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A quantile regression analysis of the impact of climate change on the seasonal pollen release in Sweden

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Abstract

It is well established that climate change has led to significant changes in the timing and intensity of phenological events around the world. One such event is the release of pollen by plants, which is a major cause of allergies in humans. This study aims to investigate the impact of climate change on the timing and intensity of pollen release in Sweden. We also look at whether or not the latitude of plants has a significant influence on seasonal pollen release. Using data provided by the Swedish Museum of Natural History, we compare nonparametric quantile regression and linear regression on empirical quantiles to model the changes in pollen season. We find that empirical quantiles produce better results. Our findings show that the start and peak dates of various species of pollen advance at a similar rate over time in a warming climate while the ending dates move at a slower rate. The amount of days a year the pollen season is deemed to be active thus increases over time. Furthermore, the effects mentioned appear to be intensified at higher latitudes, apart from the extension of seasonal length for grass pollen, which was found to be reduced at more northerly latitudes. To conclude, our findings suggest that climate change is having a significant impact on the timing and intensity of pollen release in Sweden, which is of concern for reasons of public health and potentially for wildlife and agriculture, thus it is important to monitor these changes in pollen release patterns and develop strategies to mitigate their impact.

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