Wider research context / theoretical framework

The proposed approach will exploit the complementary nature of instruments within three quality observational networks under the umbrella of activities of the pan-European Aerosol, Clouds and Trace Gases Research Infrastructure - ACTRIS: the Pandonia Global Network (PGN), the Aerosol Robotic Network (AERONET) and the European Lidar Network (EARLINET).

Hypotheses/research questions /objectives

The aim of the AeroPan project is twofold. Firstly, a more technical work will deal with the extension of the measurement scope of the Pandora spectrometer from current trace gases to aerosol remote sensing capabilities. Secondly, by combining the adapted Pandora spectrometer, with sun photometer, lidar and a set of cameras, new insight and research on the vertical and horizontal distribution of aerosol properties, such as aerosol optical depth, Angstrom exponent or single scattering albedo will be gained in an Alpine environment as well as in the Mazovian Lowland environment.

The first objective of the project is the novel retrieval of aerosol optical and microphysical properties with the Pandora spectrometer, using sky radiance measurements as an input for well-established operational algorithms within the existing aerosol network. The second objective is the investigation of the aerosol extent and properties with respect to the boundary layer and the free troposphere.

Approach/methods

The Pandora offers advantages in terms of spectral information and instrumental flexibility, such as the possibility of easy modifications of measurement routines and viewing geometry. Currently, the main disadvantage of this instrument is the challenging radiometric stability. Within this project we are going to tackle these challenges to compensate for the weaknesses by a synergetic approach.

Two measurement campaigns foreseen to be conducted, one in the Warsaw agglomeration and its vicinity and one in the Alpine region of Innsbruck, will be completed with long-term synergetic observations.

Level of originality / innovation

The project's innovative aspects include the exploration of combining complementary trace gas and aerosol remote sensing infrastructures within ACTRIS, in particular to improve its aerosol measurement products and to apply new techniques and synergies for aerosol research. Synergetic AOD retrievals will have a higher accuracy due to trace gas information from Pandora and an extended spectral range of measured radiance. Another novelty is the use of synchronized cameras for the wavelength- and angle-dependent lidar signal detection.

Primary researchers involved

University Professor Iwona Stachlewska, Senior PostDoc Axel Kreuter, Senior PostDoc Jochen Wagner, 2 PostDocs and 2 PhD students.