Snow Grain Size and Albedo over the Antarctic Ice Sheet and Sea Ice from Satellite Remote Sensing – Understanding Mechanisms of Change and Trends

(Planned research project)

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The spectral albedo of snow and ice is one of the key quantities in the radiative balance of the Antarctic as it tells how much of the incoming solar radiation of each wavelength is reflected back into space. Since Arctic and Antarctic are the major heat sinks in the global climate system, the radiative balance of the Antarctic has global relevance. However, the spectral albedo in the Antarctic and in particular its changes and the processes that cause changes are not very well known. The aim of this project is therefore to understand the mechanisms that change the spectral albedo of the Antarctic and to look for trends of the spectral albedo in the past 10 years. The base for this are spectral albedo maps of the Antarctic ice sheet and sea ice retrieved with a recently developed method to derive snow grain size and spectral albedo from remote sensing data, namely, visible and near infrared radiances measured by the MODerate-resolution Imaging Spectroradiometer (MODIS), operational on the satellites Terra and Aqua since 2000 and 2002, respectively. These data will be complemented by data derived form passive microwave satellites as well as – in cooperation with the Alfred-Wegener Institute – in-situ data of snow parameters from measurement campaigns.