

Bad Soden, Germany, 18 July 2006

What makes aerosols so health-damaging and climate-relevant?

Microparticle researcher Martin Ebert receives the Adolf Messer Prize

There is a general awareness now that aerosols such as fine dust particles, diesel soot and cigarette smoke are harmful to health. However, aerosol particles in the air also affect the climate. Yet their physical and chemical properties are still insufficiently researched.

Dr. Martin Ebert from the Institute for Applied Geosciences at Darmstadt University of Technology (TU Darmstadt) is now being recognized for his vital research work in this area with the 50,000-euro science prize from the Adolf Messer Foundation. Martin Ebert, who was born in 1970, studied chemistry at TU Darmstadt, did his doctorate in materials science and, after a longer spell of scientific work in the U.S.A., is currently working on his post-doctoral lecturing qualification.

Ebert deserves particular credit for his comprehensive chemical and mineralogical characterization of atmospheric aerosol particles, tiny microparticles that are found everywhere in the air. His work in connection with global climate change as well as in relation to the negative health effects of atmospheric aerosol particles is of international significance. The results of his work have been applied directly to the area of environmental policy and form the basis for measures aimed at reducing air pollution.

Aerosol particles have a strong influence on the global climate system due to the fact that they can scatter and absorb solar radiation. In addition, they act as condensation nuclei in the formation of cloud drops and ice crystals. This means that they have an opposite effect to the greenhouse effect. Compared with greenhouse gases, little research has been done so far on aerosols. Dr. Ebert is studying the optical and hygroscopic properties of these particles and their capacity to act as ice nuclei.

The second field in which Ebert works concerns the negative effects of aerosols, for example the impact of fine dust on human health. In particular, links between high aerosol concentrations and respiratory and cardiovascular disease as well as lung cancer have been proven. Around 75,000 deaths a year in Germany (9 %) can be attributed to aerosols, which corresponds to an average reduction in life expectancy of ten months. One of the conclusions of Ebert's work is that in order to reduce the dangers from fine dust in the air, the emission of nitrogen oxides and sulphur dioxide, among other things, would have to be greatly reduced.

The Adolf Messer prize, which is worth 50,000 euros, is awarded annually at the TU Darmstadt to promote research and teaching for scientists with outstanding achievements in the fields of natural sciences, engineering, economics or social sciences.

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