

Improving pollen forecasting for a better quality of life for allergy sufferers

New measurements on the properties and spread of airborne pollen to improve the forecasting of this natural allergen, which affects human health as well as the Earth's temperature, have been published in a new international study led by Dr Detlef Mueller in the research journal *Atmospheric Environment*.

Pollen, considered to be one of the main causes of allergies and also a major contributor to pollution, is easily spread through the air and its impact on human health may increase due to climate change. The physical and optical properties of pollen also determine how much sunlight arrives on the Earth's surface – and the amount of sunlight reaching the surface has a major influence on our planet's temperature.

Dr Mueller, now at the University of Hertfordshire's School of Physics, Astronomy and Mathematics and previously at Leibniz Institute of Tropospheric Research (TROPOS) in Germany, said: "Together with colleagues from the Gwangju Institute of Science and Technology (GIST) in Korea, we used a tool called a polarisation lidar to observe particles, including pollen particles, in the atmosphere."

"We found that pollen particles from trees are distributed in the lower part of the atmosphere in cities. This is caused by small air convections, air updrafts and downdrafts – and good weather conditions, such as high temperatures and low relative humidity, also contribute to this."

Polarisation lidar (Light Detection and Ranging) is a relatively new research technology. Operating in a similar way to radar, it measures the difference in time between sending a laser pulse up into the sky and receiving the back-reflected laser pulse – allowing the distance between the instrument and the reflecting object (pollution particles in this case) to be computed.

Using these sophisticated laser techniques, the team measured some different optical properties of airborne pollen for the first time – including the light-extinction coefficient which enables the determination of the optical depth of the atmosphere. This optical depth determines the amount of sunlight falling onto Earth's surface, and hence directly influences Earth's temperature.

Dr Mueller continued: "Dust is known to act as carrier of bacteria and fungi as well as pollen. We observed an increase in the number of people who were hospitalised after large dust outbreaks over South Korea where we were taking the measurements. They suffered from breathing problems, eye inflammations and other strong allergic reactions. And we have noted similar conditions around the world, such as in the Sahel Zone in Africa, where cases of meningitis may have been caused by bacteria carried by dust."

Dr Mueller recently joined the University of Hertfordshire where he is funded by the Royal Society through the Wolfson Research Merit Award which is given to outstanding scientists in the UK. He continues to develop and improve lidar measurement technology for climate research, and also for investigating the spread of dust, spores and fungi. As well as helping to improve the forecast of the spread of natural airborne allergens, this research will help to find new ways of reducing crop losses - it is estimated that approximately sixteen per cent of the global crop yield is lost each year due to fungal diseases.

Y. M. Noh, D. Müller, H. L. Lee, T. J. Choi (2013): Influence of biogenic pollen on optical properties of atmospheric aerosols observed by lidar over Gwangju, South Korea, *Atmospheric Environment*, Volume 69, pages 139-147, <http://dx.doi.org/10.1016/j.atmosenv.2012.12.018>

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Notes to Editor

About the University of Hertfordshire

The University is the UK's leading business-facing university and an exemplar in the sector. It is innovative and enterprising and challenges individuals and organisations to excel. The University of Hertfordshire is one of the region's largest employers with over 2,650 staff and a turnover of almost £233 million. With a student community of over 27,200 including more than 2,800 students from eighty-five different countries, the University has a global network of over 175,000 alumni. It is also one of the top 100 universities in the world under 50 years old, according to the new Times Higher Education 100 under 50 rankings 2012. Research is at the core of the University's strategy to facilitate far-reaching engagement with business, community and national and international partners. The University's research is world-leading and has been recognised by the 2008 Research Assessment Exercise (RAE). For more information, please visit www.herts.ac.uk Did you know...?350 qualified nurses graduate from the University of Hertfordshire each year - We are caring!Find out more at go.herts.ac.uk/didyouknow

About the Gwangju Institute of Science and Technology

The Gwangju Institute of Science and Technology (GIST) was founded in 1993 by the Korean government to meet the nation's demand for advanced research as well as to enhance the development of higher education in science and engineering. Since its foundation, GIST was ranked 6th in the world and 1st in Asia in terms of Citations per Faculty conducted by QS, a British global university-evaluating agency in 2013. GIST ranks in the top among 463 Asian universities with respect to number of papers per faculty. Since 2005, graduate students from the doctorate program of GIST had published an average of 6 research papers in SCI journals before graduation. The number of patent applications per student is 0.24, which is the highest in Korea. GIST is achieving the nation's demand for advanced research as well as to enhance the development of higher education in science and engineering. GIST takes a leading role in performing research and development in cooperation with the industrial sector. GIST employs around 2000 staff, among them are 1372 students. The total annual budget of the institute is 140 Million Euro.

<http://www.gist.ac.kr/>

About the Leibniz Institute of Tropospheric Research

The Leibniz Institute of Tropospheric Research (TROPOS) is member of the Leibniz Society which consists of 86 independent research institutes. Research at these institutes ranges from natural-, engineering- and environmental research to economy, regional and social research to the humanities. Leibniz institutes work on questions relevant to society, economy and ecology. The institutes focus on knowledge- and application-oriented basic research. They operate scientific infrastructure and offer research-based service. The Leibniz society puts focus on knowledge transfer toward policy, science, economy, and the public sector. Leibniz institutes are in intensive cooperation with universities – including the ScienceCampi -, with industry and other partners in Germany and abroad. The institutes undergo high-quality, independent and transparent evaluations. Because of their importance for Germany, the Federal Government and the federal states fund the Leibniz-Society together. The Leibniz-Institutes employ around 16.500 staff, among them are 7.700 scientists. The total annual budget of the institutes is 1.4 Billion Euro.

<http://www.leibniz-gemeinschaft.de>