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The role of land cover, land use, and atmospheric transport for the mismatch of flowering and atmospheric pollen seasonality

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Aeroallergens contribute a major climate change impact on human health since warming favours the production and advances the release of plant pollen. This goes in line with a widely observed advance of flowering in response to increasing temperatures. However, documented plant phenological changes vary with species traits, seasons, and sites. Nevertheless, the start and end of flowering dates are known to build a solid baseline for assessing the spatial and temporal patterns in pollen calendars. A closer look at the match/mismatch of flowering and start of pollen season dates reveals considerable differences which may be also indirectly linked to climate change. In this talk, we will present three perspectives related to (1) grassland land use, cutting regimes and agri-environment measures (AEM), (2) post-season pollen transport of an alpine *Alnus* species, as well as (3) a first climatology of pre-season long-range pollen transport to Bavaria. These selected examples underline the prominent role of land use/land cover (LULC) and pollen transport besides direct temperature mediated climate change effects on flowering for regional pollen calendars.