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Scaling down birch and grass pollen emission sources for use in SILAM

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Mitigation measures can be taken for easing off allergy symptoms caused by allergenic airborne pollen by making available timely information on forthcoming pollen episodes. This calls for a forecasting system at the scale of the citizens. By providing modelled and forecasted airborne birch and grass pollen levels near the surface at the one by one kilometer scale we can achieve this in a better way. This requires the scaling down of birch and grass pollen emission sources.

SILAM is used as tool for modelling and forecasting airborne birch and grass pollen in Belgium. It is driven by ECMWF ERA5 meteorology in a bottom-up emission approach. Pollen emission source maps determine the spatial distribution and the potential amount of emitted pollen to the air. Currently, in Belgium, we apply maps with a spatial resolution of 0.10° x 0.10° and 0.05° x 0.05° for birch trees and grasses, respectively. Here, we combine monthly MODIS Land Surface Temperature (LST) data on a one by one kilometer grid with pollen emission source maps from earlier research on top of a pollen footprint analysis. We apply daily pollen footprints produced by SILAM running in a 3-day backward mode for five locations in Belgium, coupling the fraction of air to the pollen levels monitored by the devices of the aerobiological network. SILAM uses the down-scaled pollen emission source maps as input in the forward mode to obtain modelled birch and grass pollen concentrations more directly at the level of sensitive persons for pollen.

First results for the period 2013-2018 show that late winter/early spring MODIS LST might have some potential to assess the severity of the grass pollen season. For the birch pollen season, an accumulation of LST values from the period August-February (before the start of the birch pollen season in Belgium) might be a good proxy to estimate the seasonal pollen index. A substantial improvement between observed and modelled time series of airborne pollen levels (up to 210% increase in R^2 values for grass pollen) is found for some monitoring stations, especially at the site at the North Sea. This is probably due to the better separation between sea and land in the more detailed pollen emission source maps compared to the native coarser datasets.

Please, submit you abstract

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