9 November 2020



MEDIA RELEASE

UP research team partners with NASA to study effects of air pollution on health

PRETORIA – University of Pretoria (UP) researchers are part of an international team that is measuring air pollution for the National Aeronautics Space Administration (NASA) as part of the global Multi-Angle Imager for Aerosols (MAIA) project.

"This is the first time that NASA has partnered with epidemiologists and health organisations to use spacebased data to study human health and improve lives," says environmental epidemiologist Professor Janine Wichmann, Head of the Environmental and Occupational Sciences Division at UP's School of Health Systems and Public Health, and the local principal investigator of epidemiology research for the MAIA project. Several study sites around the world are part of the project, four of which are African countries: South Africa, Ghana, Kenya and Ethiopia.

The MAIA satellite is due to be launched by NASA in 2022. "My research interest is investigating human health effects due to air pollution and climate change indicators," says Prof Wichmann. "The main aim of the global project is to see what the human health effects are of fine particulate matter of a diameter of 2.5mm, known as PM2.5, and its chemical composition.

"Particulate matter in the air includes many chemical species that might be toxic," she explains. "The degree to which they contribute to human health effects, such as respiratory disease, also varies. This requires us to know which specific air pollutants, combination of pollutants, sources of pollutants and characteristics of pollutants are most responsible for our ill health, such as adverse birth conditions, cardiovascular and respiratory disease, and premature death."

According to Prof Wichmann, studies have shown that maternal exposure to severe air pollution is associated with adverse birth outcomes, such as restricted intrauterine growth, pre-term delivery and low birthweight. Short-term exposure on a daily to monthly basis is associated with respiratory illness, such as asthma and premature death; and chronic exposure over many years is associated with cardiovascular and respiratory disease.

The MAIA project, which was announced by NASA in 2016 as part of its Earth Venture, was envisioned as a departure from conventional methods of assessing air quality. Generally, measuring the air quality in specific places has been conducted through the use of expensive equipment in a fixed place, which measured air particles in the locality. However, these monitoring networks are few and far between, especially in densely populated and highly polluted areas.

According to NASA, the MAIA satellite will generate comprehensive information on particle size distribution, shape and light scattering, as well as absorption for a set of globally distributed target areas. It will include all of these capabilities at moderately high spatial resolution. Cameras will be mounted on a two-axis gimbal that will provide multiple-angle views.

In 1999, NASA's Terra satellite offered a possible solution for providing global estimates of PM2.5 exposure levels by measuring aerosol optical depth (a measure of particle light extinction in the atmosphere). Now satellite-based methods have been developed to estimate ground-level PM2.5 levels to support local

monitoring and help fill the gaps in data for a better understanding of the link between air pollution and respiratory and other diseases. MAIA's algorithm will be able to work out the total particles present in the air, including chemical composition such as sulphate, nitrate, organic carbon and black carbon.

"By understanding what's in the air we breathe and just how toxic it could be, we can make decisions to establish global standards for our air quality and develop strategies to control air pollution with a targeted approach," says Prof Wichmann.

For more stories like this, visit <u>Research Matters</u>. This is a curated content website featuring the University of Pretoria's impactful and innovative research excellence. The media is welcome to use content from this site. Simply send us a note indicating you would like to use content from this site and provide us with a source credit in return. At the University of Pretoria, we believe that our research should have a local and global impact and it should also be a source of transforming lives and society through what we do. Visit <u>www.up.ac.za/research-matters</u> today.

Media inquiries:

Please email Prim Gower at Primarashni.Gower@up.ac.za or call 083 229 9011.

ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on the Hatfield Campus, Pretoria. This 112-year-old institution is also the largest producer of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business Science (GIBS). It is the only university in the country that has a Faculty of Veterinary Science which is ranked top in Africa, and overall has 120 academic departments, as well as 92 centres and institutes, accommodating more than 55 000 students and offering about 1 100 study programmes.

UP is one of the top five universities in South Africa, according to the 2019-2020 rankings by the Center for World University Rankings. It is also ranked among the top 100 universities worldwide in three fields of study (veterinary science, theology and law), and among the top 1% in eight fields of study (agricultural sciences, clinical medicine, engineering, environment/ecology, immunology, microbiology, plant and animal sciences and social sciences).

In May 2020, the annual UK Financial Times Executive Education Rankings once again ranked GIBS as the top South African and African business school. The University also has an extensive community engagement programme with approximately 33 000 students involved in community upliftment. Furthermore, UP is building considerable capacities and strengths for the Fourth Industrial Revolution by preparing students for the world beyond university and offering work-readiness and entrepreneurship training to its students.

As one of South Africa's research-intensive universities, UP launched the *Future Africa Campus* in March 2019 as a hub for inter- and transdisciplinary research networks within UP and the global research community to maximise 4IR innovation and address the challenges and stresses our continent and world is facing. In addition UP also launched the Javett Art Centre in September 2019 as a driver of transdisciplinary research development between the Humanities and other faculties. In 2020 UP will launch Engineering 4.0. as a hub not only for Smart Cities and Transport, but also to link the vast resources in technology and data sciences to other faculties via Future Africa. These initiatives are stimulating new thinking at the frontier of 'science for transformation'.

For more information, go to <u>www.up.ac.za</u>