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Comment on acp-2021-980

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Community comment on "Pollen observations at four EARLINET stations during the ACTRIS-COVID-19 campaign" by Xiaoxia Shang et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-980-CC1, 2022

Let me please thank ACP for giving me the opportunity to join the discussion. I indeed find the subject of pollen observations with lidar important and appreciated the performed field measurements which will interest several readers.

I however have concerns about the proposed data analysis as the retrieved depolarization of pure birch disagrees with the literature by Cao et al. (Cao, X., Roy, G. and Bernier, R.: Lidar polarization discrimination of bioaerosols, Opt. Eng., 49(11), 116201, doi:10.1117/1.3505877, 2010). I hope the questions below will help improving the analysis of these interesting lidar data and help future readers identifying the benefits / limitations of the proposed methodology:

- From Cao et al. (2010), we indeed learnt that the pure birch depolarization is equal to 32 +/- 2 % but the present algorithm arrives to 24 +/- 5 %. Can the authors explain this discrepancy? It may interest potential readers from the pollen community. I think future readers may then wonder about the need for developing an algorithm (with inherent assumptions) to retrieve the depolarization of pure birch while Cao et al. published its value: can the authors explain?
- The pure birch depolarization is retrieved "under the assumption that the BAE between 355 and 532 nm should be zero (± 0.5) for pure pollen". In the meanwhile, from light scattering theory (see Mishchenko et al., 2002 for example), we know that the value of BAE is a complex relationship between size, shape and chemical composition. Can the authors then explain their chosen assumptions: an identical BAE for birch and birch and grass, a zero value for BAE for pure pollen, a 0.5 uncertainty on BAE ?

Kind regards,
Alain Miffre