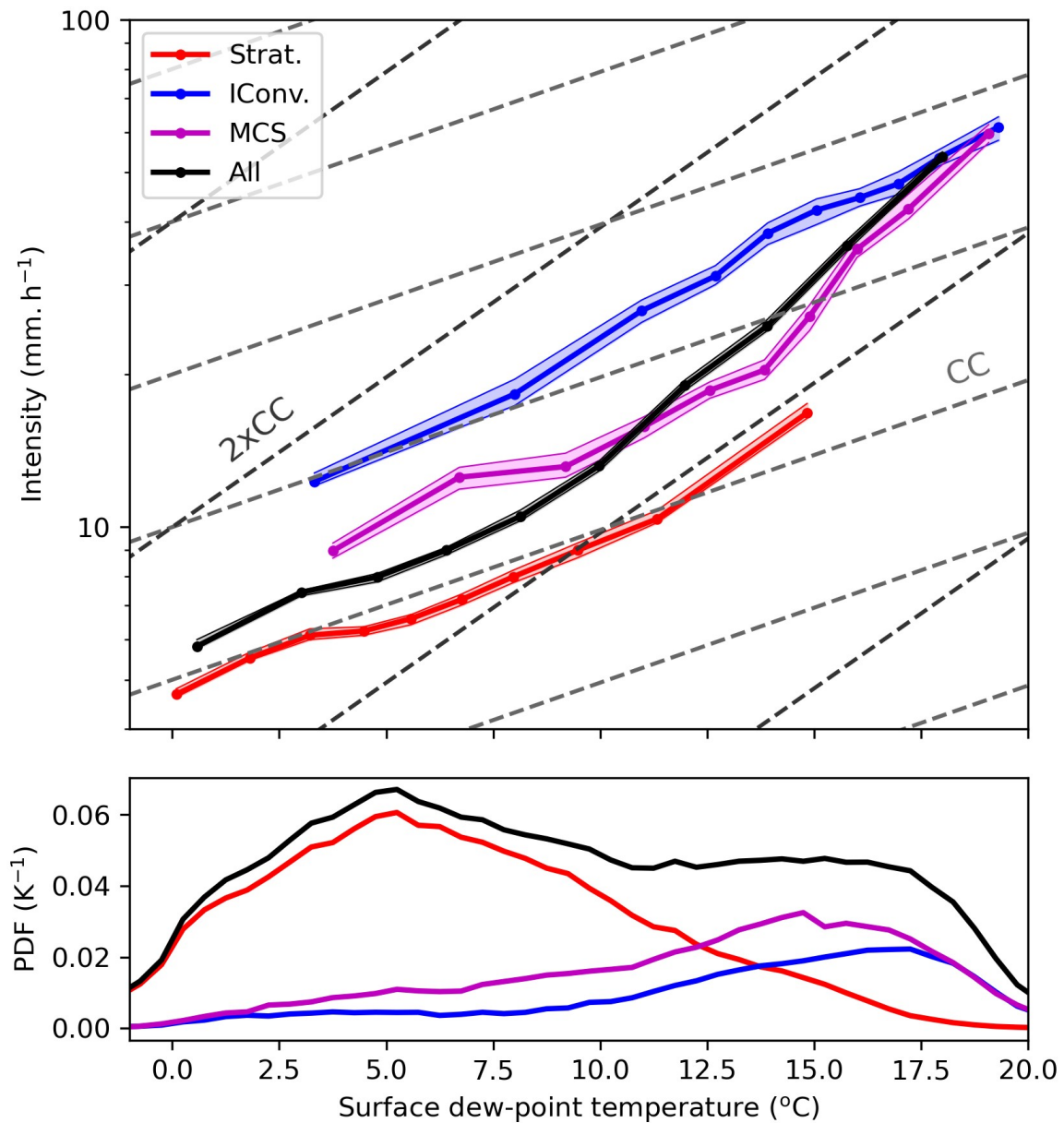


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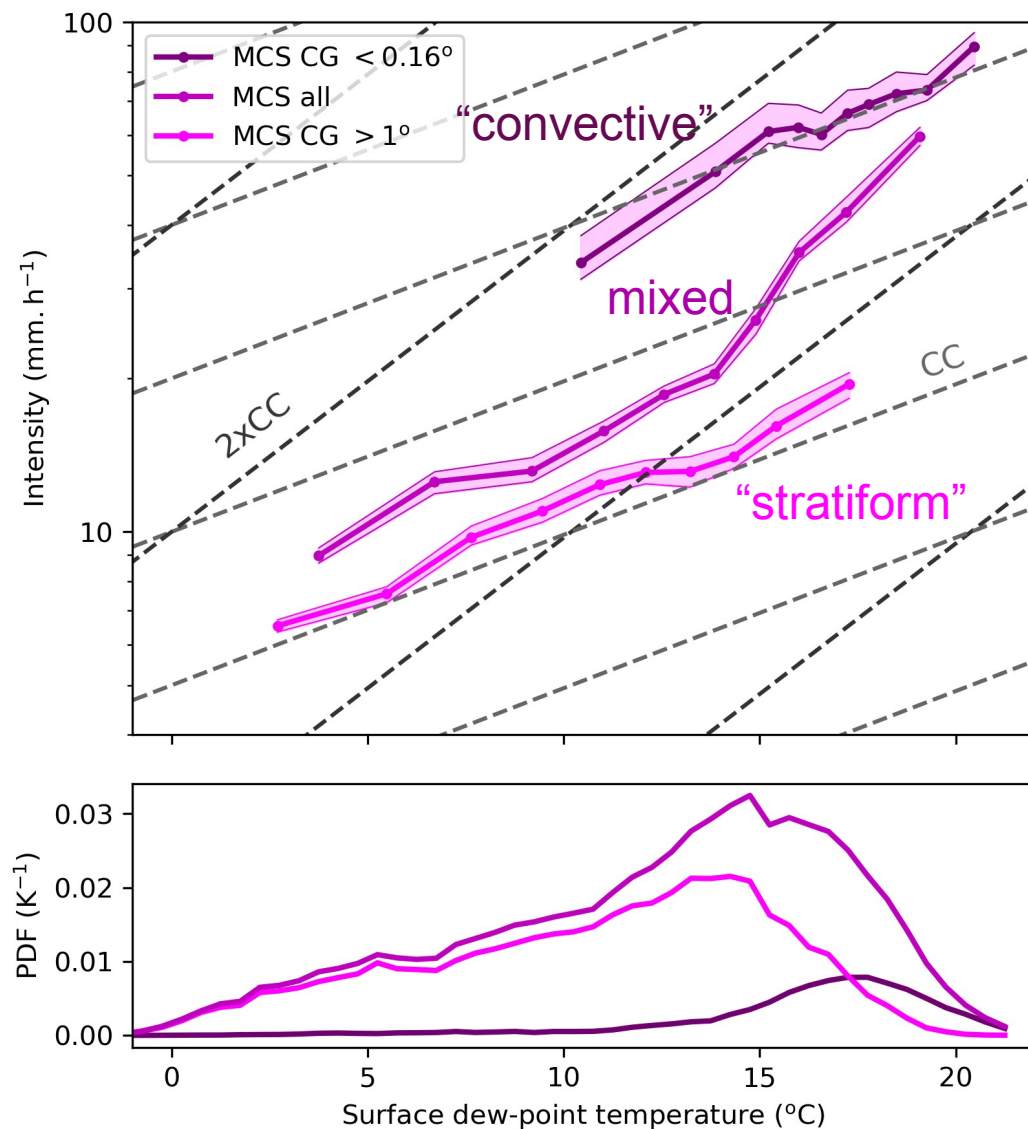
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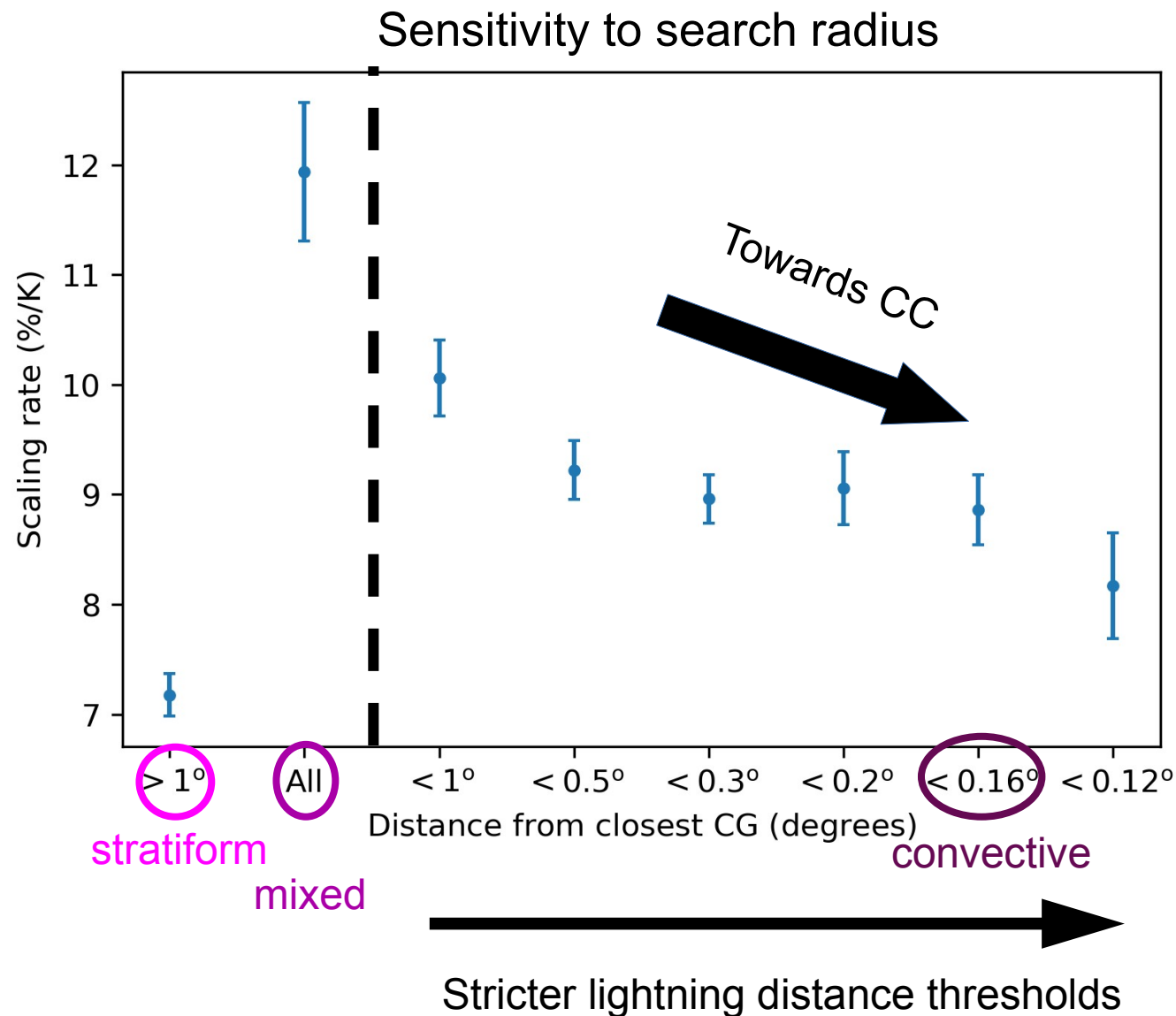
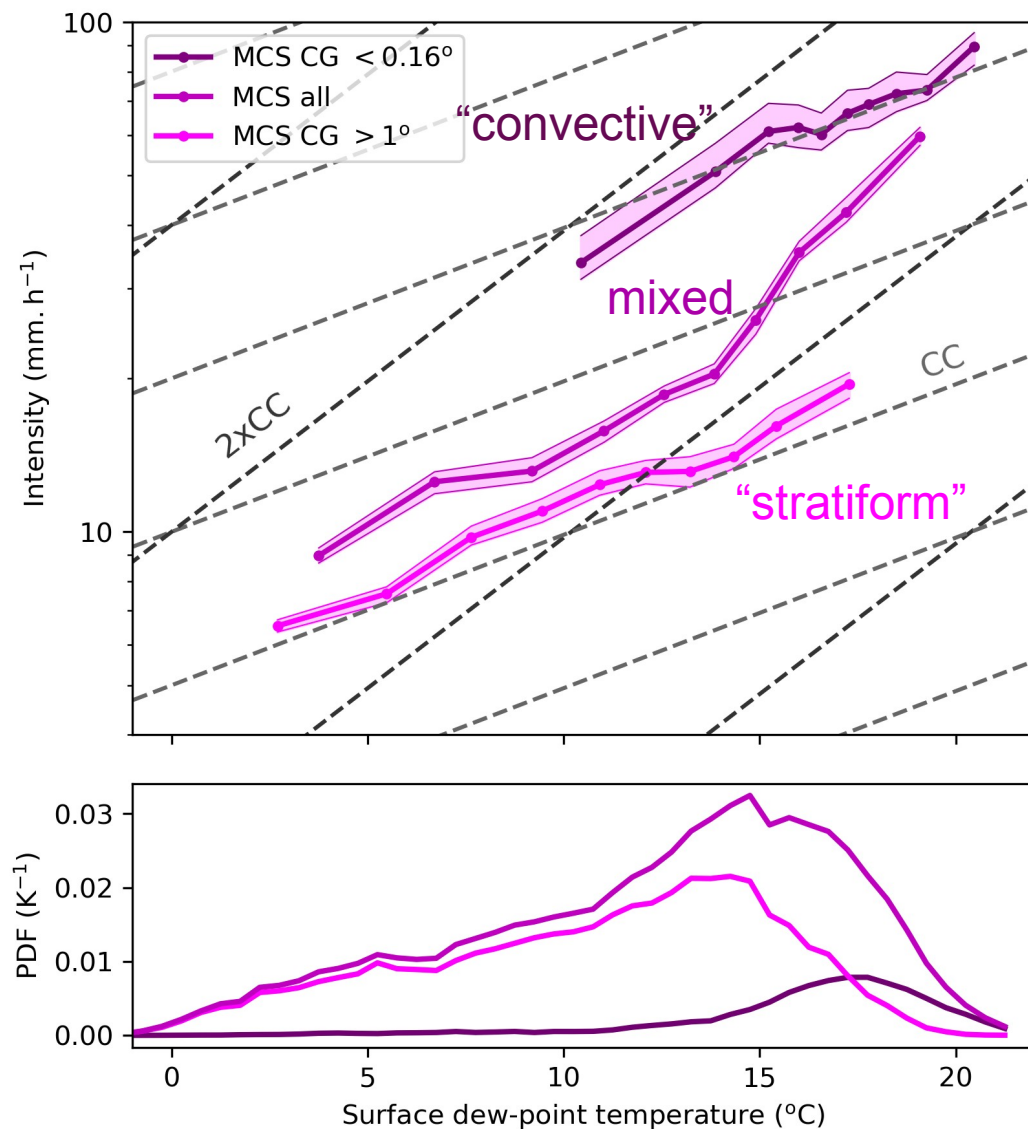
Pronounced super-CC scaling of MCS precipitation at warm Td



MCS super-CC explained by increased convective fraction with Td




MCS super-CC explained by increased convective fraction with Td



Conclusions

- Super-CC scaling of 10-minute MCS precipitation extremes for $T_d > 14^{\circ}\text{C}$ when accounting for both stratiform and convective regions
- Explained by a dramatic increase in MCS convective fraction
- Taken separately, 10-minute convective and stratiform MCS precipitation extremes follow $\sim \text{CC}$
- MCS convective fraction is projected to increase in a warmer climate (Dougherty et al., 2023)



In case of any question, please reach me here:
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Thank you for your attention!