

Variations in pollen counts largely explained by climate and weather

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The interaction between climate and vegetation is well studied within phenology. Climatic / weather conditions affect e.g. flowering date, length of vegetation period, start and end of the season and the plant growth. Besides phenological stages also pollen counts can be used to investigate the interaction between climate and vegetation. Pollen emission and distribution is directly influenced by temperature, wind speed, wind direction and humidity/precipitation. The objective of this project is to study daily/sub daily variations in pollen counts of woody and herbaceous plant species along an altitudinal gradient with different climatic conditions during the vegetation period. Measurements of pollen were carried out with three volumetric pollen traps installed at the altitudes 450 m a.s.l (Freising), 700 m a.s.l (Garmisch-Partenkirchen), and 2700 m a.s.l (Schneefernerhaus near Zugspitze) representing gradient from north of Munich towards the highest mountain of Germany. Airborne pollen concentrations were recorded during the years 2014-2015. The altitudinal range of these three stations accompanied by different microclimates ("space for time approach") can be used as proxy for climate change and to assess its impact on pollen counts and thus allergenic risk for human health. For example the pollen season is shortened and pollen amount is reduced at higher sites. For detailed investigations pollen of the species *Plantago*, *Quercus*, *Poaceae*, *Cupressaceae*, *Cyperaceae*, *Betula* and *Platanus* were chosen, because those are found in appropriate quantities. In general, pollen captured in the pollen traps to a certain extent has its origin from the immediate surrounding. Thus, it mirrors local species distribution. But furthermore the distance of pollen transport is also based on (micro-) climatic conditions, land cover and topography. The pollen trap shortly below the summit of Zugspitze (Schneefernerhaus) has an alpine environment without vegetation nearby. Therefore, this trap can be used to detect short-, middle- and long-range pollen transport. The pollen trap in Garmisch-Partenkirchen is located in the valley below Zugspitze making these two stations suitable for a direct comparison. First results show that the total amount of pollen at Schneefernerhaus for *Plantago*, *Quercus*, *Poaceae*, *Cupressaceae*, *Cyperaceae* and *Betula* is only about 20% in comparison to Garmisch. Furthermore there are daily differences in the pollen counts in yearly sum between morning (24:00 - 12:00) and afternoon (12:00- 24:00). This phenomenon might be caused by diurnal climatic variations in the boundary layer as well as local mountain wind systems (changing wind direction from morning to afternoon time). Additionally pollen counts were linked to weather data recorded by the German Meteorological Service and local climate stations. Results indicate that the duration of precipitation events is a major factor of influence concerning the counted pollen. With increasing duration of a rain event pollen counts are decreasing.