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The emission sources in airborne birch pollen modelling

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Air pollution from anthropogenic, biogenic and geogenic sources contributes to increased mortality and lower quality of life. Allergenic pollen in the air, a biogenic pollutant, might lead to the development of pollinosis in a quarter of the adult population and a third of all children in Europe. Future climate and land-use changes may increase the amount of allergenic pollen in the air and prolong the pollen season. Mitigation measures against airborne pollen requires proper modelling and forecasting of allergenic pollen.

We use the pollen transport model SILAM (System for Integrated modeLLing of Atmospheric coMposition), driven by ECMWF ERA5 meteorology in a bottom-up emission approach for the period 1982-2019 for the Belgian territory. The pollen source emission maps are key inputs into SILAM.

Here we quantify how spatially-varying pollen emission sources affect the modelled airborne birch pollen levels in a Monte-Carlo approach. This preliminary analysis indicates that the selection of median emission values of a gridcell increases the correlation between the modelled and in-situ observed pollen levels with 16%. In a forecasting framework, it is critical to select prior to the start of the pollen season the best map with pollen emission sources. This might be done by constructing relationships between the pre-pollen season vegetation state and meteorology and the expected birch pollen loads of the up-coming season. We will present an overview of our efforts to select the best pollen emission source map based on a-priori knowledge.

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