DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The objective of the project is to examine the impact of absorbing aerosols on the height of planetary boundary layer, which is the lowest part of the atmosphere that is directly influenced by its contact with the Earth's surface. Atmospheric aerosols are minute particles suspended in the atmosphere, which are created both naturally and are result of human activity.

Those particles may have negative influence on people's health. High concentration of aerosols in the immediate vicinity of the Earth's surface may be the reason for decline in the quality of life or shortening of people's average life expectancy, especially in big urban agglomerations and in highly industrialized areas.

Aerosols play a considerable role in physical and chemical processes occurring in the atmosphere due to the fact that atmospheric aerosols interact with the Earth's climate. Aerosols, which in the atmosphere play the role of cloud condensation nuclei, are a significant factor affecting the creation, lifespan and optical properties of clouds. Some aerosols (e.g. soot) absorb solar radiation, which causes warming of the air. That, in consequence, results in changes of the vertical profiles of temperature and humidity in the atmosphere. The effect of that is a slowdown in the vertical transport and an increase in the concentration of pollution. In the mountainous areas, in the cases of nocturnal temperature inversion, absorbing anthropogenic aerosols accumulate in basins. Such phenomenon creates favourable conditions for observations of mutual interactions between aerosols and the boundary layer.

The aim of field measurements will be to examine the development of the planetary boundary layer and absorbing aerosols optical and microphysical properties. Devices collecting samples of the air and instruments performing remote measurements (using scattered laser light) will be used. Within the framework of this project it is proposed to develop vertical profiling of atmospheric aerosols properties by placing measuring set on a cable car. Numerical models, used for carrying out computer simulations of physical processes in the atmosphere, will also be applied.

Because of aerosols influence on the climate and health, it is important to characterize their concentration, size distribution and optical parameters at many different locations around the world at various times of the year and under a range of meteorological conditions.

The realization of this project will allow extending knowledge regarding how absorbing aerosols affect the PBL height, an important parameter used in air pollution studies, weather forecasting and climate modelling. Apart from having scientific value, that piece of information may be significant in the creation of the national environmental protection policy and in evaluation of the fulfilment of international obligations regarding the environment. The installation of the measurement equipment on the cable car may in the future be used for constant monitoring of the state of atmosphere pollution. Such research will allow determining concentration of anthropogenic aerosols affecting the development of the smog which fills mountain valleys, which in consequence will enable implementing atmosphere protection programmes. Towns situated in the mountainous regions of the south of Poland take up notorious first places in ranking of cities with most polluted atmosphere.