Validation for cloud extinction retrieval of ATLID with inversion results from airborne lidar

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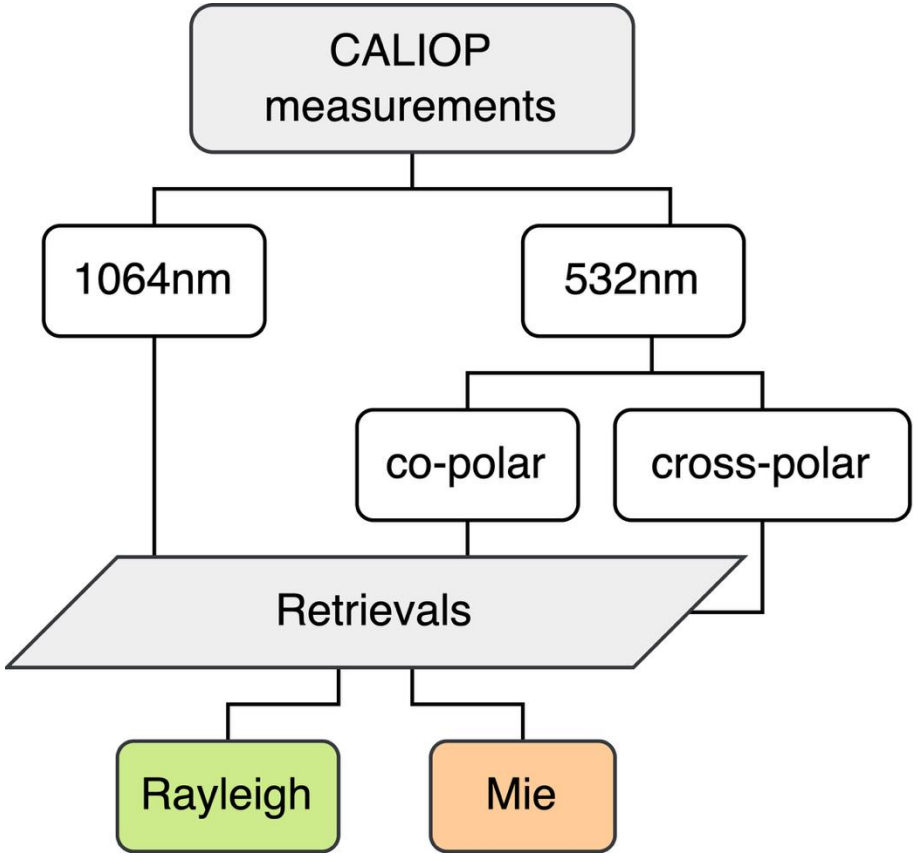
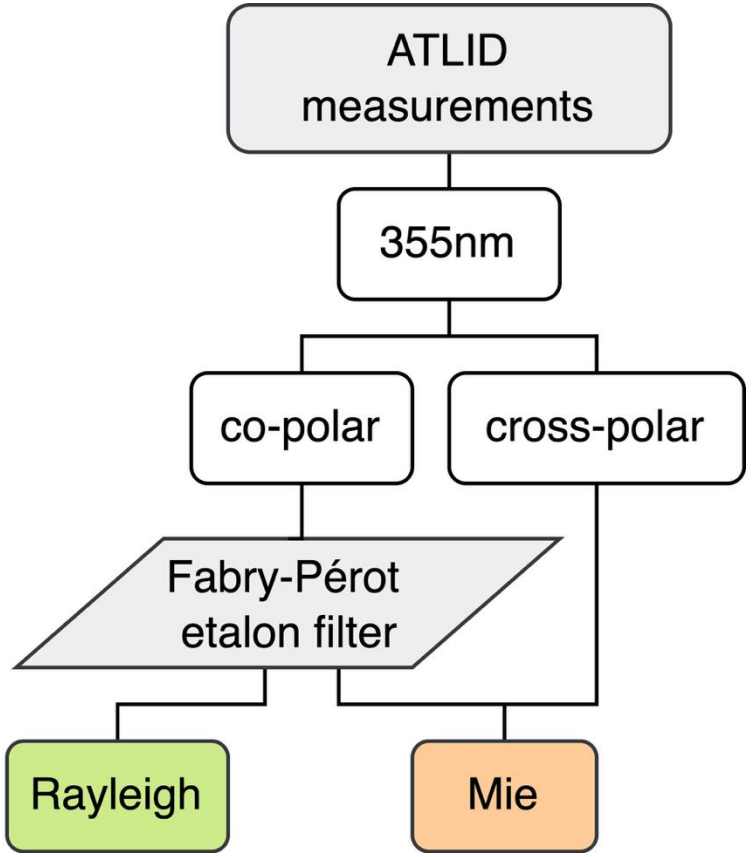
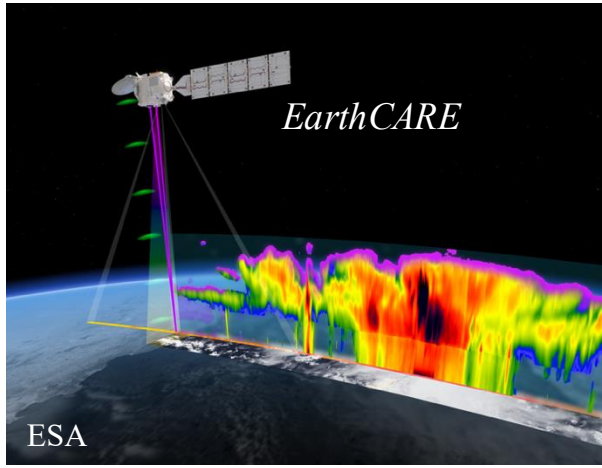
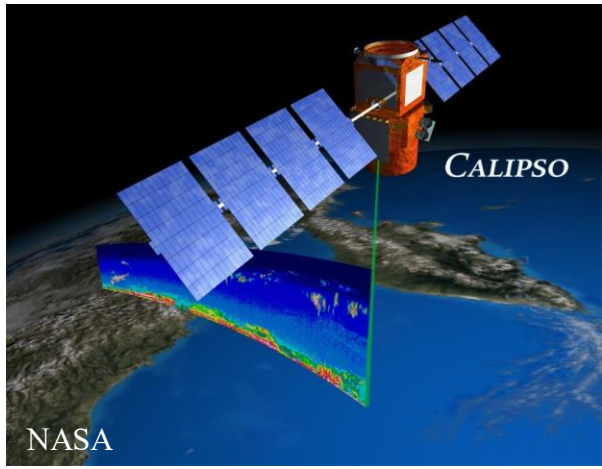
ATLID: A New Era for Spaceborne Lidar

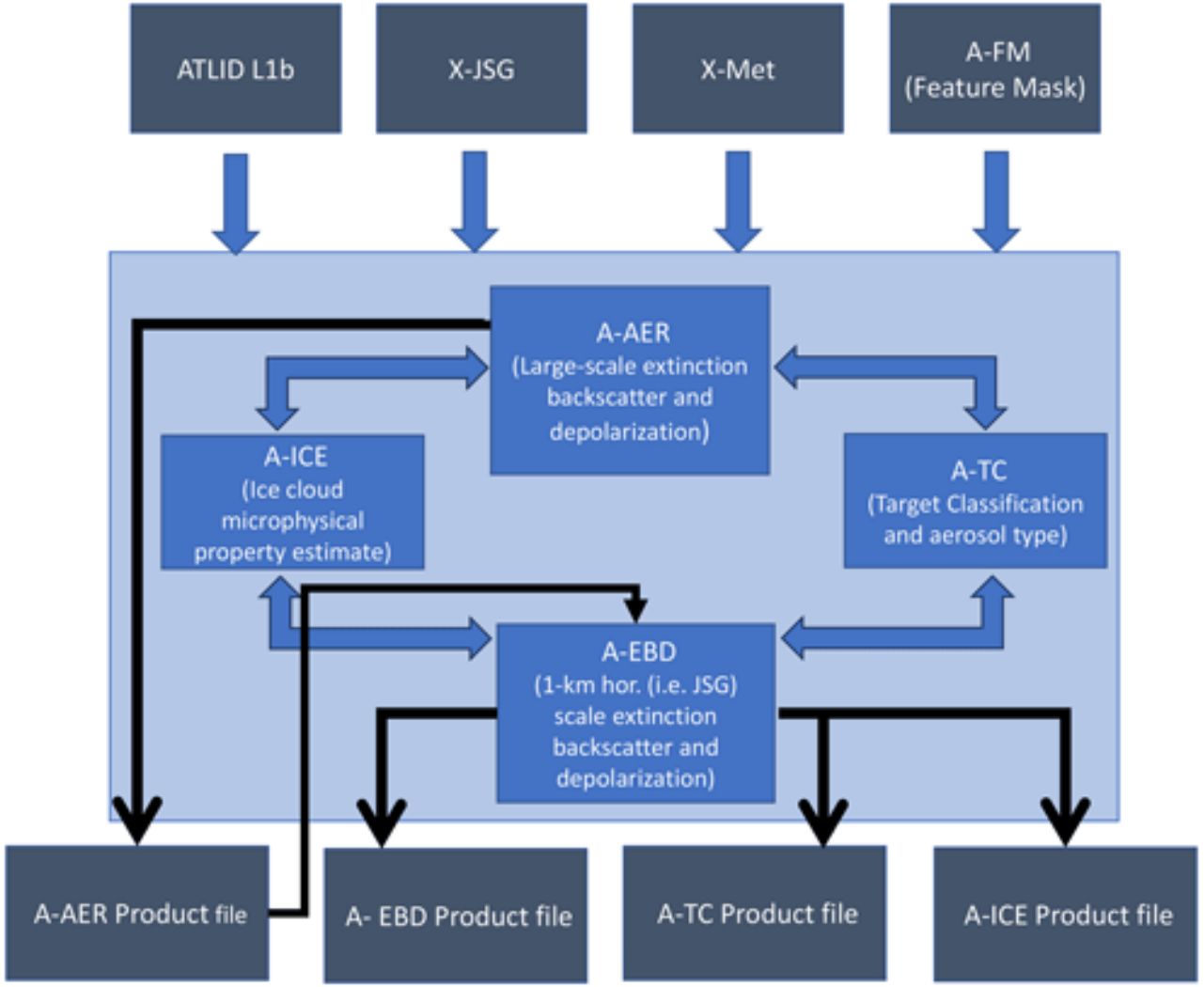








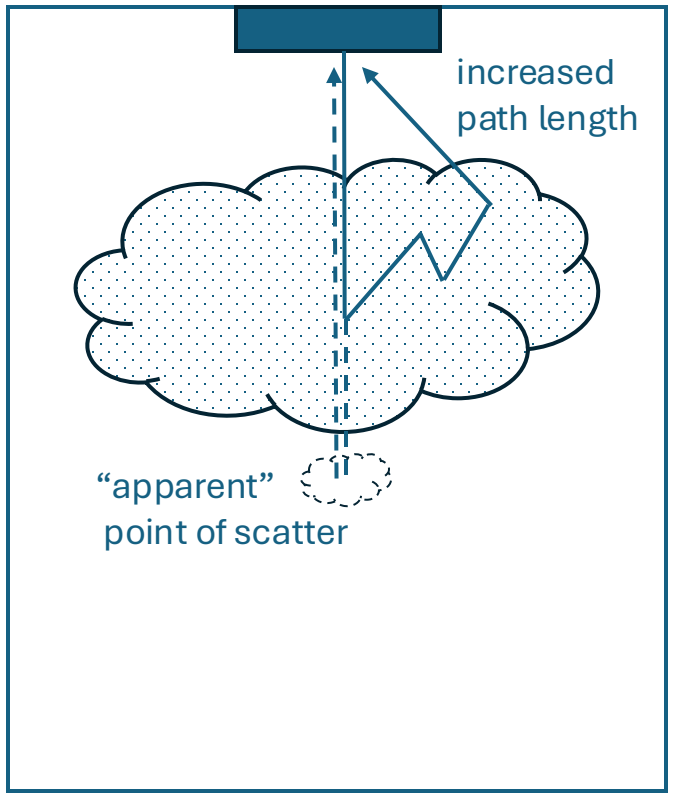
ATLID data products: the A-PRO algorithm



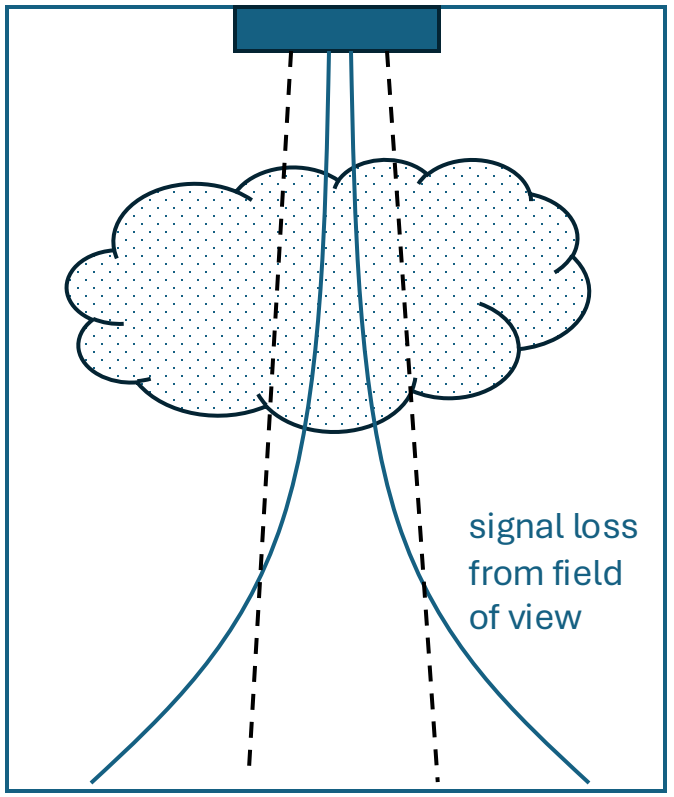
- **A-AER:** direct HSRL method retrieved cloud extinction products
- **A-EBD:** forward-modelling and optimal estimation retrieved cloud extinction products

Donovan, D. P., van Zadelhoff, G.-J., and Wang, P.: The EarthCARE lidar cloud and aerosol profile processor (A-PRO): the A-AER, A-EBD, A-TC, and A-ICE products, Atmos. Meas. Tech., 17, 5301–5340, https://doi.org/10.5194/amt-17-5301-2024, 2024.

The multiple scattering challenge and ATLID's solution



Underestimated cloud optical depth



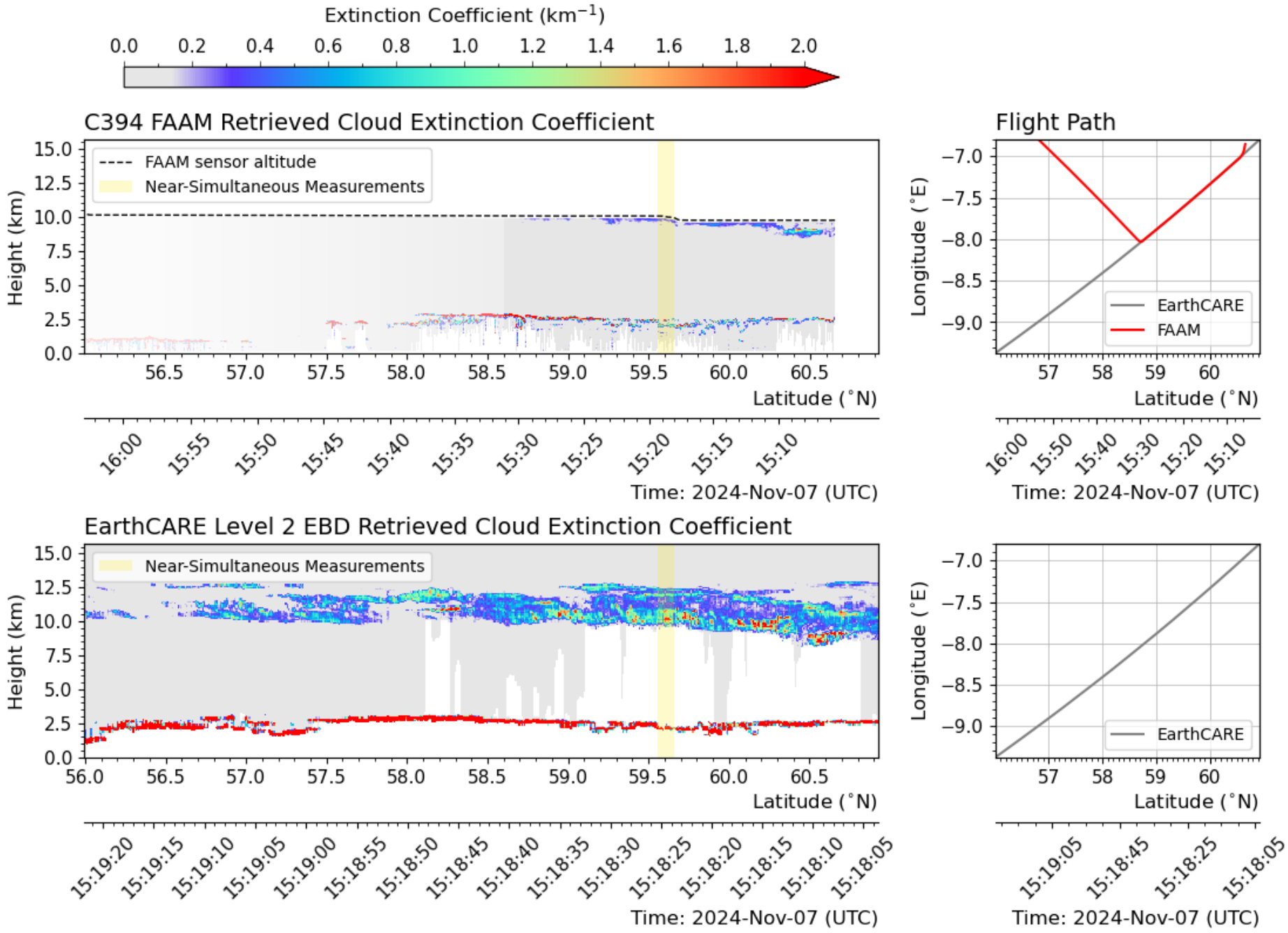
The "tails" effect

"Platt + tails":

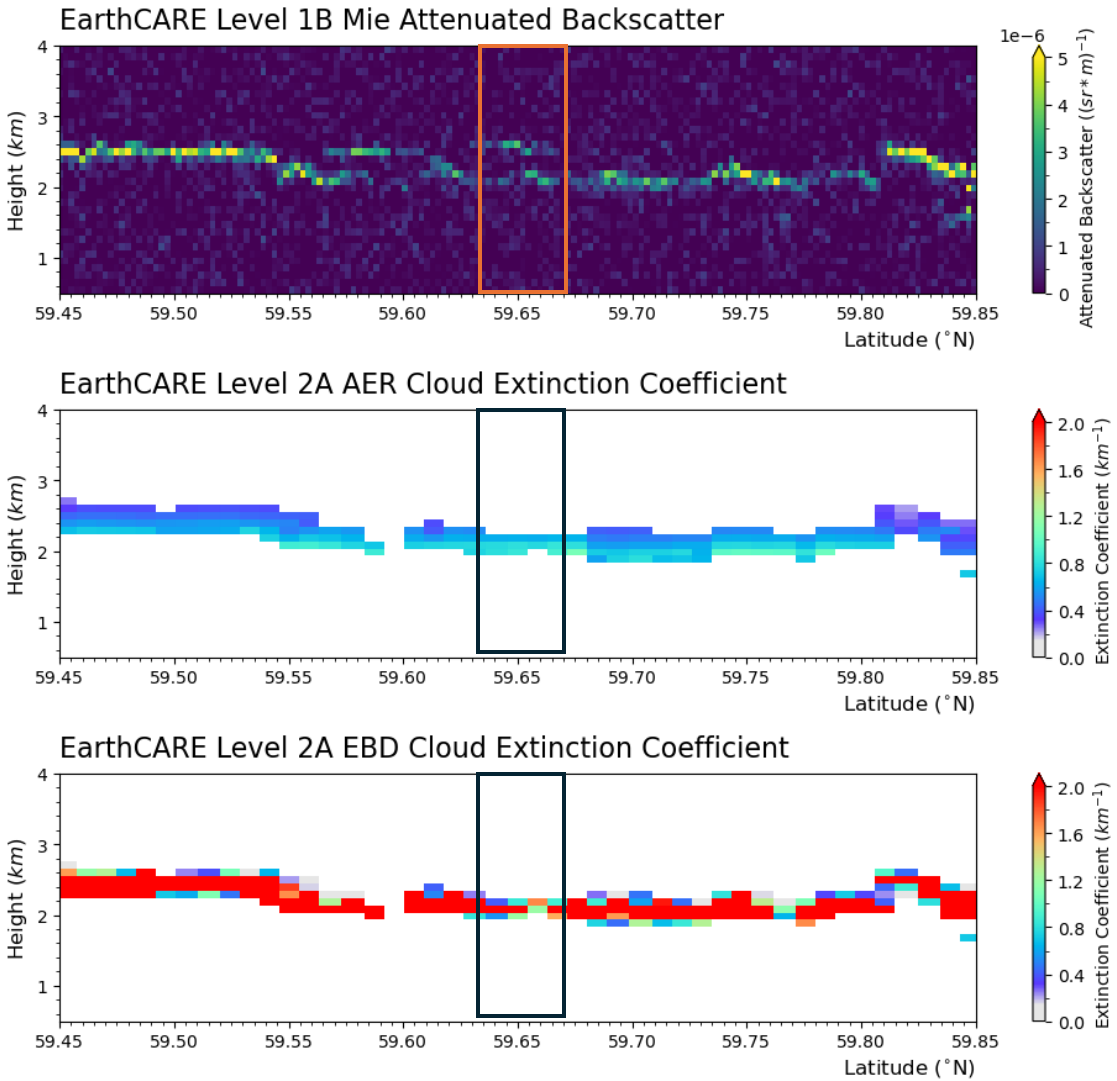
- A tail-fitted optical depth retrieval with multiple scattering correction
- Potential inaccuracy in multi-layer cases

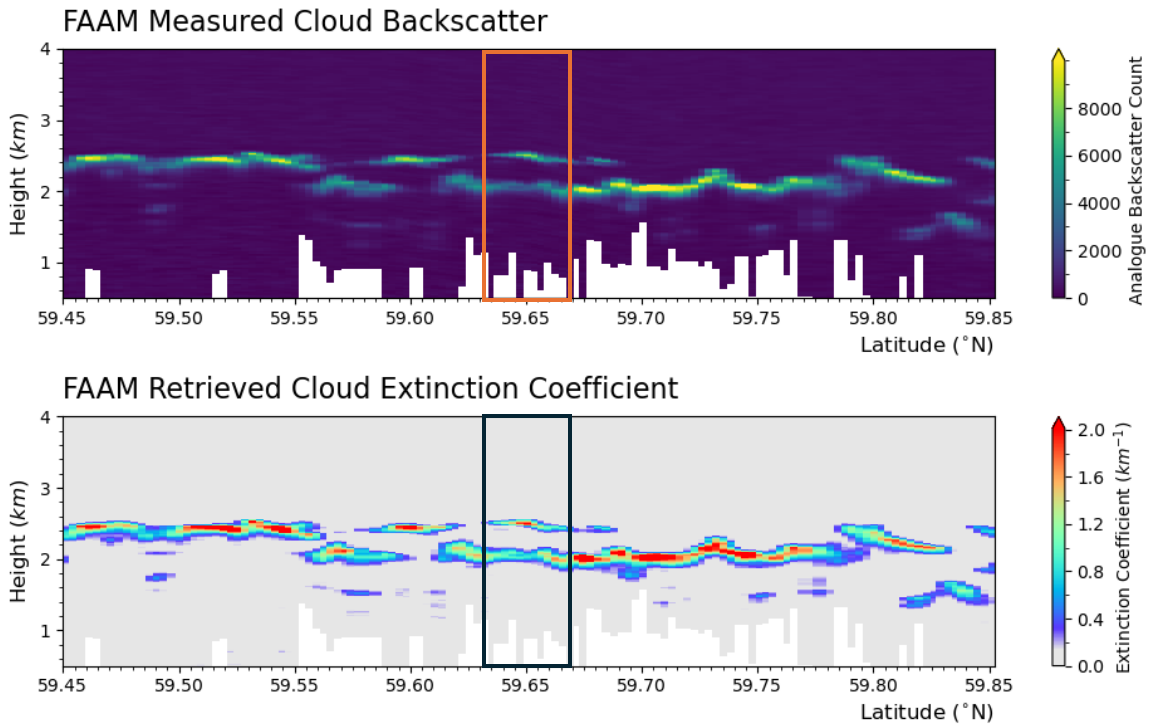
Donovan, D. P., van Zadelhoff, G.-J., and Wang, P.: The EarthCARE lidar cloud and aerosol profile processor (A-PRO): the A-AER, A-EBD, A-TC, and A-ICE products, Atmos. Meas. Tech., 17, 5301–5340, https://doi.org/10.5194/amt-17-5301-2024, 2024.

The VERIFY Campaign



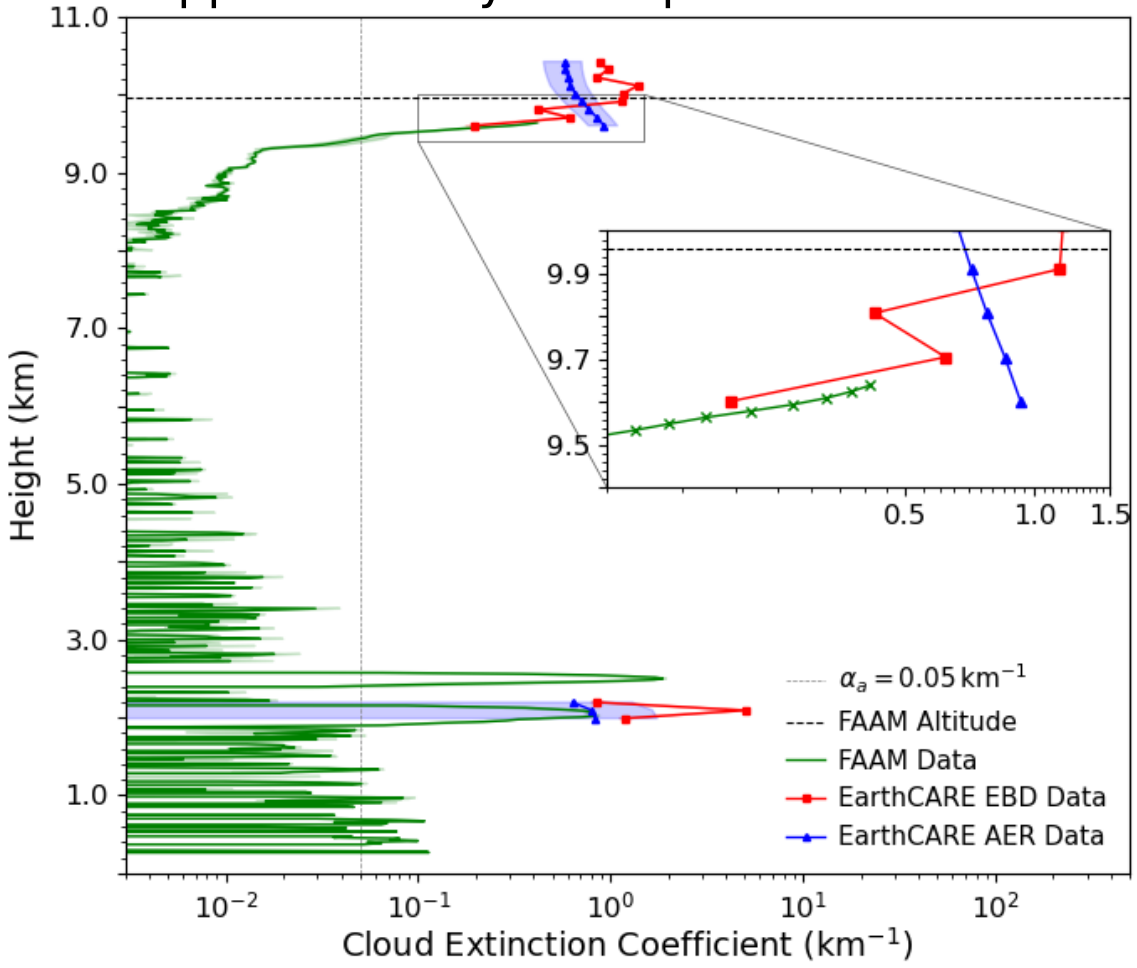
FAAM-EarthCARE lower layer cloud comparison



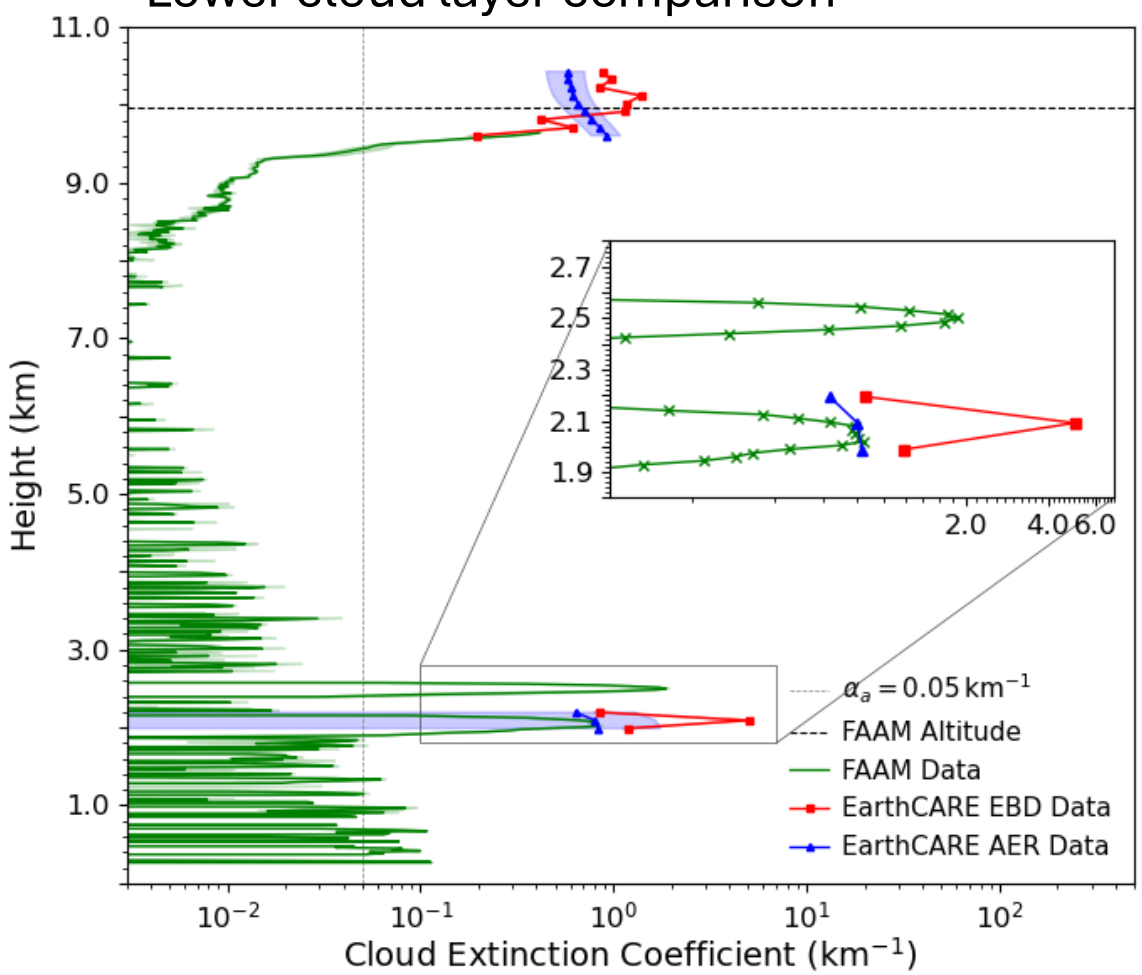


Simultaneous measurement comparison

Upper cloud layer comparison



Lower cloud layer comparison



Thank you!