On the Limits of CALIOP for Constraining
Free Tropospheric Aerosol

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*D. Watson-Parris et al., Geophys. Res. Lett. (2018)*

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Calculating aerosol backscatter in ECHAM-HAM: LIDAR simulator

|	COSP (clouds)	In-house (aerosol)
Wavelength	532nm (hardcoded)	Flexible, multiple
POV	From space	From space or Earth
Observables	attenuated total backscatter	attenuated total backscatter total backscatter aerosol extinction Rayleigh extinction LIDAR ratio (colour ratio)
Profile	model levels	model levels
Scatterers	1 fixed particle mode (effectively)	Flexible (model dependent)

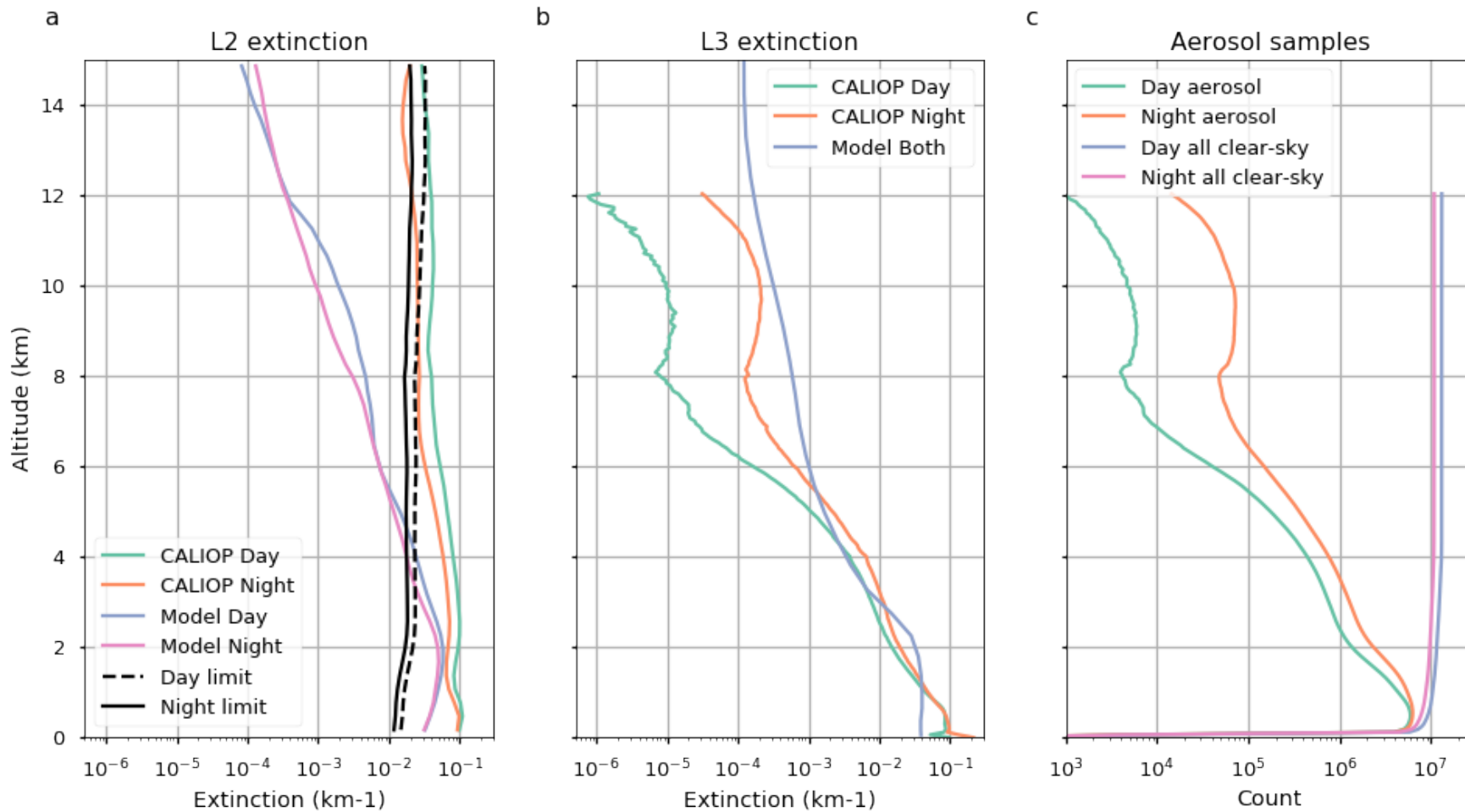Required input: profiles of extinction and backscatter
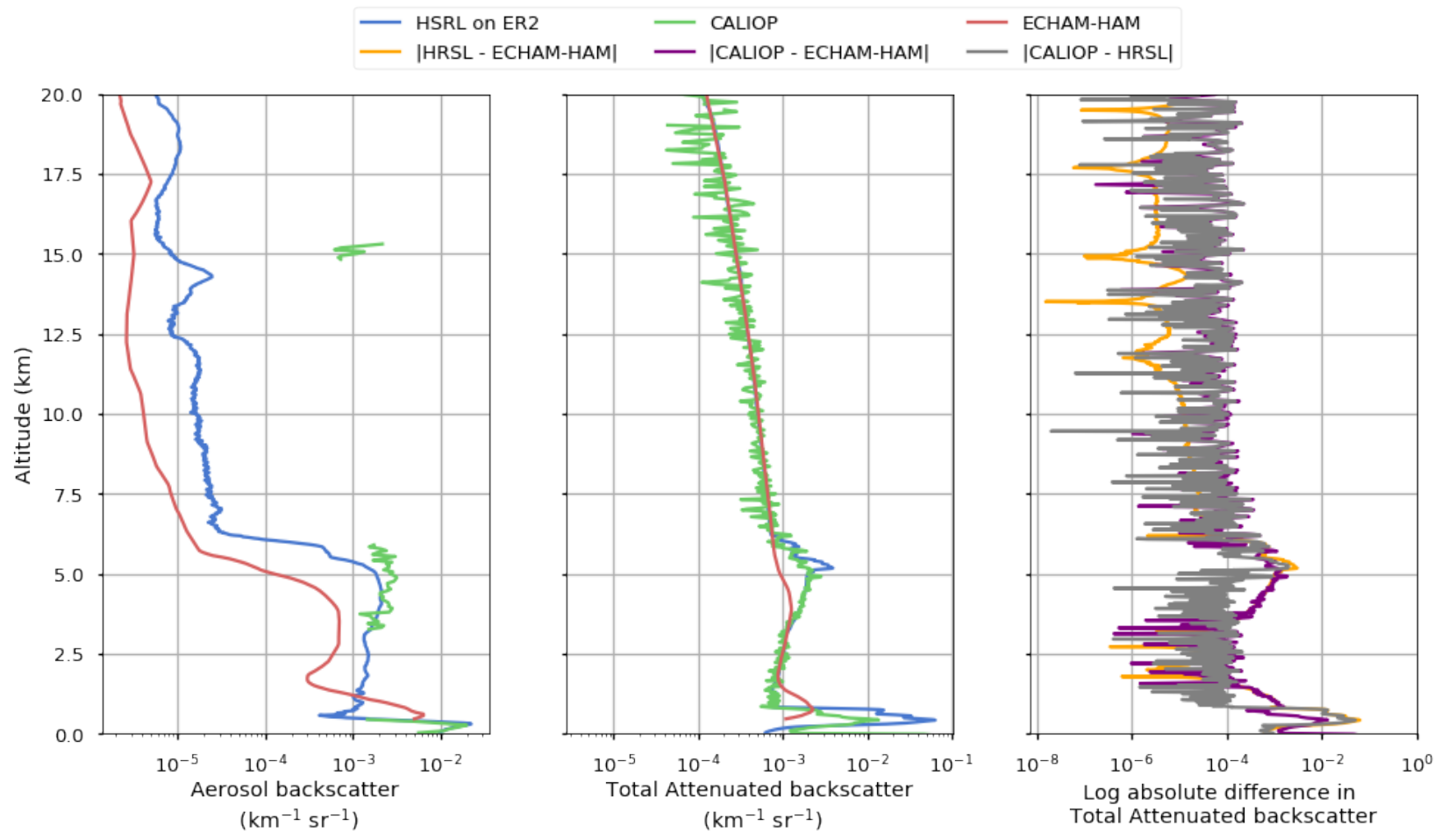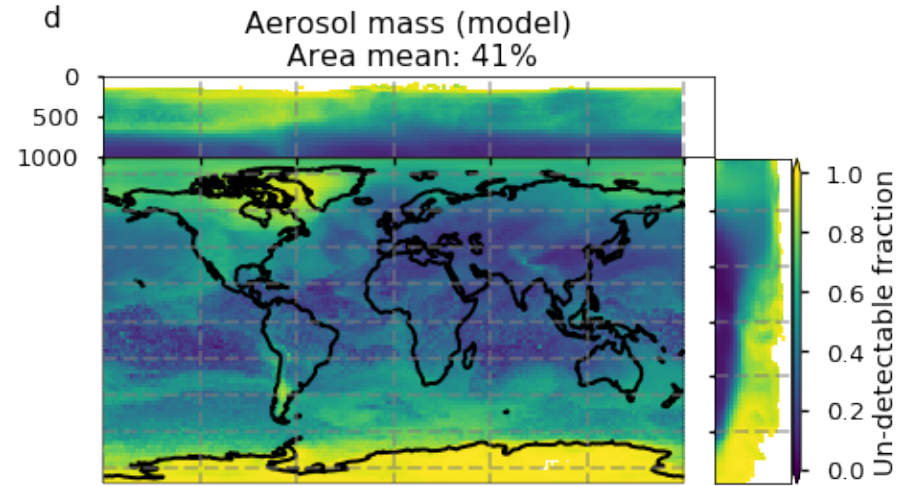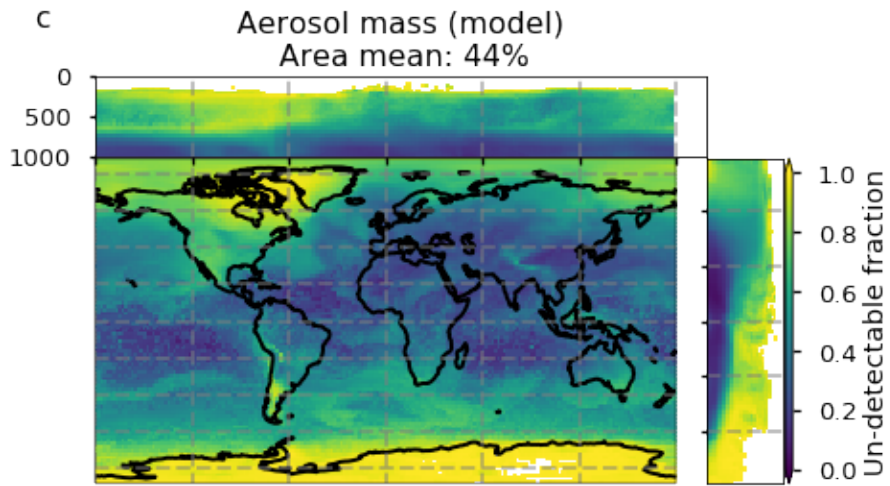
L2 Backscatter
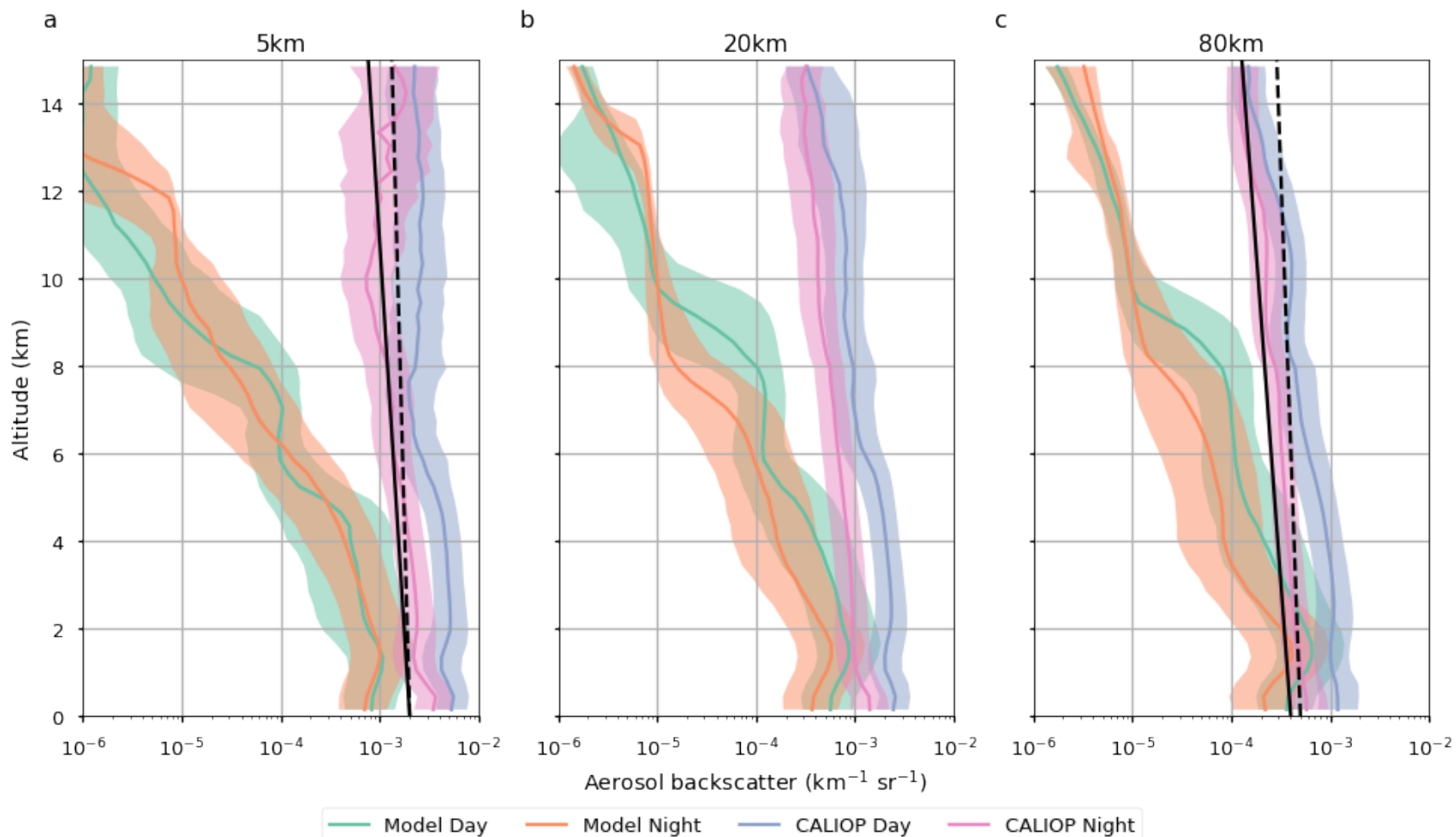
Full backscatter histograms
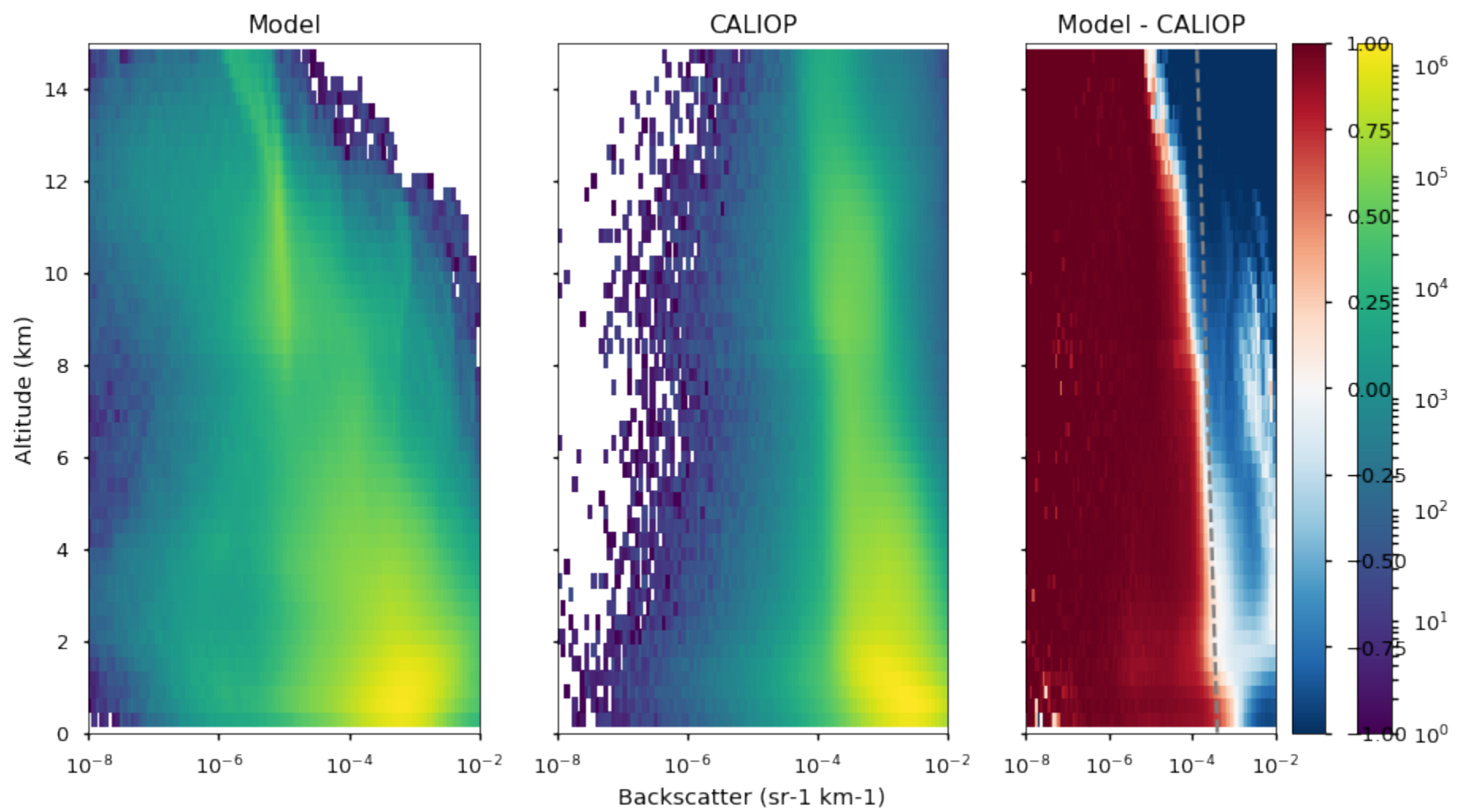
L2&3 Extinction

HSRL on ORACLES ER2 comparison

Fraction of undetected aerosol

Effect on ACI estimates
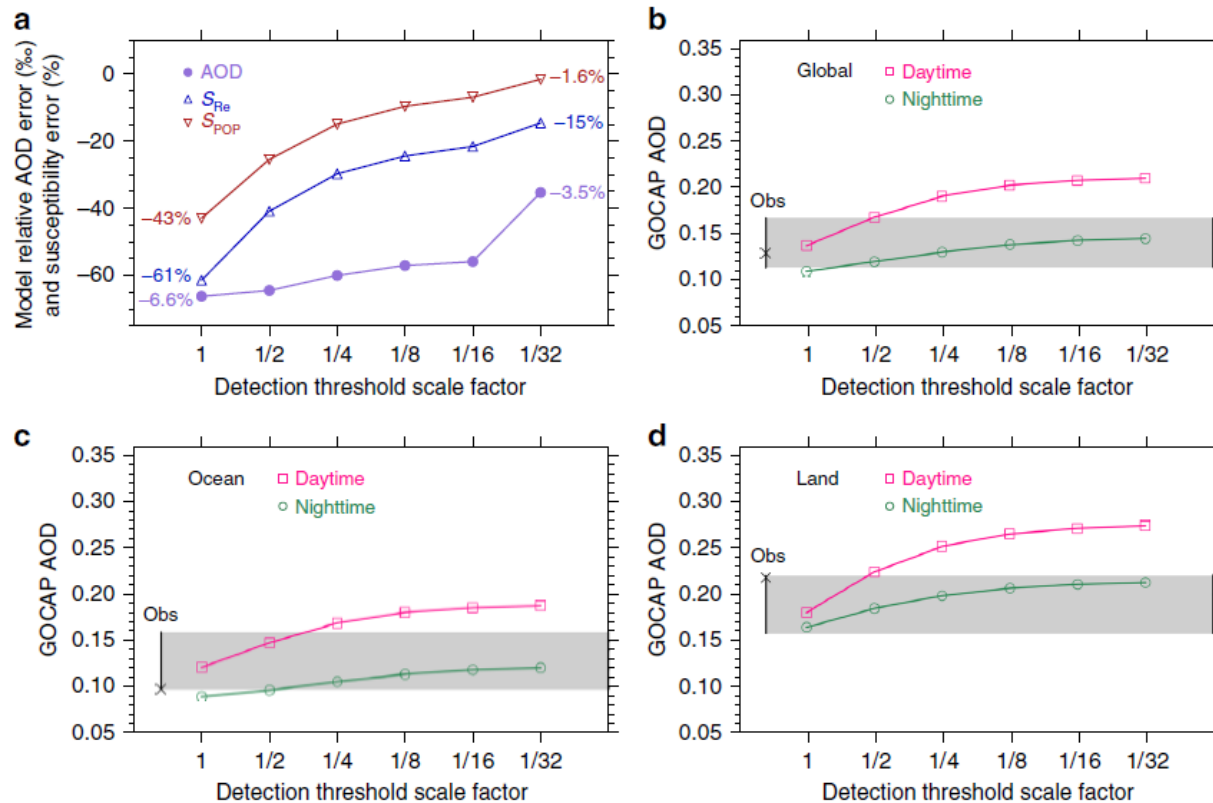
P. Ma et al., Nature Comms. (2018)

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Summary

- We explored the effects of the CALIOP L2 aerosol detection sensitivity on backscatter and extinction profiles with different missing value assumptions

- Using a GCM lidar simulator we show large differences in the free troposphere where detection is rare

- Limited detection of tenuous aerosol can bias AOD estimates and hence ACI metrics

- To what extent does this effect other sensors?

- How can AeroCom / AeroSat help avoid these biases?