Atmospheric aerosols can adversely influence human health and the overall quality of life. An excessive exposure to aerosols can cause cardiovascular disease and often leads to premature death. Moreover, aerosols interact with solar radiation in the Earth's atmosphere influencing the climate as well as the amount of radiation reaching the surface. UV radiation is biologically active and is necessary in biological processes, however an overexposure may be harmful for humans and animals. Furthermore changes in solar irradiance may influence rates of photochemical reactions involved in the formation of photochemical smog. Chemical compounds involved in this type of smog (e.g. ozone, nitrogen oxides) may be particularly harmful for humans. This becomes especially important in the case of an excessive exposure to the increased concentrations of aerosols or reactive trace gases and resulted in lows introducing limits for atmospheric pollutions.

Modeling of pollutants' concentration in the atmosphere is particularly difficult due to a large number of factors influencing them. The atmospheric contaminants may engage in chemical reactions that are often moderated by the solar radiation. This directly decreases the reliability of chemical weather forecasts and limits the possibility for forecasting many days ahead. One of the aforementioned limiting factors are photo-chemical processes induced by the reactions between the aerosols, trace gases and the solar UV radiation. The reliability of the models may be increased if the detailed knowledge of the vertical aerosol structure is available. Unfortunately most of the aerosol measurements are performed near the surface so the radiative transfer models usually make use of mean climatological aerosol profiles. This may result in imprecise forecasts for the biologically active UV radiation at the ground level and in large uncertainties in forecasting photo-chemical weather.

The aim of this project is a retrieval of the real profiles of aerosols' optical properties, including absorption coefficients, and investigation of their influence on modelling of solar UV irradiance at the ground level (UV index). That index is predominantly designed to measure the health effects associated with an exposure to the UV radiation. The use the measured aerosols' profiles, instead of standard model configurations, is expected to improve the agreement between UV index and near-ground ozone concentrations and the measured values.