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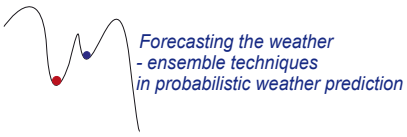

A new Parameterization Scheme for Pollen Emission in Numerical Models

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In modern society, one of the major health problems are pollen allergies. The best way to reduce allergic symptoms is to avoid the allergens completely. Therefore, a thorough knowledge about the distribution of the pollen in the air is desirable. A recent approach to achieve this information is to include pollen grains into numerical weather prediction (NWP) models and simulate their dispersion.

COSMO-ART is one of the NWP models that are already able to simulate pollen concentrations. Additionally to transport and deposition processes, the emission of pollen from the plant into the atmosphere needs to be described within the model. While transport and deposition are physical processes that can be described with identical equations for different substances, the emission process of pollen is a combination of physical and biological processes that are unique to each plant species. At present, only relatively crude parameterizations exist for pollen emissions that are based on ad hoc assumptions and are not thoroughly validated. To fill in this gap, we have developed an emission parameterization, which is based on biological and physical reasoning and can easily be adapted to different plant species by adjusting just a few key factors. Our goal was to establish an emission parameterization, for which the influencing factors (e.g., temperature, humidity, wind speed) can be determined using straight-forward experiments.

We will present an overview of the basic ideas behind the emission parameterization and how they are implemented into the model. The performance of the model will be compared to operational pollen forecasts using the pollen season of 2010 as a case study. First sensitivity tests indicate that the new emission parameterization captures the timing of emission events, in particular for major episodes. However, the magnitude of pollen concentrations still requires further parameter testing (especially for the meteorological influences on pollen release) based on idealized experiments and long-term comparison to observations.