Retrieval ot snow grain size and pollution amount in Polar regions from MODIS data with atmospheric correction

E. Zege (1), I. Katsev (1), A. Prikhach (1), A. Malinka (1), G. Heygster (2), and H. Wiebe (2)

(1) B.I. Stepanov Institute of Physics, National Academy of Sciences of Belarus, Minsk, Belarus (epzege@yahoo.com), (2) Institute of Environmental Physics, University of Bremen, Bremen, Germany

This paper presents a new analytical algorithm to retrieve Snow Grain Size and Pollution concentration (SGSP) from satellite spectral data along with a new method of atmospheric correction in the coupled system snow-atmosphere developed in the framework of the DAMOCLES Integrated Project. The algorithm is based on a new approach to snow optics. The underlying model considers snow pack as a medium with close-packed, irregularly shaped particles. Traditionally, more idealistic models of snow as a medium with independent spherical particles have been used. The main advantage of the new algorithm is that it does not need any a priori assumptions about the snow particle shapes. Beside, the SGPS analytical retrieval provides an extremely fast satellite data processing. The original atmospheric correction procedure uses fast code for radiative transfer computation developed by authors earlier that includes bi-directionality of the snow reflection and coupluing in snow-atmosphere system. The accuracy of the SGSP with newly developed atmocpheric correction technique for the specific conditions of Polar Regions (first of all, for large sun zenith angles) was checked and has been shown to be satisfactory. The comparison with results of retrieval by known techniques demonstrates some advantages of the developed approach specifically for the Polar regions with oblique Sun illumination. The satellite data processing includes cloud masking and atmospheric correction. The data processing with regular retrieval snow grain sizes and soot pollution amount for Polar Regions from MODIS satellite data is arranged and results will be demonstrated.