



Dual-aureole and sun spectrometer system for airborne measurements of aerosol optical properties

Paul Zieger, Rene Preusker, Thomas Ruhtz, and Jürgen Fischer

Institute for Space Sciences, Freie Universität Berlin (Carl-Heinrich-Becker-Weg 6-10, 12165 Berlin, paul.zieger@wew.fu-berlin.de)

We have designed an airborne spectrometer system for the simultaneous measurement of the direct sun irradiance and the aureole radiance in two different solid angles. The multi-spectral radiation measurements are used to derive optical properties of atmospheric aerosols. The main scientific objective is to use a passive remote sensing technique to derive vertical and horizontal profiles of aerosol layers, which later can be used for radiative transfer simulations.

Our new instrument FUBISS-ASA2 (*Free University Berlin Integrated Spectrographic System - Aureole and Sun Adapter 2*) is constructed to measure the direct irradiance of the sun, as well as the scattered radiation in two different solid angles in the forward scattering region. We are therefore able to determine the Ångström coefficient, and in addition to it, the aerosol volume scattering function for each field of view. We define a new *aureole index awi* , where the aerosol volume scattering functions are set in ratio. To make specific propositions about the aerosol detected, we have done Mie calculations for various aerosol models using the algorithm of W.J. Wiscombe. The results were used to make device-specific aerosol simulations for miscellaneous measurement and aerosol conditions. The sampled data can then be used to make probability statements about the detected aerosol, that would not have been possible with the single Ångström coefficient determination. FUBISS-ASA2 was successfully in operation in several field campaigns, where vertical profiles of aerosol optical properties were derived.