Differences in lidar-derived optical and microphysical properties of long-range transported biomass burning aerosol in troposphere and stratosphere

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03. Atmospheric aerosol and clouds properties

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Poster P22

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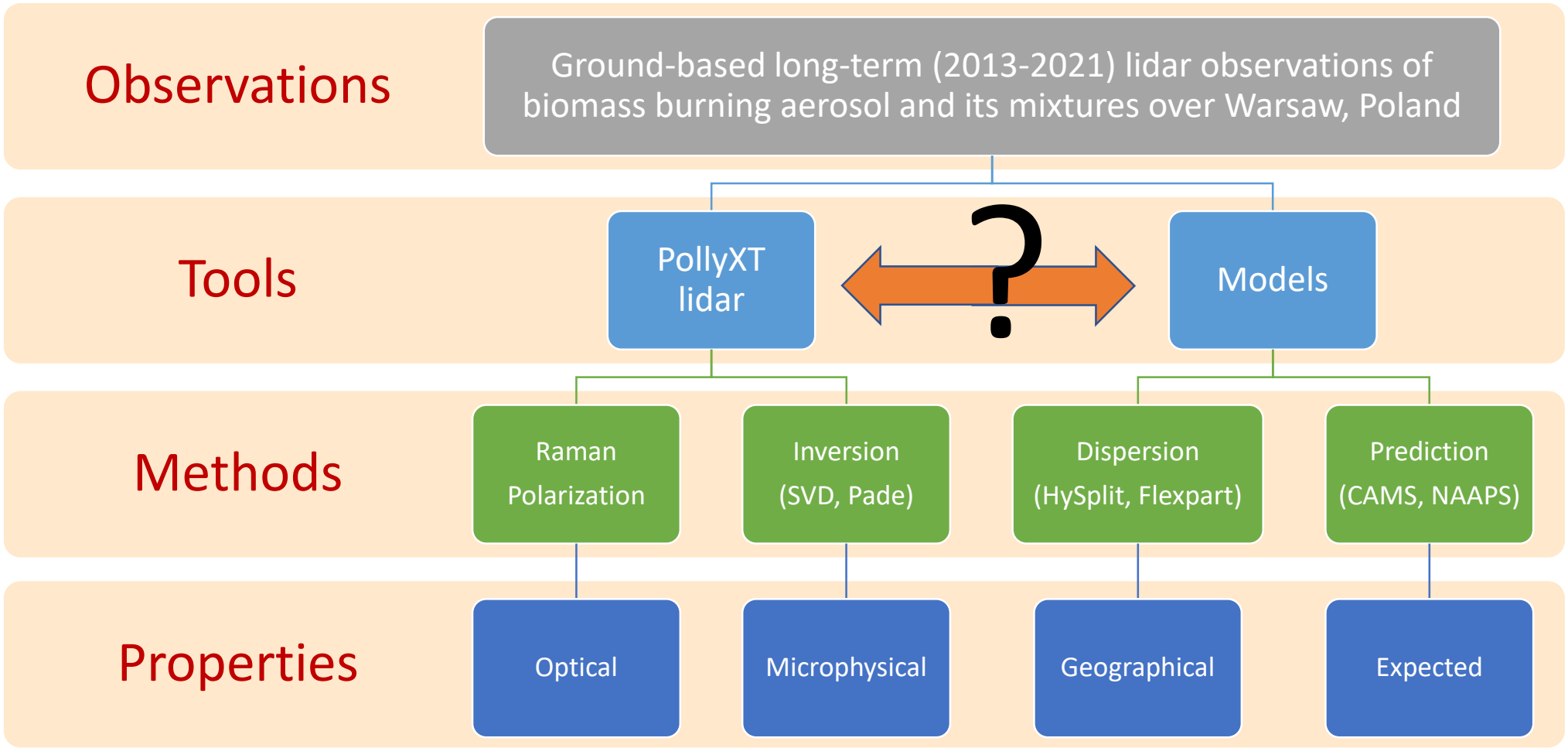
Tropospheric and stratospheric biomass burning aerosol can have strong impact on climate.

What is the true spatial and temporal footprint of single-site single-measurement EARLINET lidar data?

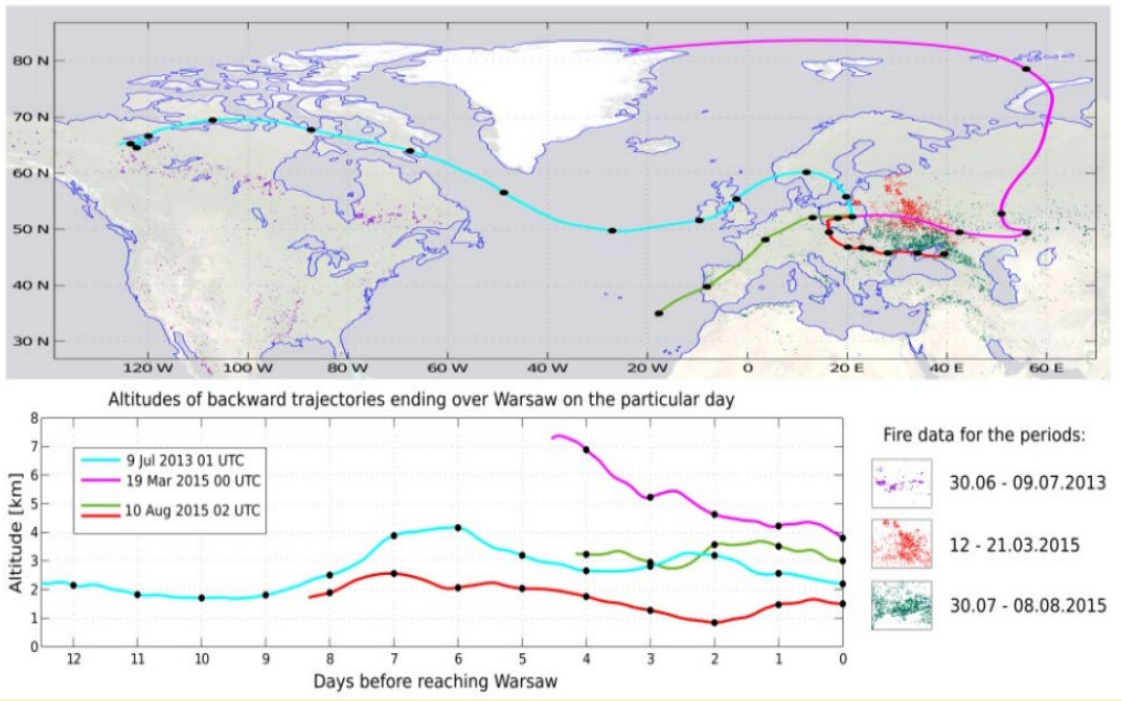


Is a true link of lidar data to the models feasible?

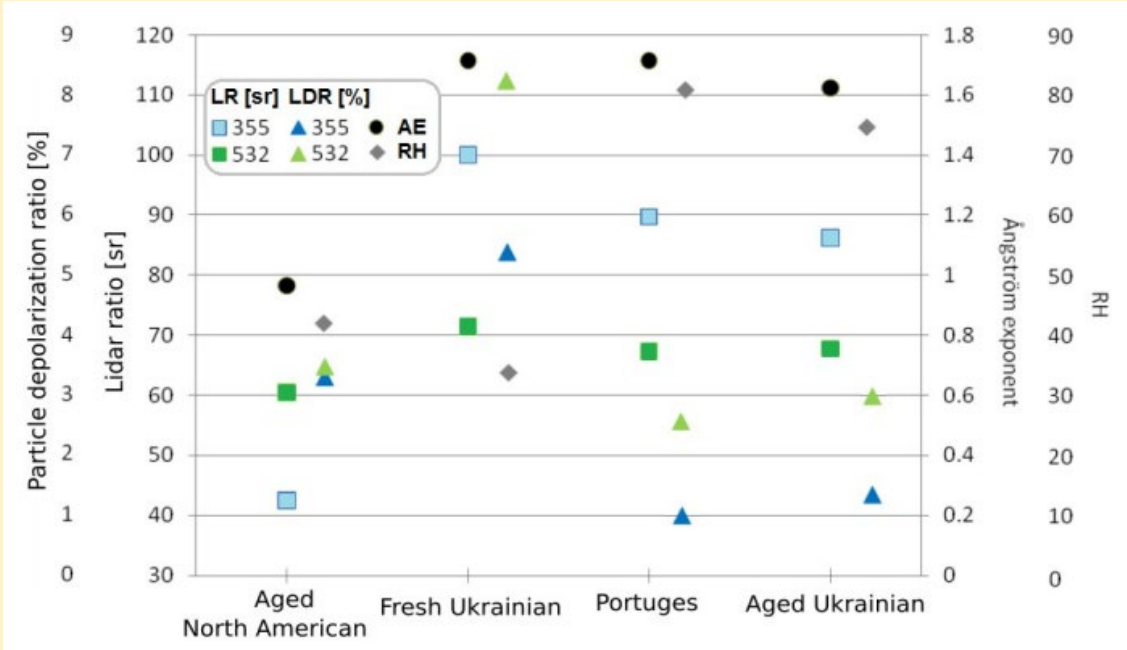
Which lidar-derived information is crucial?

What have to be improved?

Examples of pathways of long-range transported biomass burning aerosol and differences in properties



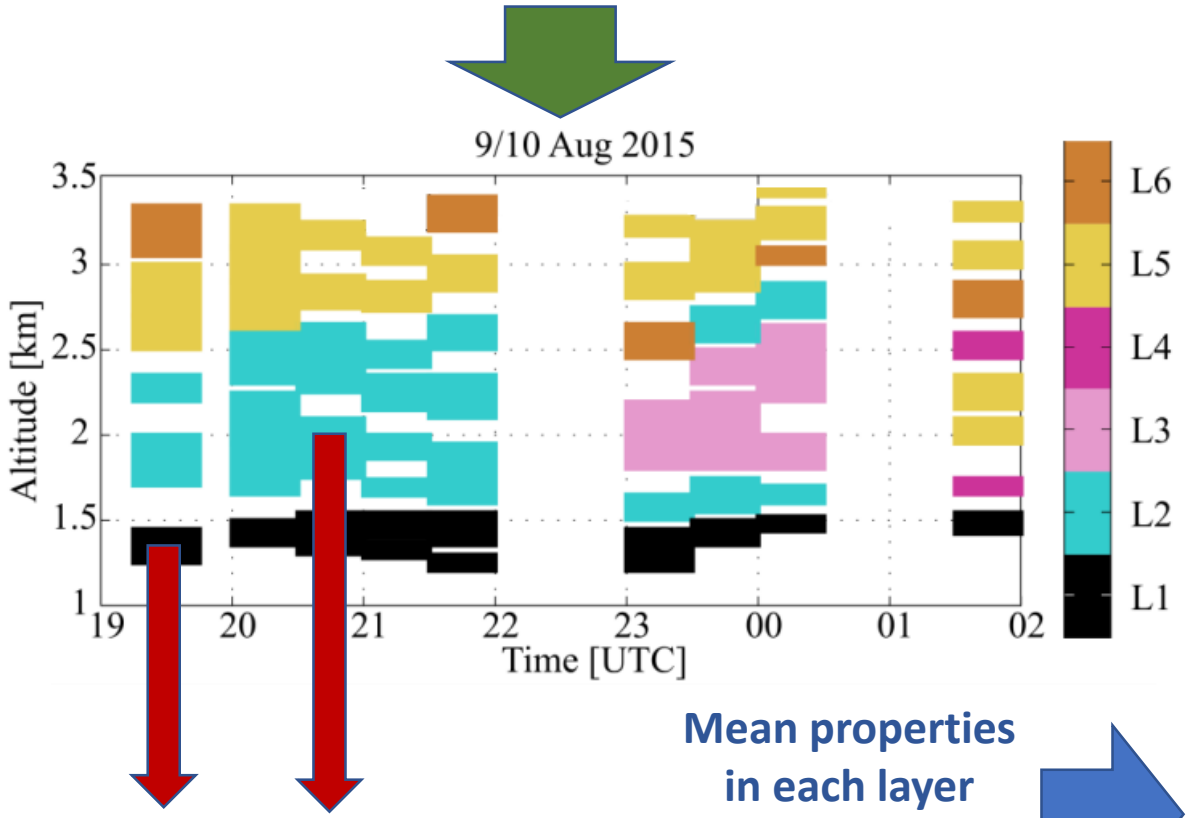
RH and LDR anti-correlated
Dry: semi-fresh Ukrainian & aged NA
Wet: Portuguese & aged Ukrainian
Larger size: aged NA



SOURCE	Height [km]	LR 532 [sr]	LR 355 [sr]	AE 355/532	RH [%]	δ part. 532	δ part. 355
Aged North American	2,2-2,7	61	43	0,97	42	3,5	3,3
Fresh Ukrainian	3,5-4	71	100	1,71	34	8,3	5,4
Portuges	2,7-3,1	67	90	1,71	81	2,6	1
Aged Ukrainian	1,4-1,5	68	86	1,62	75	3	1,4

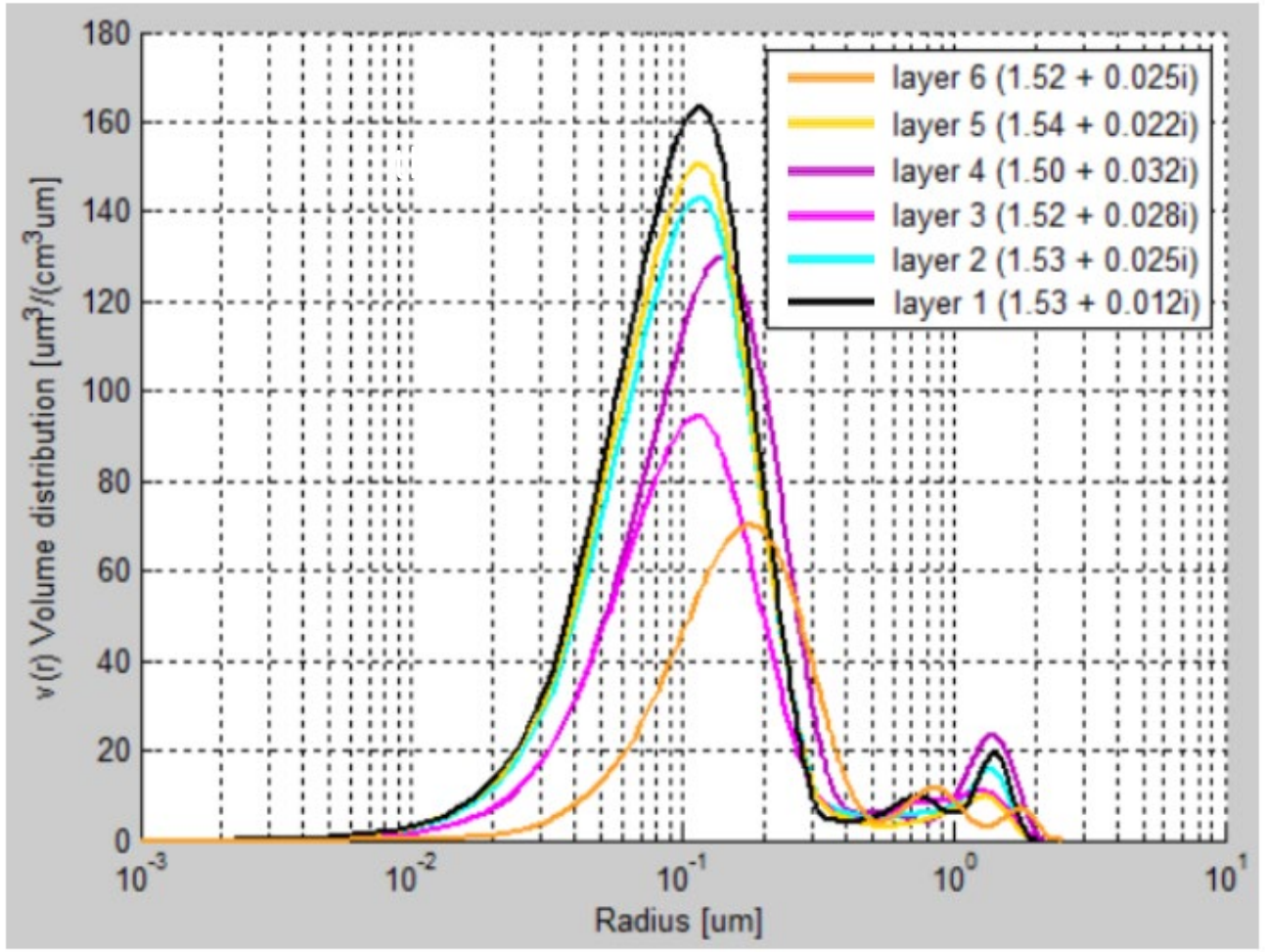
Fine-scale height-time resolved 2-dim maps of aerosol microphysical properties !

Layers of similar optical properties in colors



Microphysical properties inversion for each sub-layer

Mean properties in each layer with statistical significance



- 2-D spatio-temporal plots of microphysical properties are excellent input for models and they can be obtained from multi-wavelength Raman polarization lidar data using inversion methods.
- Application of different inversion methods on a large number of sub-layers defined in lidar-derived optical properties increases our confidence in the microphysical results inversion and allows for obtaining statistical significance of such results.
- Lidar observations of fine-scale aerosol optical and microphysical properties are still too rare, thus further developments and upgrades in lidar networks are necessary to provide combo of optical and microphysical properties.

Acknowledgements

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