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The GAC-SAL: A new 27-year surface albedo data record from AVHRR

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Studies on the Earth's climate require knowledge on the interactions between solar radiation and the Earth's atmosphere-surface system. One of the key variables that govern those interactions is the surface albedo, the ratio of reflected to incoming solar radiation at Earth's surface. Recent studies (Holland et al, 2010, Fletcher et al., 2009) point to surface albedo and its variations being especially important for the climate of the Arctic. Against this background, there is a clear and growing need for robust long-term timeseries of surface albedo on a global scale.

The Satellite Application Facility on Climate Monitoring (CM SAF), a project of EUMETSAT, answers this need by releasing the first edition of the GAC-SAL surface albedo data record. The GAC-SAL describes the directional-hemispherical reflectance (or black-sky albedo) of the Earth's surface. The data record covers 27 years (1982-2009), is fully global with 0.25 degree spatial resolution, and implements published algorithms for the calculation of surface albedo over land, snow, sea ice and water. The product also incorporates a correction for topography-induced effects on image geolocation and radiometric accuracy. The data is available for all interested users, free of charge. Of special interest is the Arctic sea ice area, for which this is the first long time series reaching present day.

We present an overall description of the albedo retrieval scheme and present some results from an extensive validation effort, where GAC-SAL data was compared against in situ observations of surface albedo at 10 different Baseline Surface Radiation Network (BSRN) and Greenland Climate Network (GC-Net) sites, each validation period spanning $\sim$15 years. We have also performed comparisons between GAC-SAL, CERES FSW, and MODIS 43C3 products. Some results of these comparisons are presented. The achieved mean accuracy over all validation results was $\sim$10% (in relative terms). Stability of the data record will also be discussed.

References

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