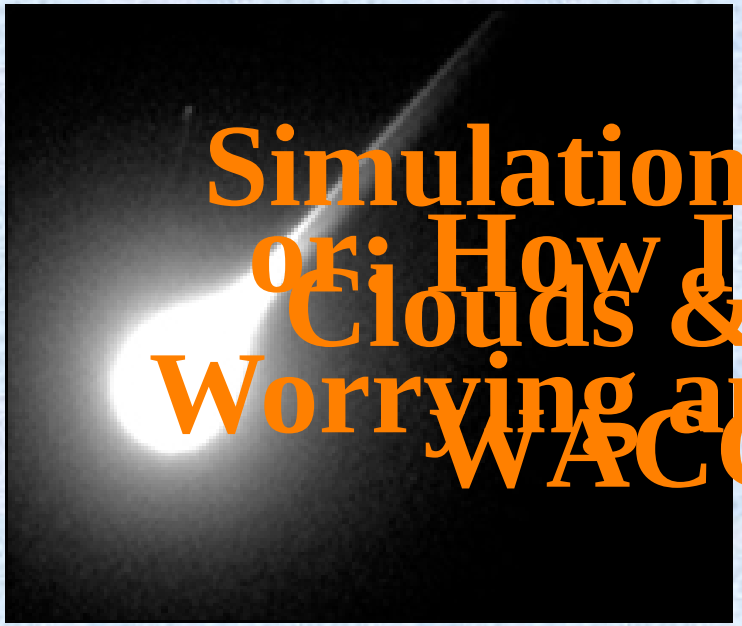
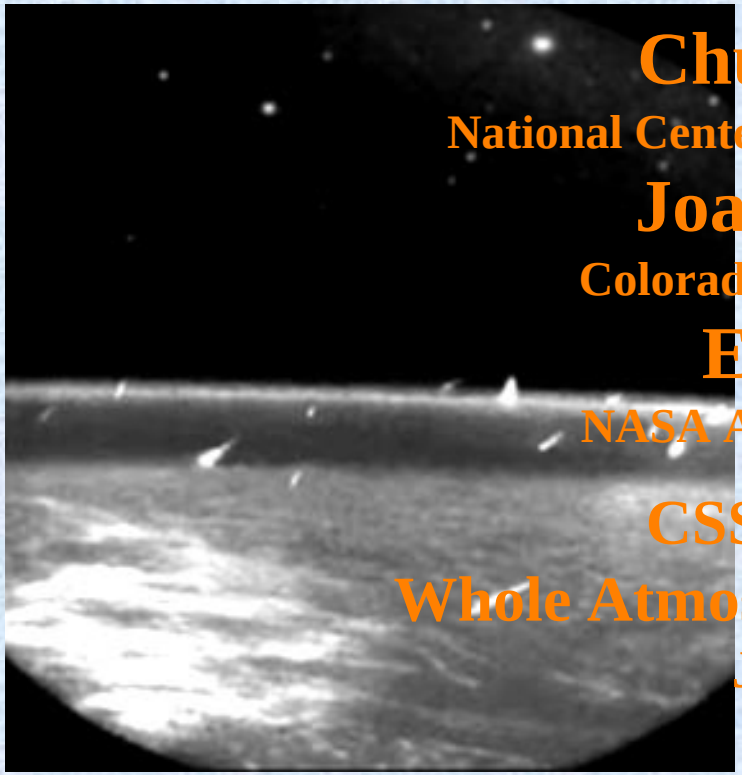


Simulations Of Mesospheric Clouds & Aerosols Using WACCM/CARMA

or: How I Learned to Stop Worrying and Love the Waves



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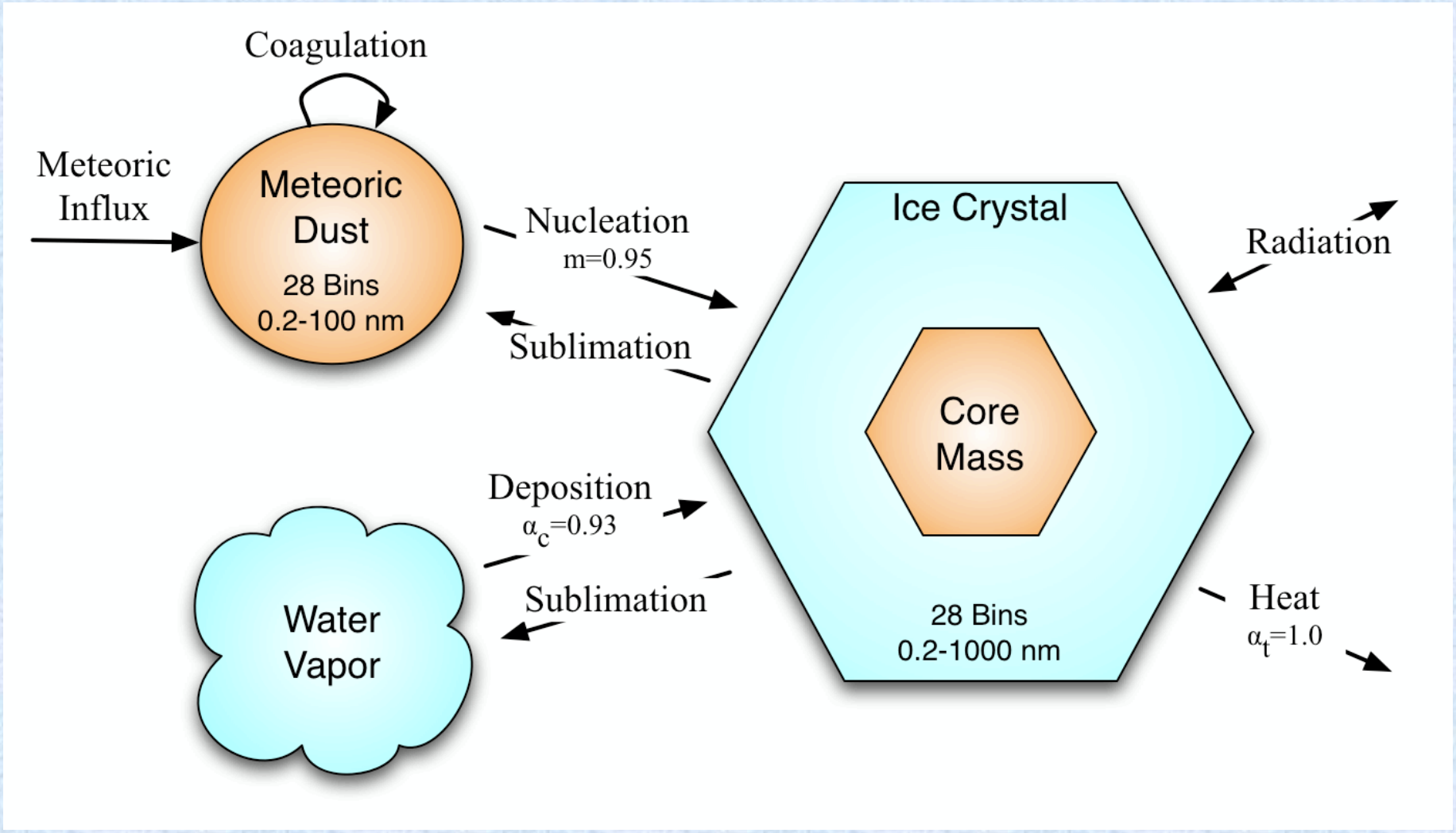
NASA Ames Research Center

CSSM Workshop

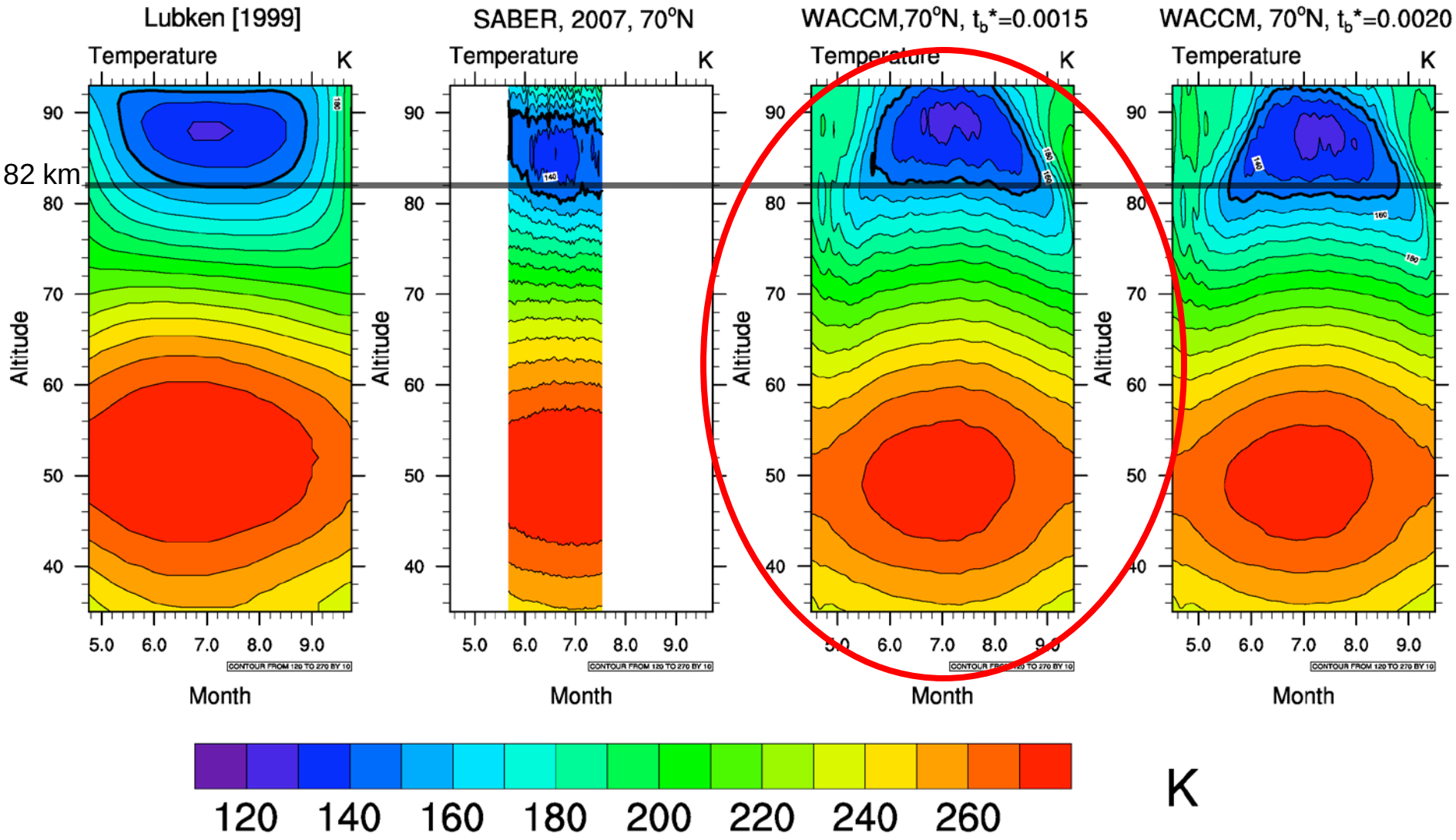
Whole Atmosphere Working Group

June 18, 2009

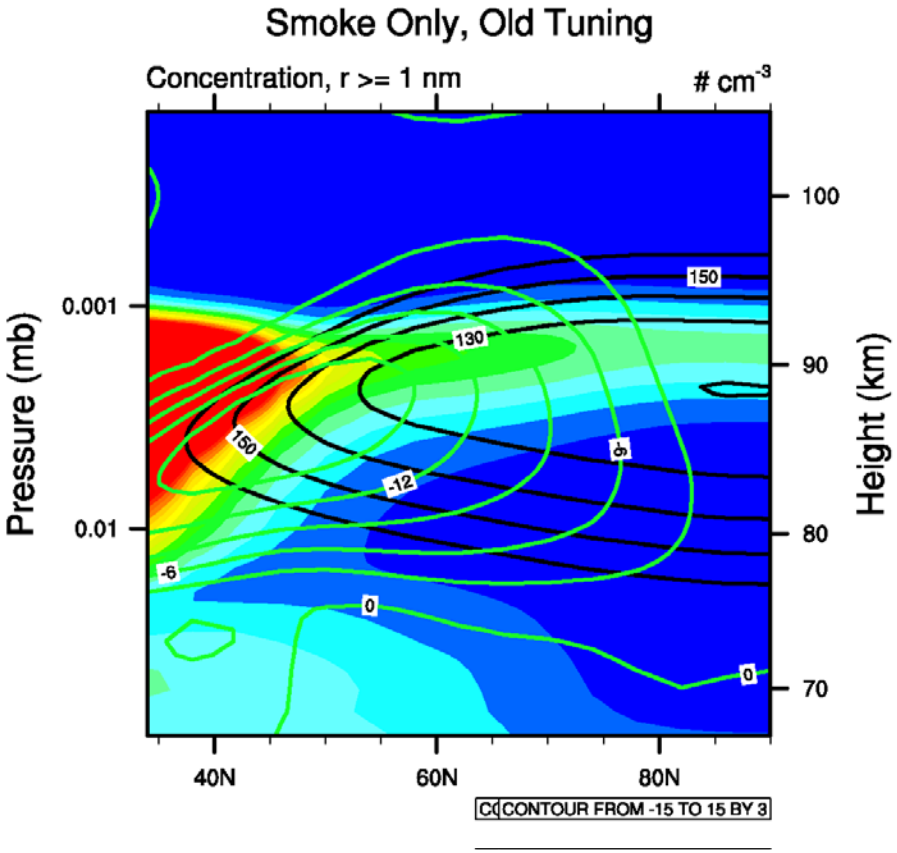
WACCM/CARMA PMC Microphysical Model

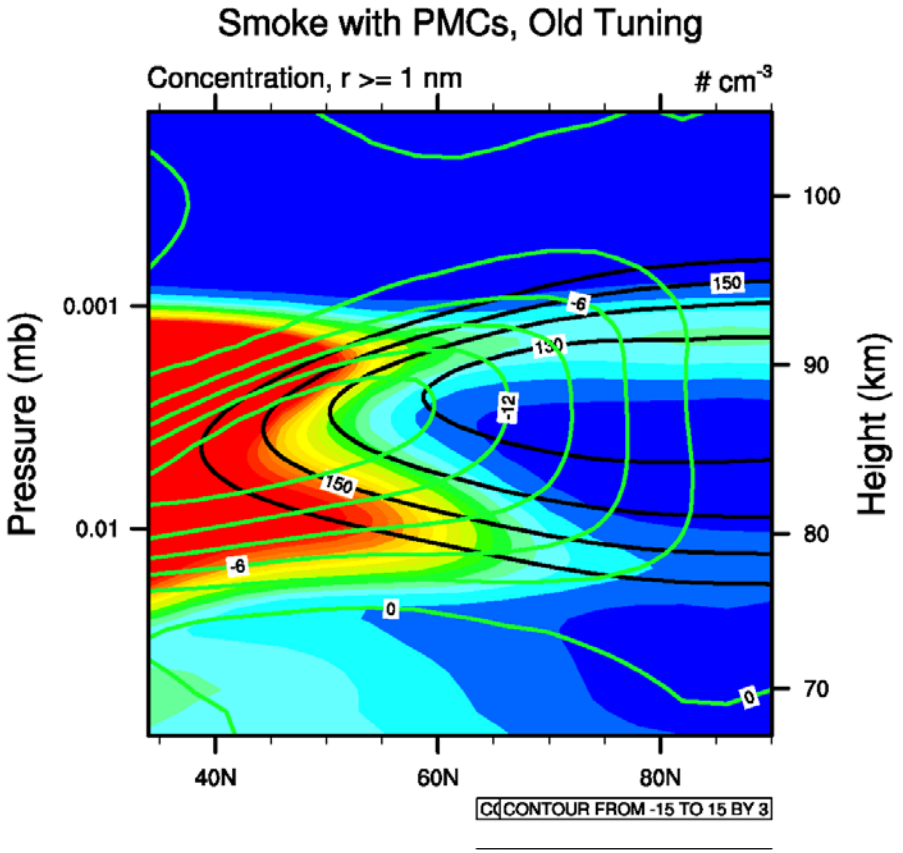


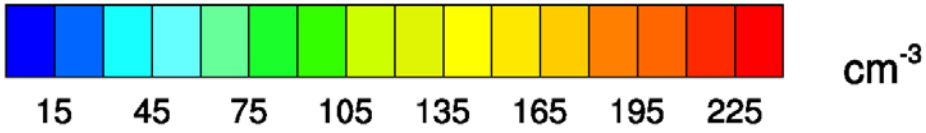
Gravity Wave Impact Upon Summer Temperatures, 70˚N



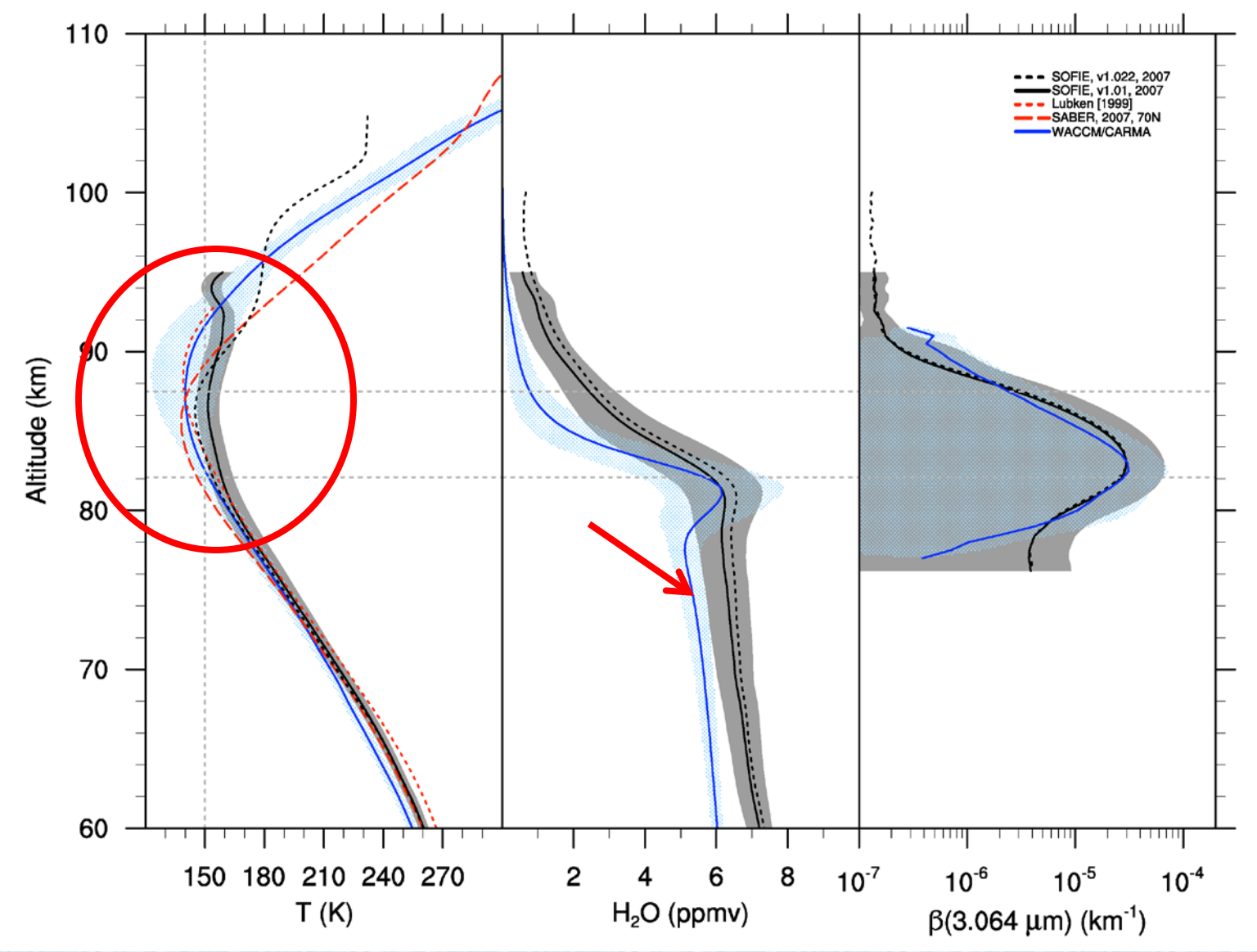
Meteoric Dust near the Summer Polar Mesopause



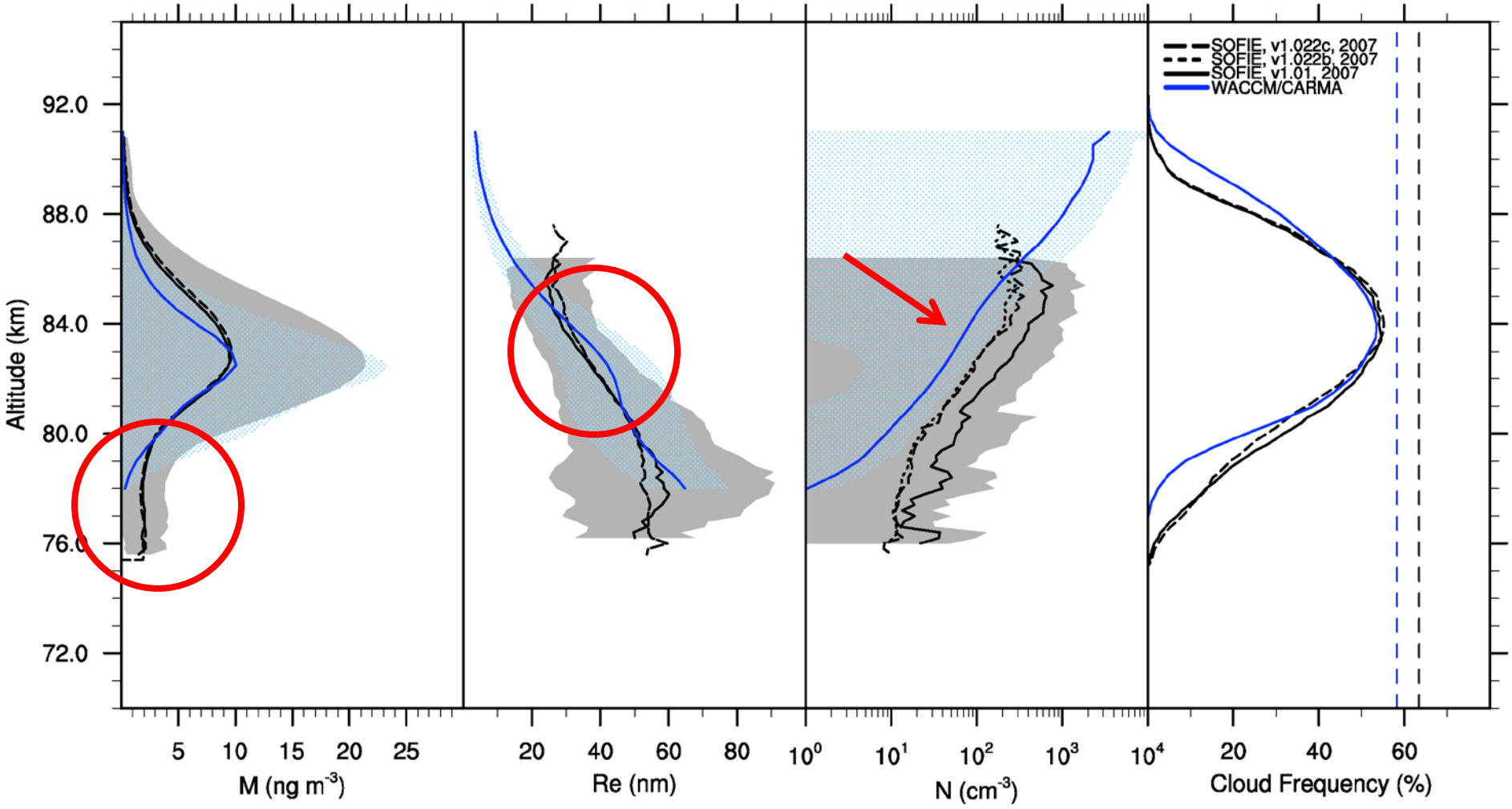




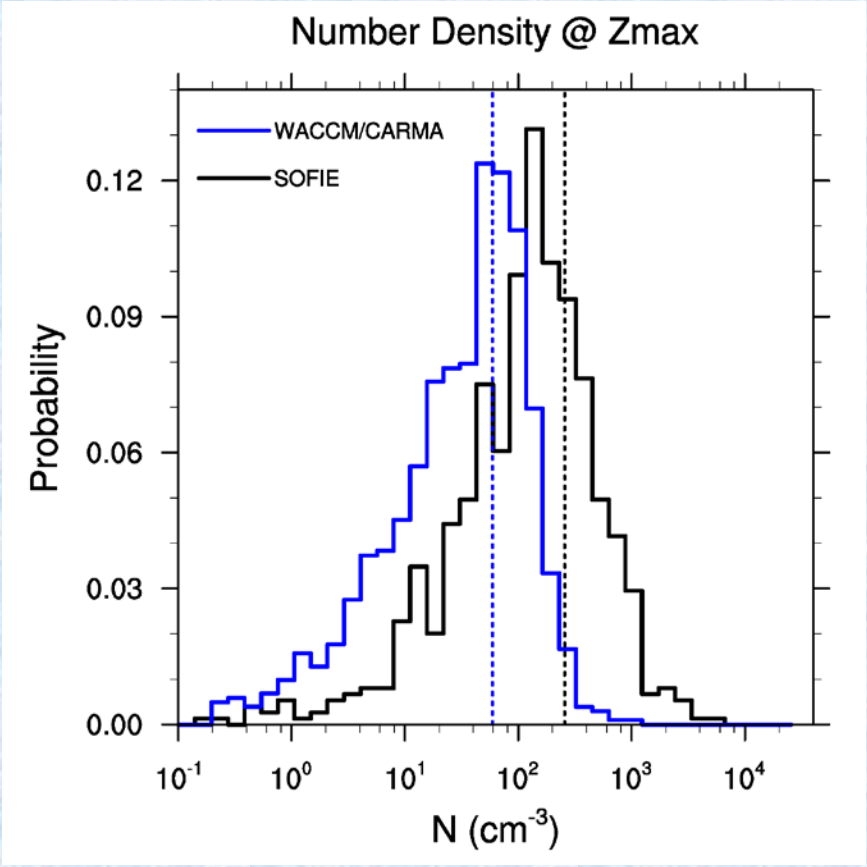
PMCs vs. SOFIE: T, H_2O, B

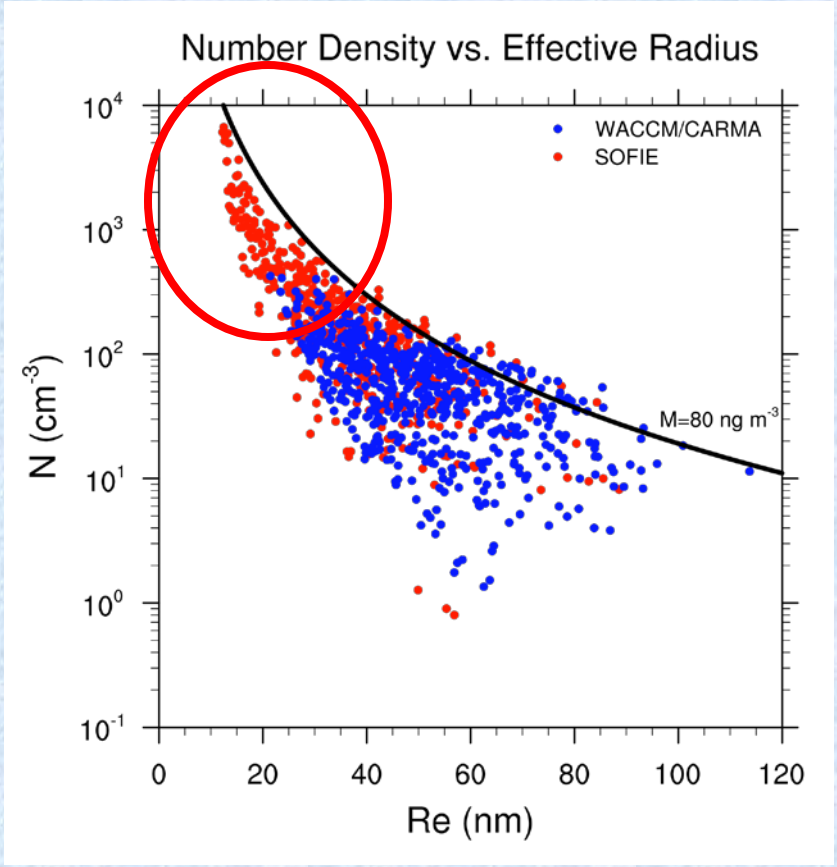


PMCs vs. SOFIE: M, Re, N

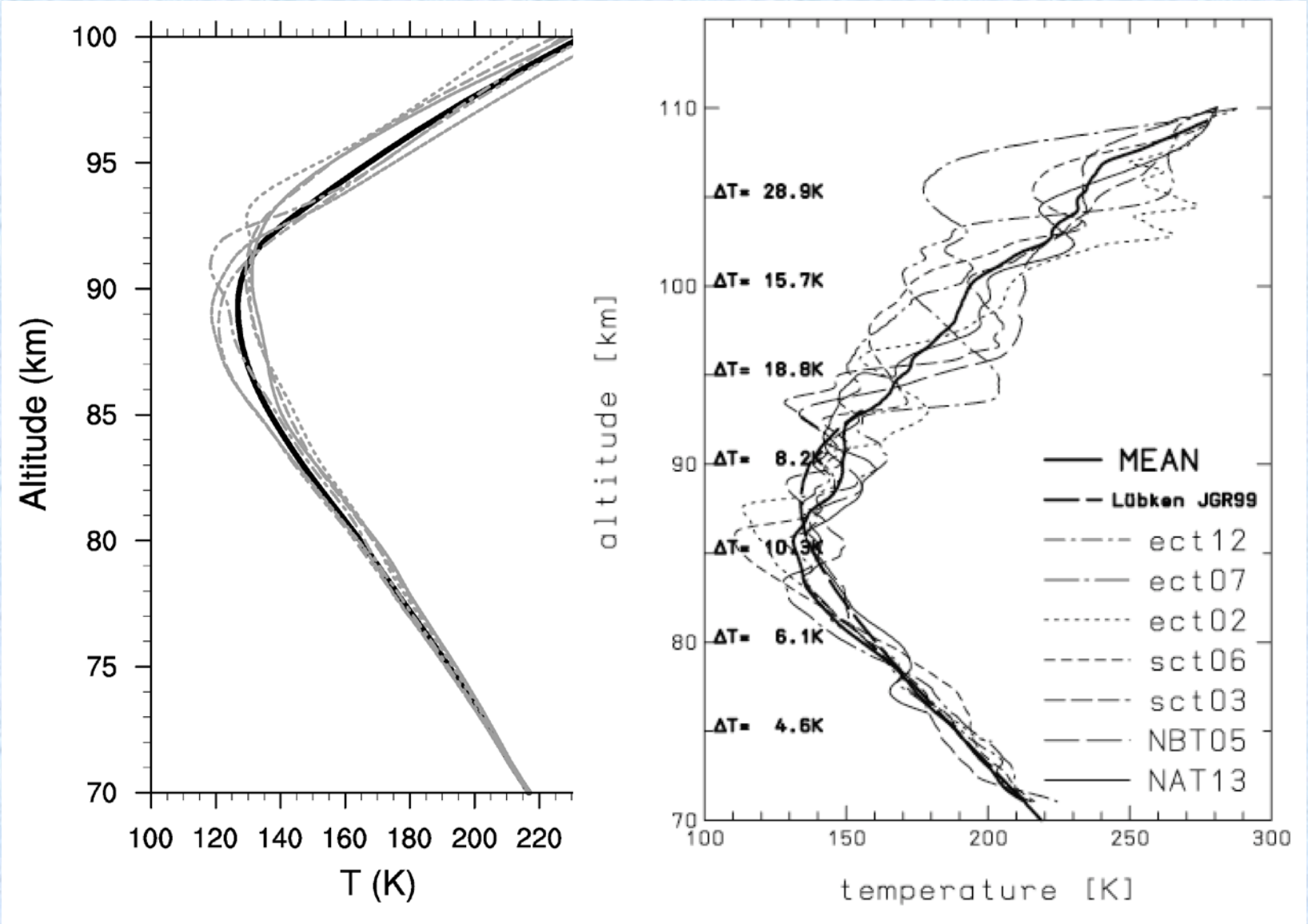


Number Density Details



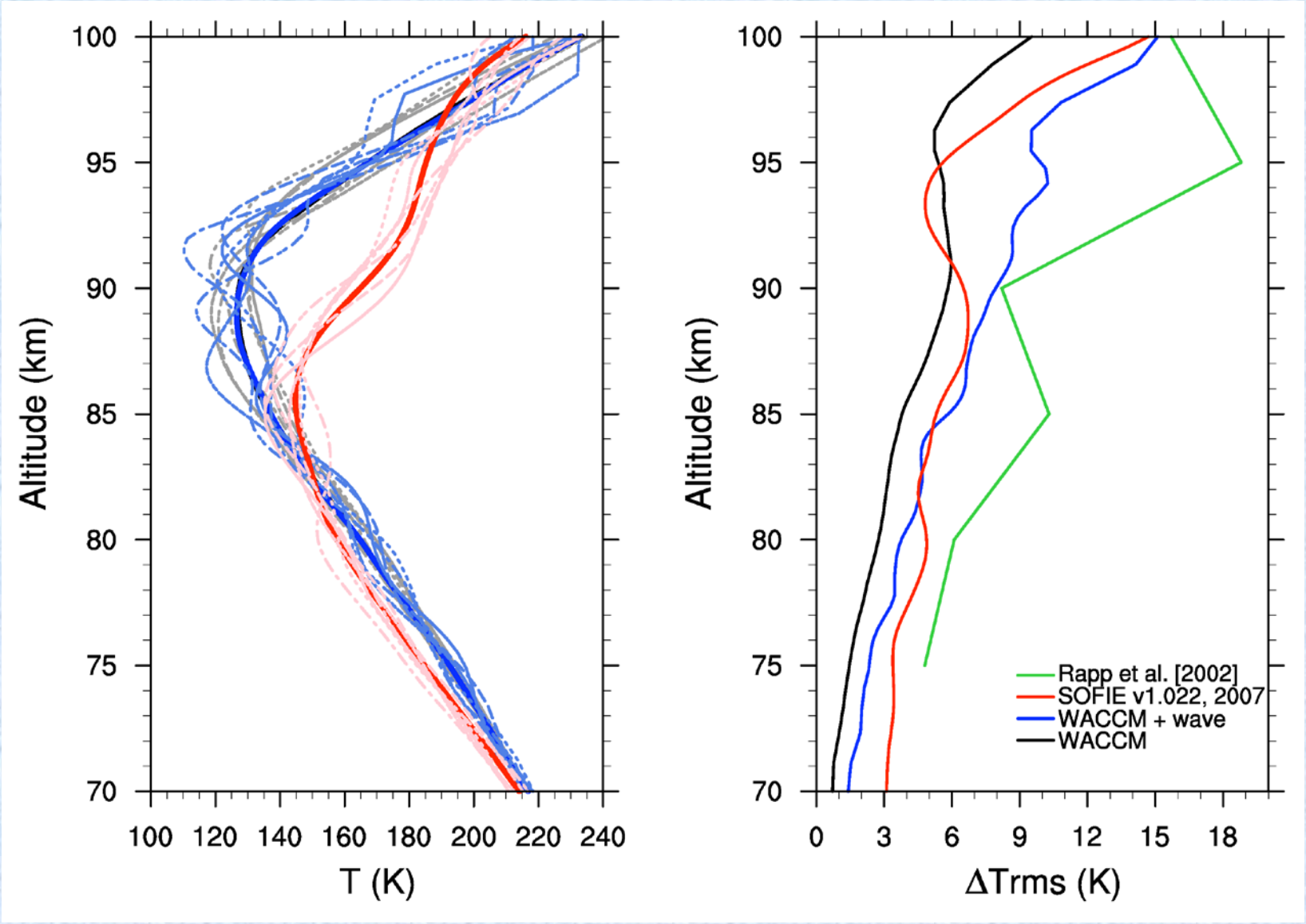


Subgrid Scale Gravity Waves



Rapp et al. [2002]

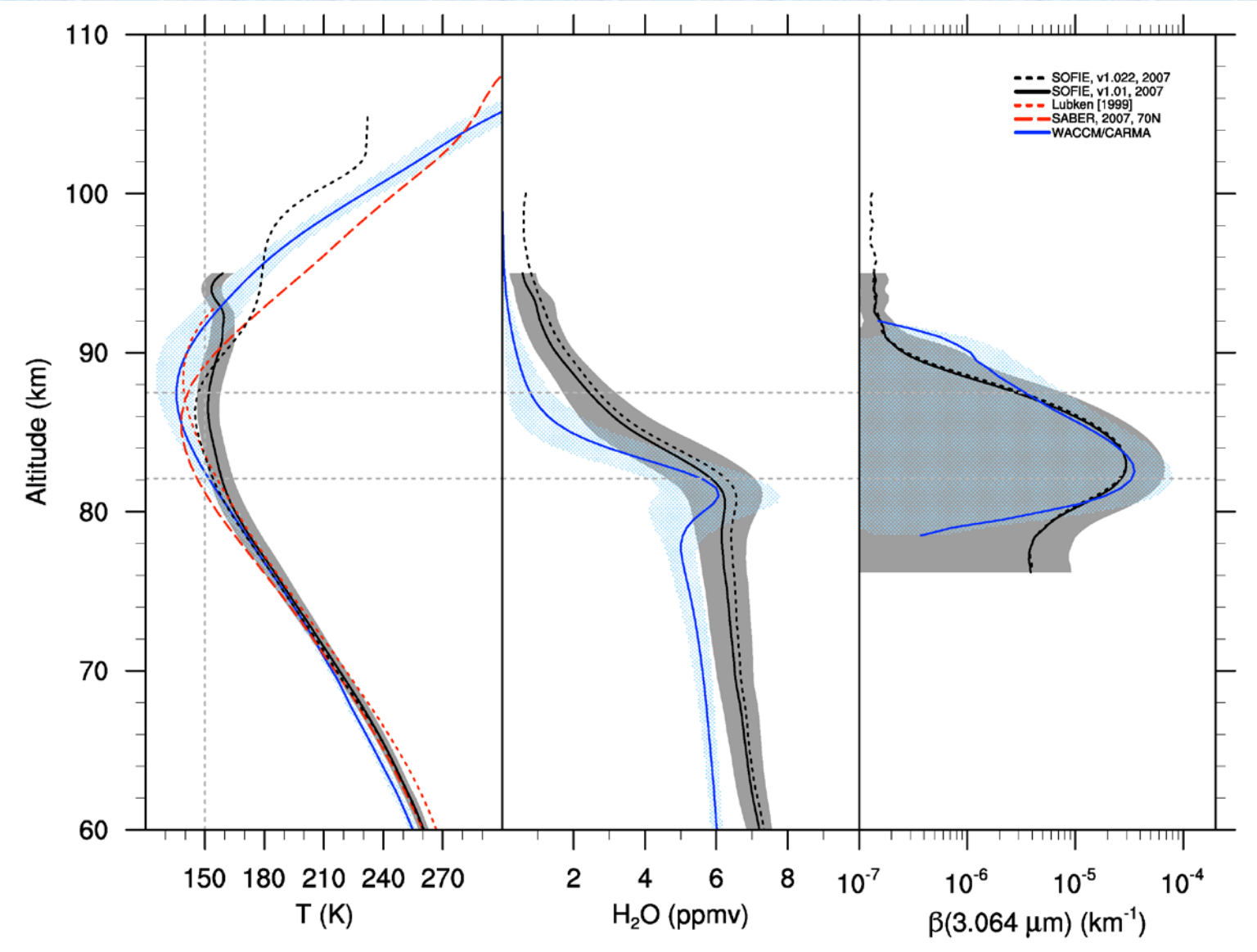
$$\Delta T = T_0(m)\sin(mz + \phi_m - \omega t)e^{z/D}$$



Rapp et al. [2002]

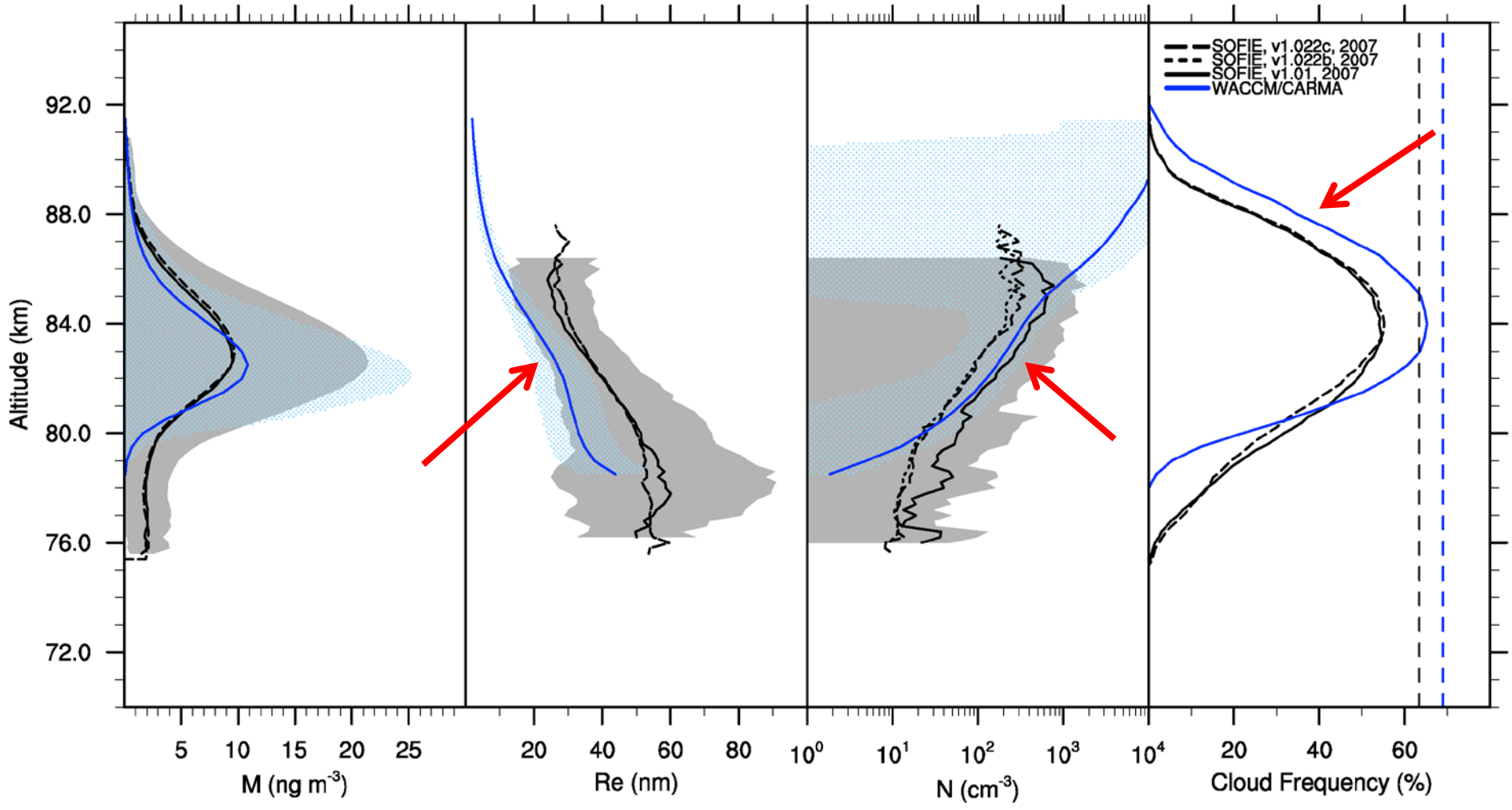
Random Every Time Step

T, H_2O & B(3.064)



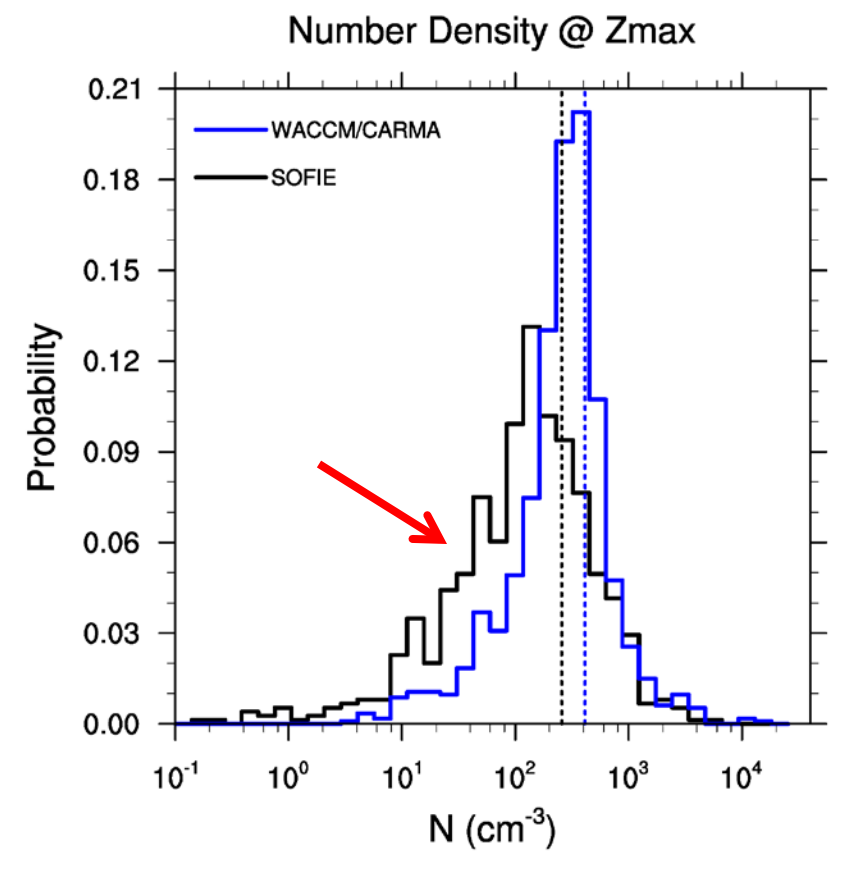
Random Every Time Step

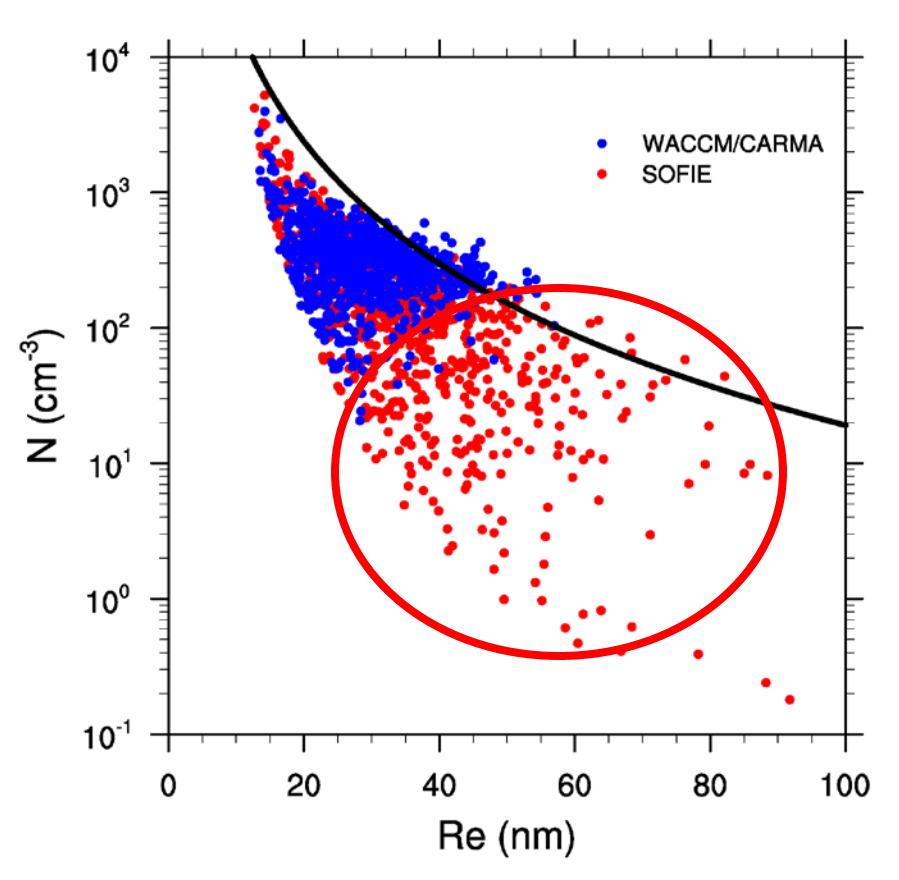
M, Re, N & Frequency



Random Every Time Step

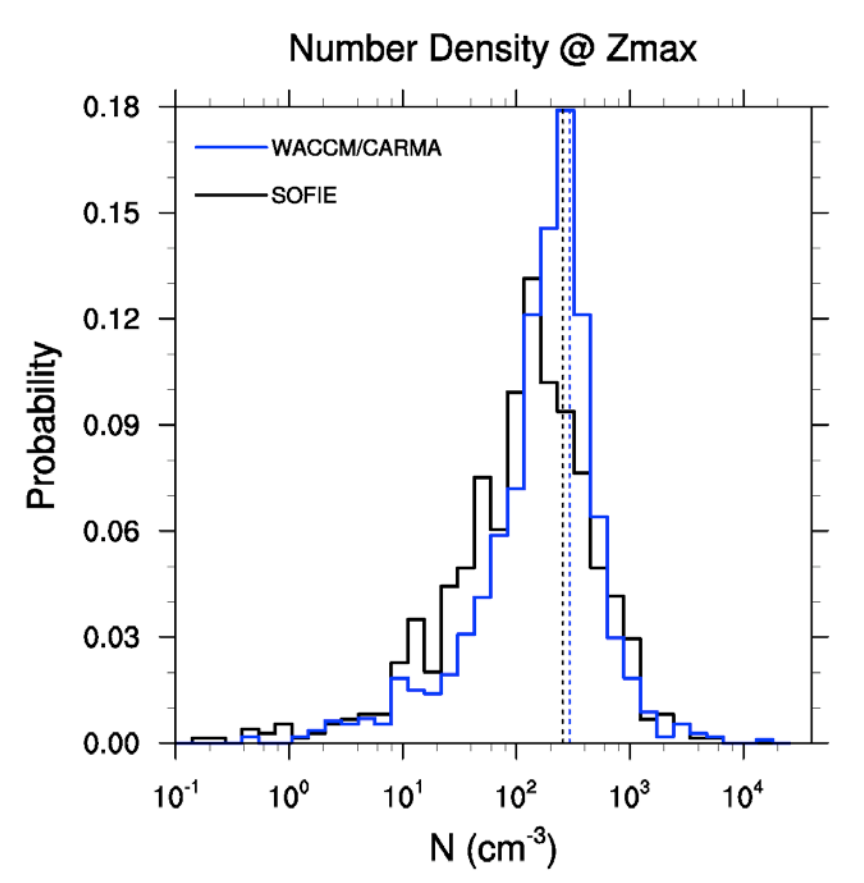
Number Density

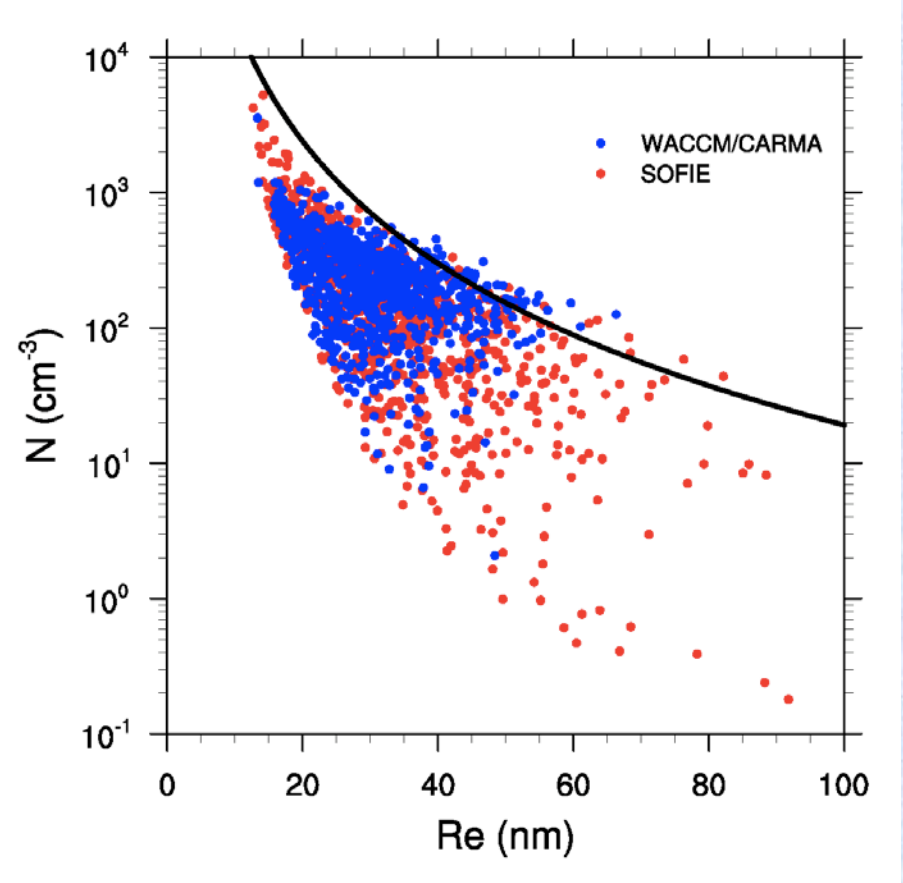




Periodic Waves, Period = 417 min

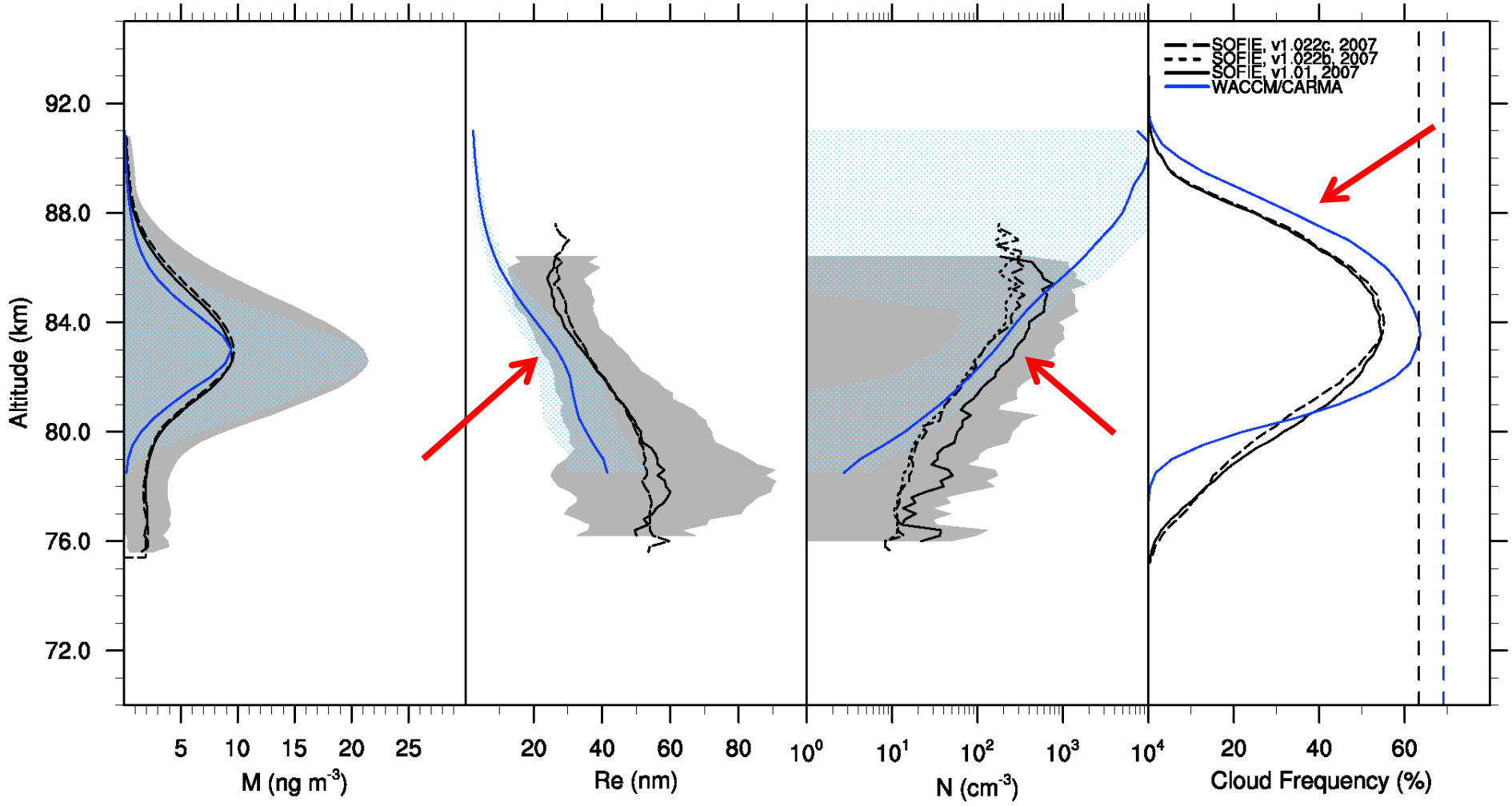
Number Density





Periodic Waves, Period = 417 min

M, Re, N & Frequency



Summary

- Small changes in the gravity wave tuning can change the distribution of meteoric dust.
- Gravity wave tuning to observed temperatures results in PMC simulations that are in very good agreement with SOFIE & CIPS observations.
- Temperature variability from subgrid scale gravity waves can generate large number densities and decrease effective radius.
- Meteoric dust is still a viable candidate as the main condensation nuclei for PMCs.
- WACCM/CARMA, a new modeling framework for clouds and aerosols, will become an optional component in WACCM.