

Interactive comment on “Assumptions on mixing heights influence the quantification of emission sources: A case study for Cyprus” by Imke Hüser et al.

Anonymous Referee #2

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The paper “Assumptions on mixing heights influence the quantification of emission sources: A case study for Cyprus” intends to quantify the influence of varying boundary layer heights on the quantification of source contributions based on backward simulations performed with a Lagrangian Particle diffusion model (LPDM). In reality, however, this paper rather describes the influence of varying emission heights on the quantification of source contributions.

Looking at surface emissions (emission height ≤ 100 m), it is incorrect to assume that such emissions are taken up by particles that are within the mixing or boundary layer height. In the Lagrangian conceptual framework, such emissions are only taken up by the particles crossing this grid cell within the lowest model level, typically set to

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0-100 m. Applications mentioned by the authors (like Stohl et al., 2007) are neither a simplification, nor do they assume constant mixing layer heights. In forward like in backward mode, the mixing layer dynamics is simulated in the model and thus does not need to be considered while counting the particles.

The framework, however, is different in case that the emission height exceeds the height of the lowest (surface) model layer, and especially in circumstances where emission heights are highly variable. This is especially the case for forest fire emissions, strongly depending on the dynamics of the fires and the temperatures prevailing in the plumes. Here, the variable emission heights need to be considered by including particles from higher levels in the quantification of source contributions. In this case, the effects described by the authors are relevant.

Therefore, these aspects should be properly discussed in a revised manuscript version, before the paper can be accepted.

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