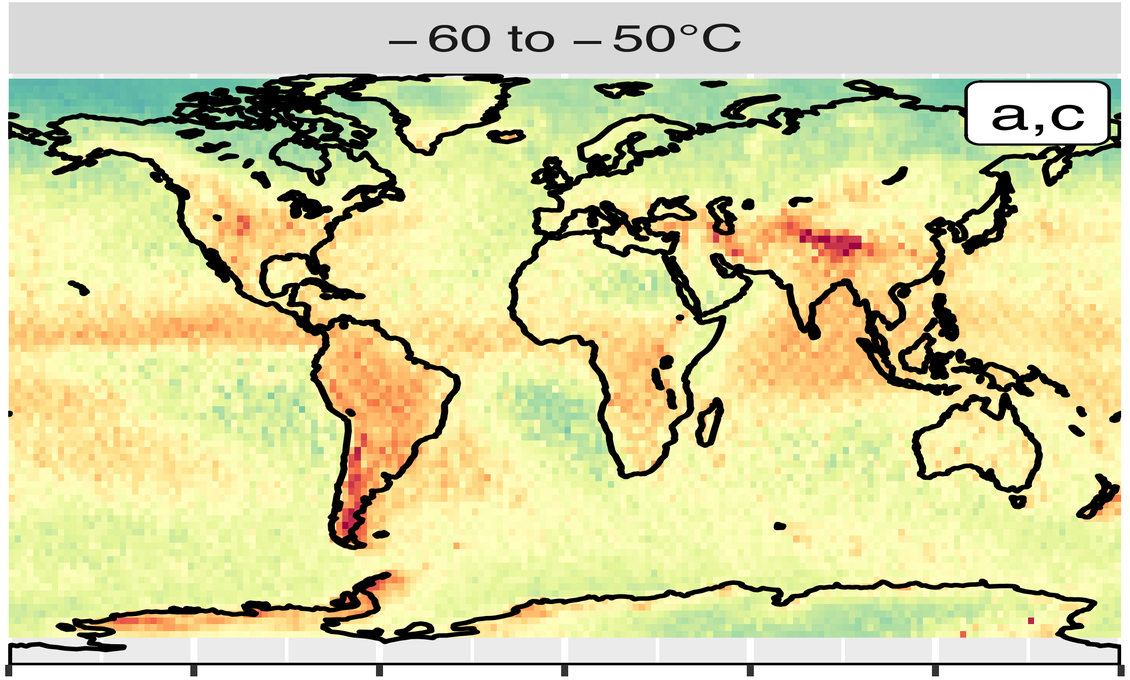
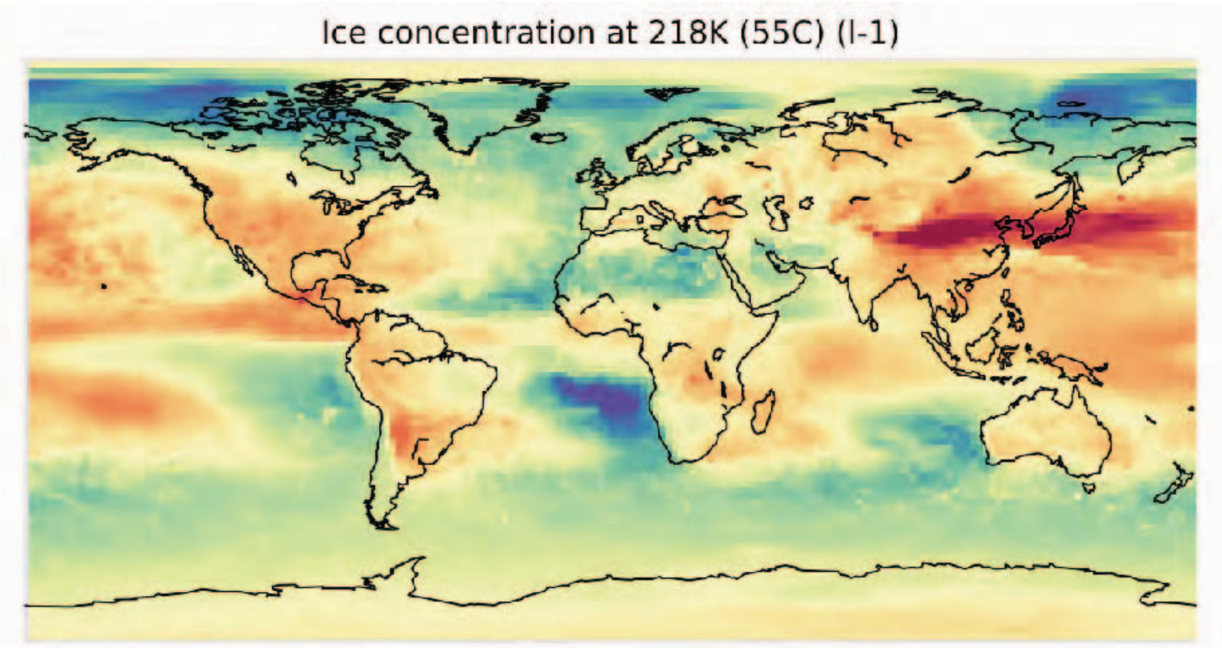
ICNC satellite vs model

Satellite



Model

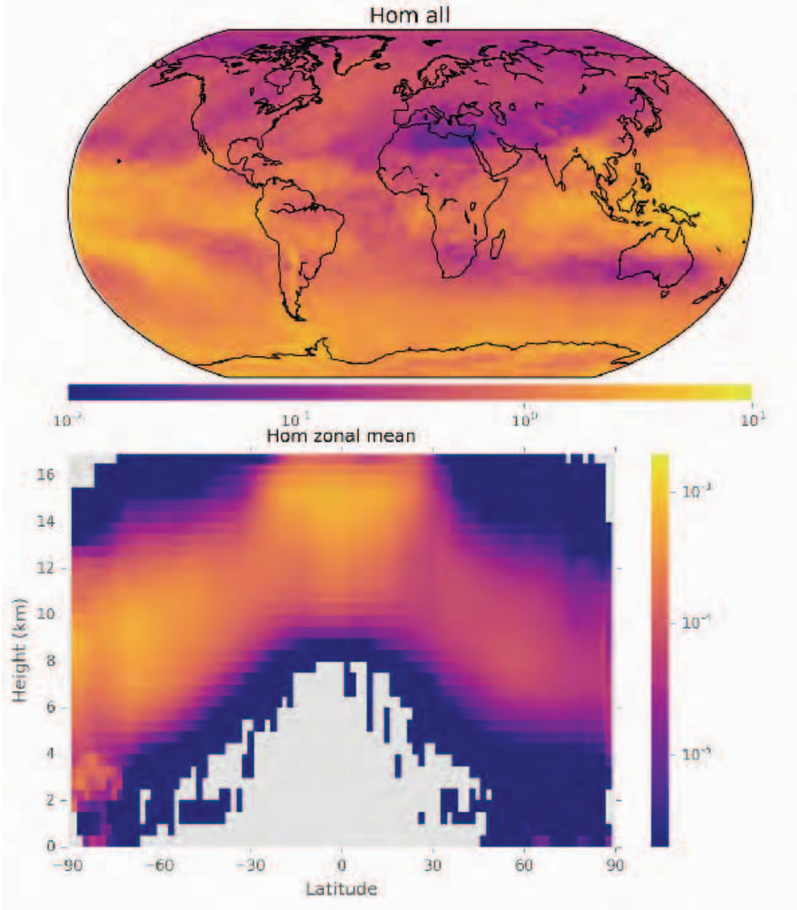


❌ Increasing with decr. temperature and maximum 300 l-1 (annual average)

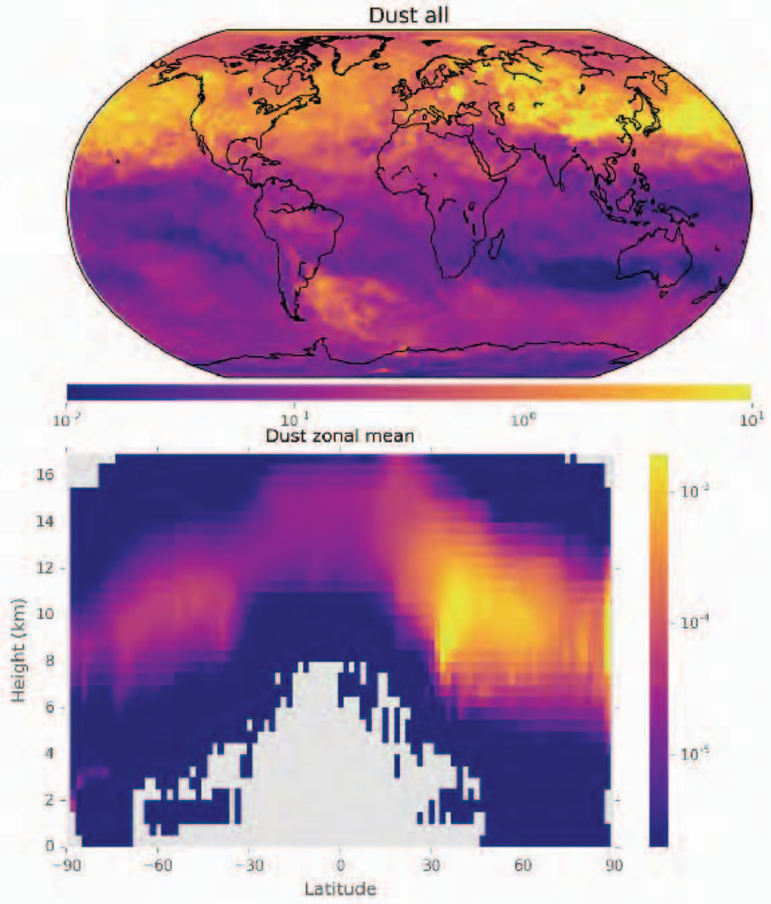
✓ Highest concentrations in the convective areas

IC Sources

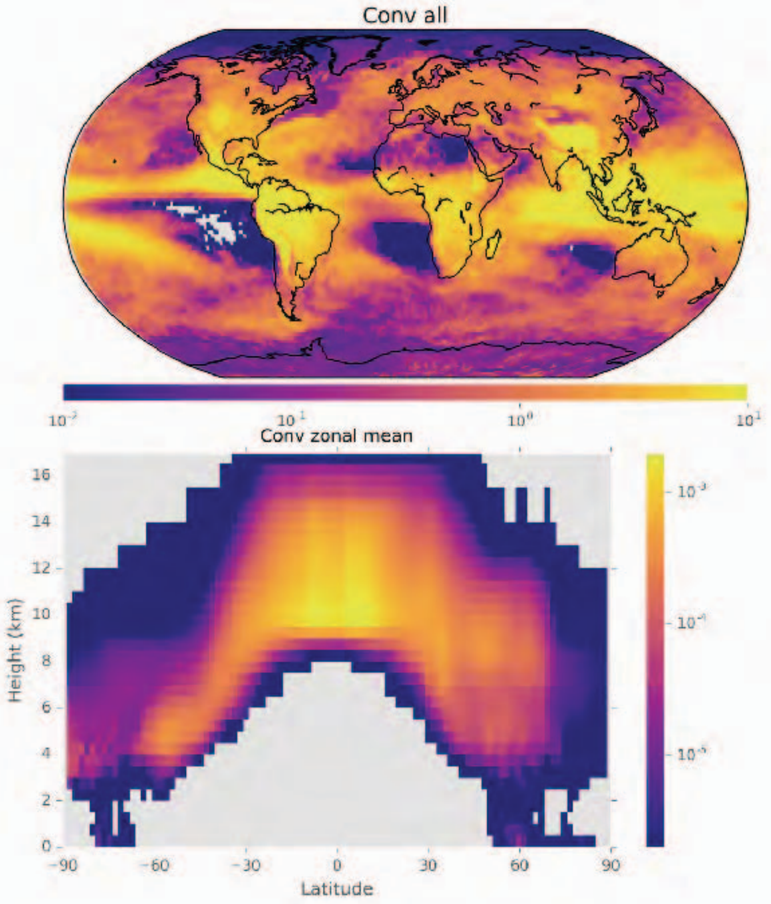
Homogeneous freezing



Ice nucleation on dust

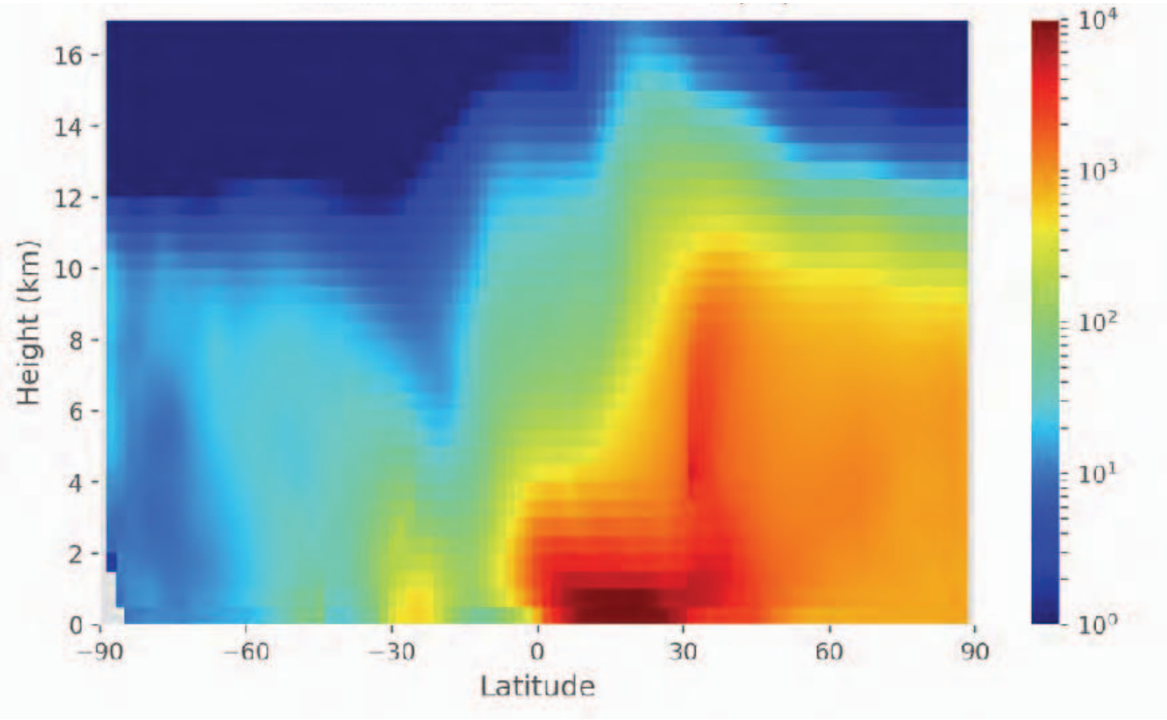


Convective detrainment

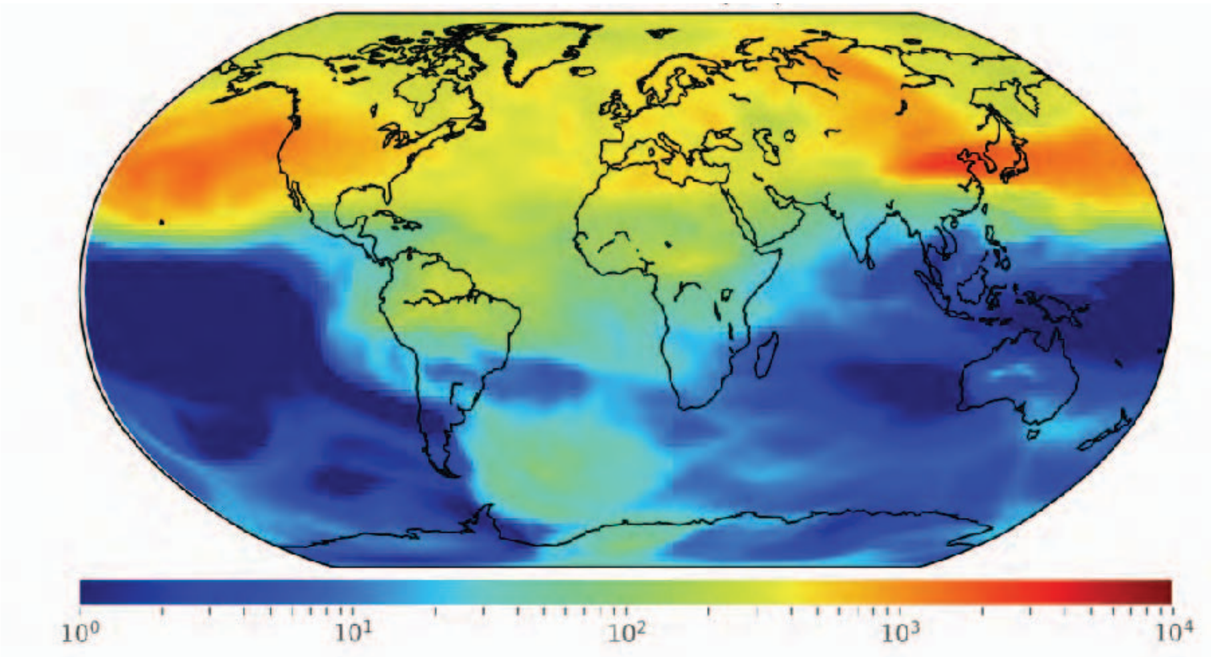


Dust concentrations in ECHAM-HAM

Dust concentration (zonal mean)



Dust concentration at 10 km

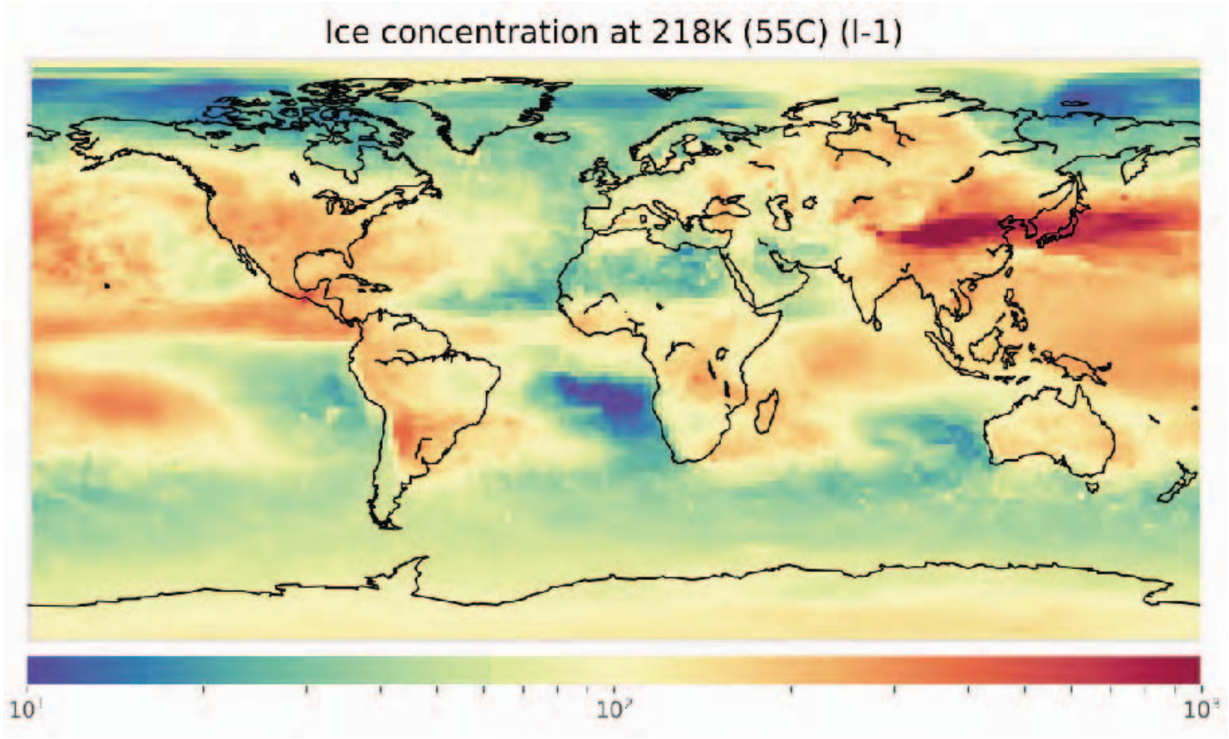


1 l^{-1}

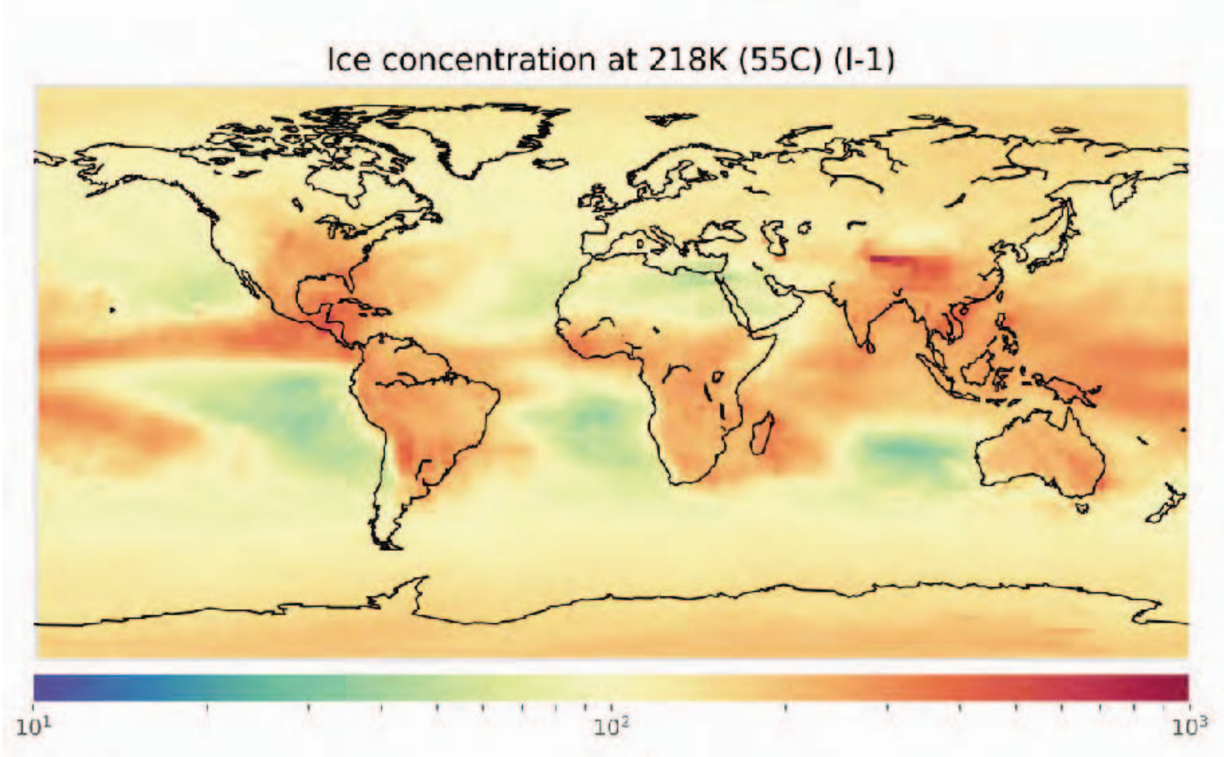
1e4 l^{-1}

Effect of dust on cirrus clouds

Hom+het

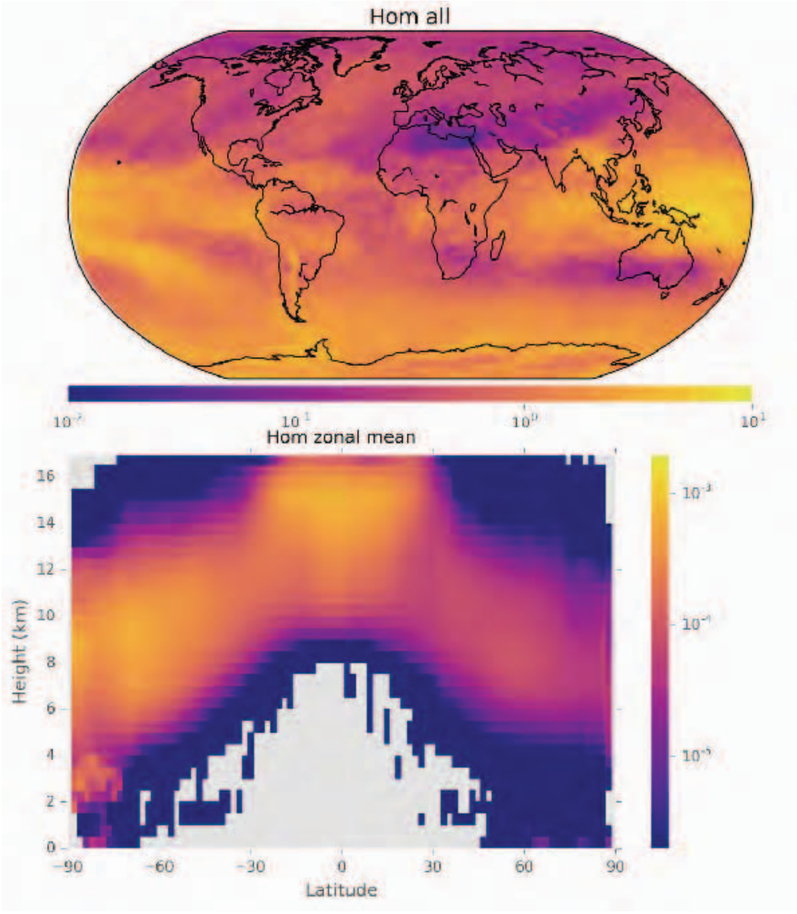


Hom only

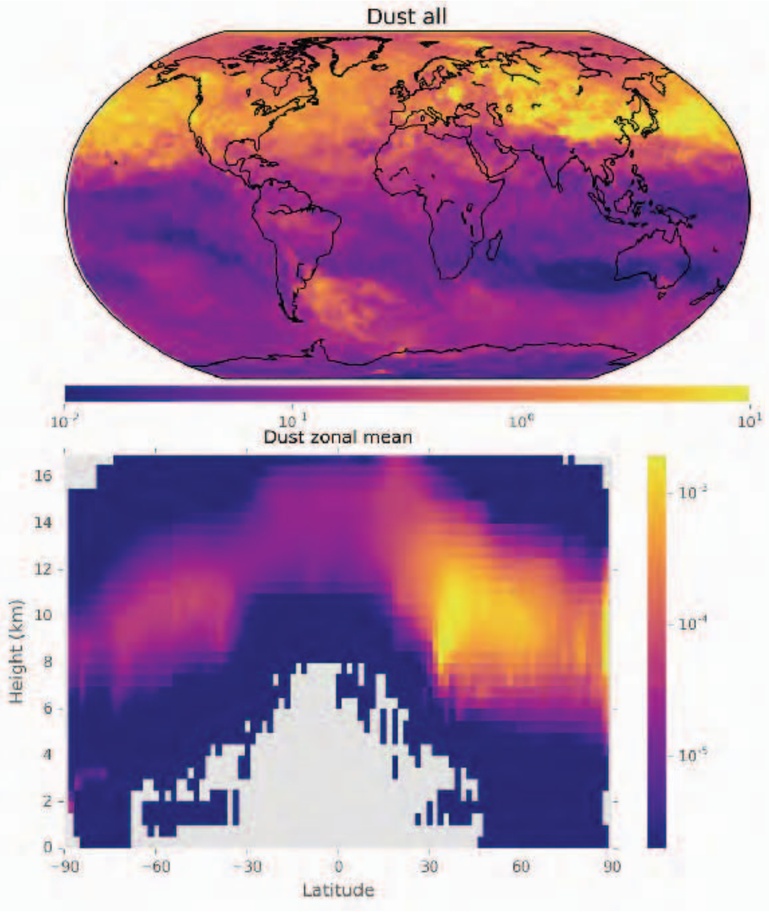


IC Sources

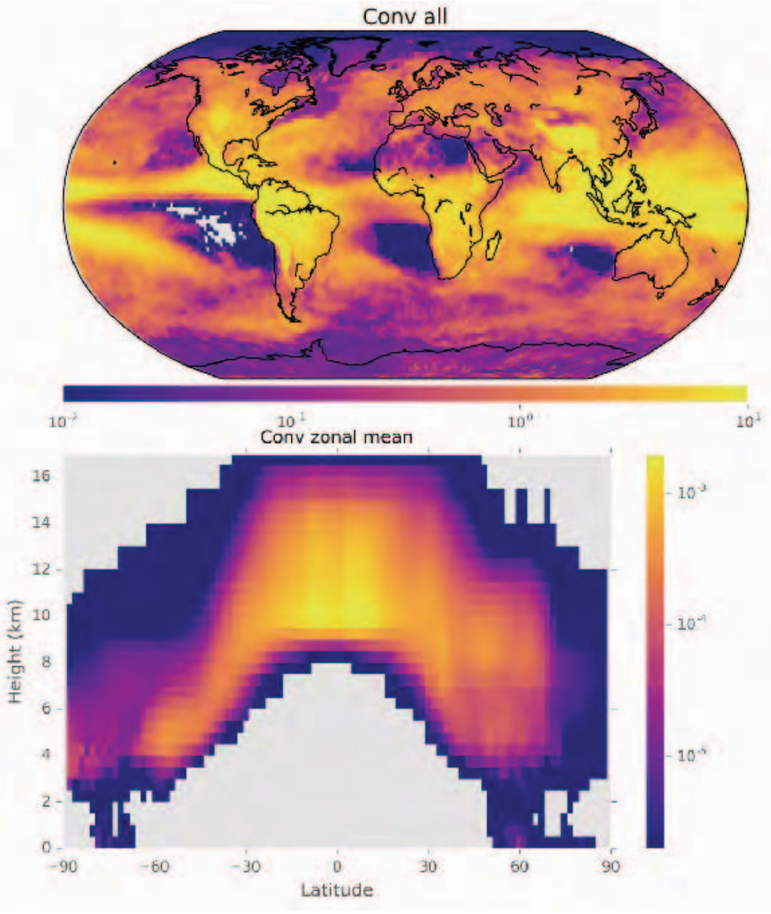
Homogeneous freezing



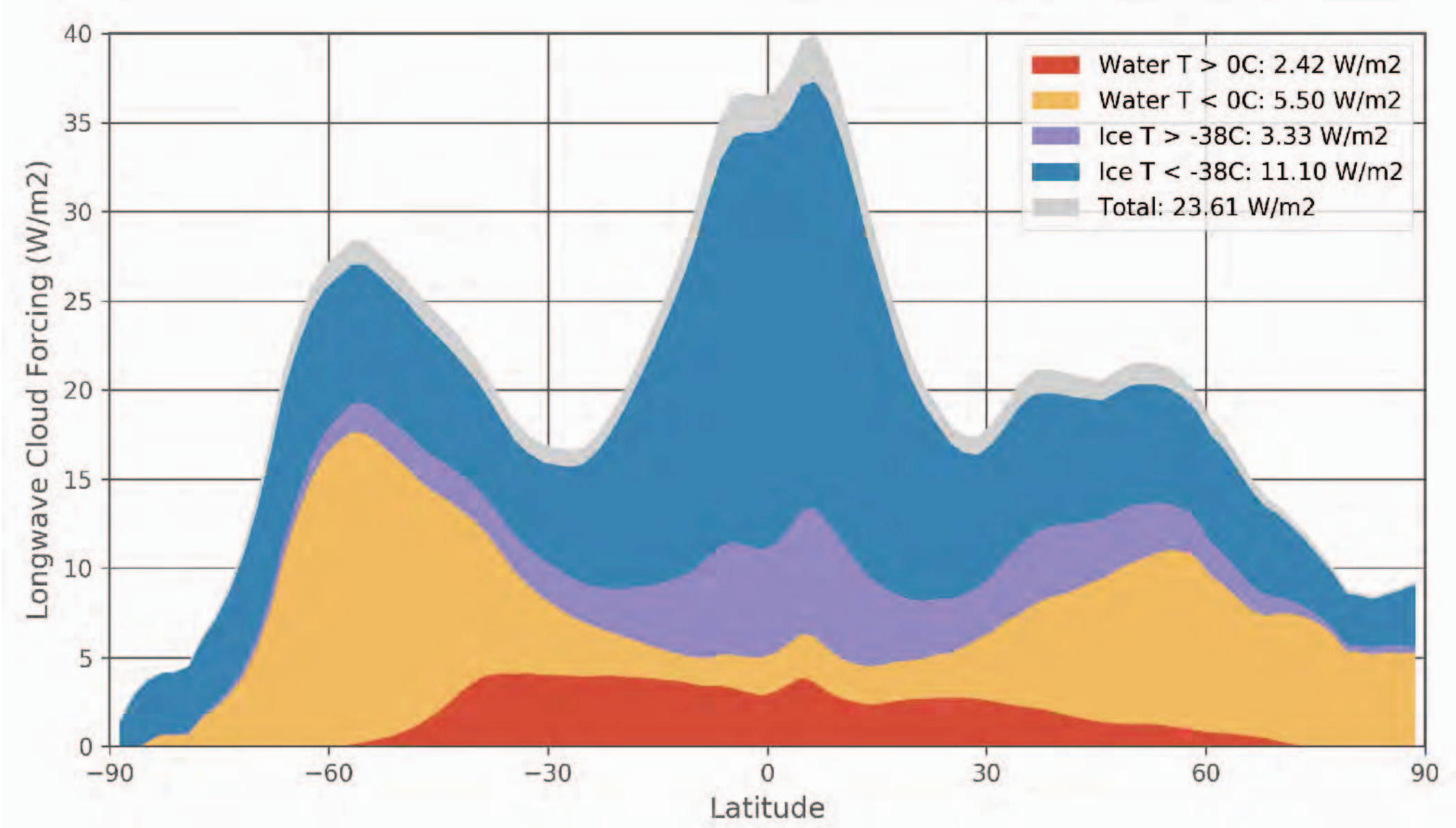
Ice nucleation on dust



Convective detrainment

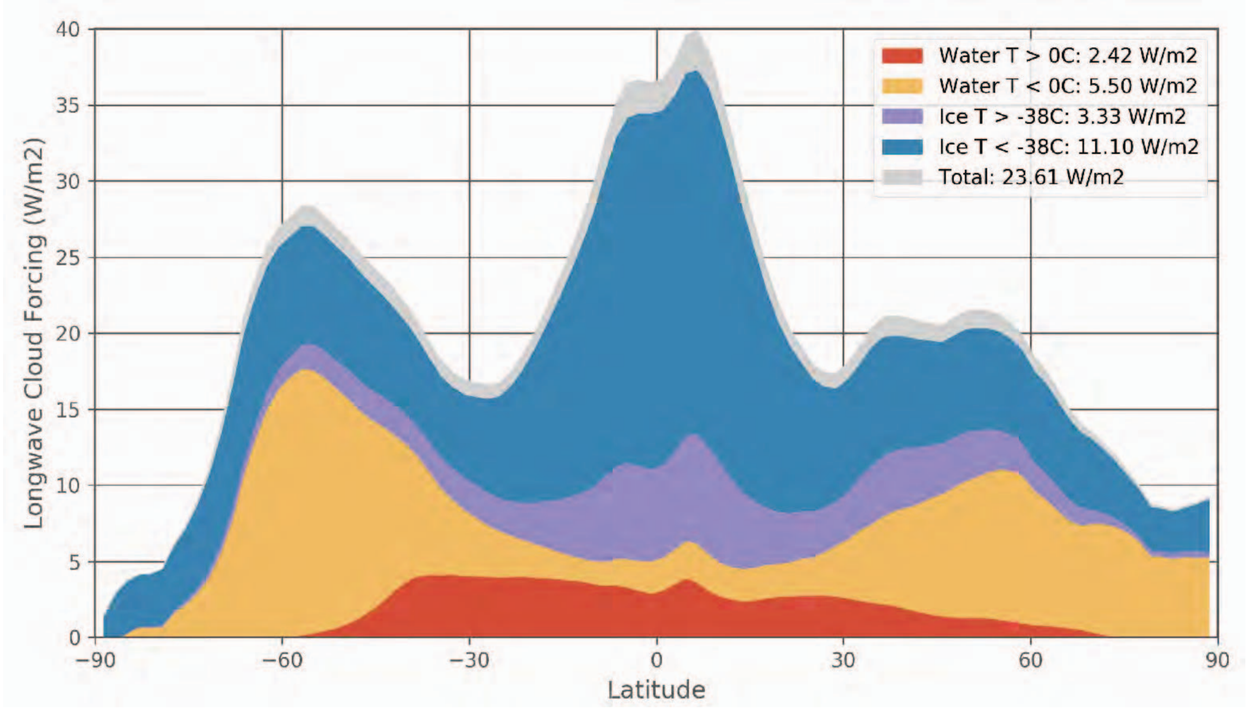


Longwave cloud radiative effect

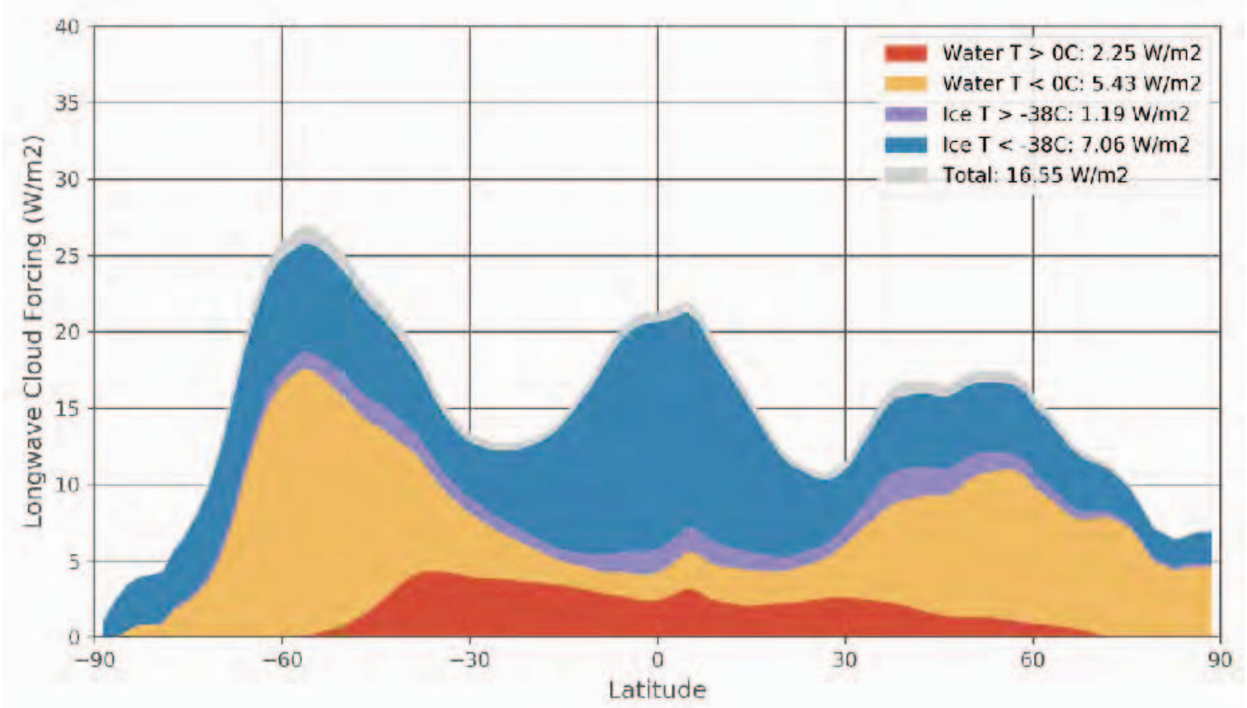


Sensitivity test

Detrained ICNC 3000 l^{-1}



Detrained ICNC 100 l^{-1}



Conclusions

- Convective detrainment is most important process for cirrus cloud mass and heating
- Horizontal ice crystal concentration pattern can be reproduced by a GCM
- In-situ cirrus formation is controlled by dust distribution
  -> much more dust over the NH -> more heterogeneous cirrus over the NH
- Convection is the major IC source and most important for the LW CRE
- But convective IC are a tuning factor