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Cloud cover and radiative fluxes at high latitude BSRN sites and their evolution over the last decade

M. Sutter (1), R. Philipona (1) and A. Ohmura (2)

(1) Physikalisch-Meteorologisches Observatorium Davos, Switzerland, (2) Institute for Atmospheric and Climate Science, Swiss Federal Institute of Technology (ETH), Zürich, Switzerland.

The Baseline Surface Radiation Network (BSRN) now offers data of about 10 years of accurate radiation measurements from several stations around the world, five of them located in high latitude regions. The APCADA algorithm, which is an automated method to evaluate cloud cover using longwave downward radiation and surface meteorological measurements, is used to calculate continuous, i.e. day and night, time series of cloud amount and cloud effect. APCADA is applied to data of the four high latitude BSRN sites Barrow and Ny Alesund in the Arctic, and Georg von Neumayer and South Pole in Antarctica. Time series of APCADA calculated cloud cover from these sites are analyzed and presented. Furthermore, APCADA calculated cloud cover was compared to cloud information from human observation and also from the International Satellite Cloud Climatology Project (ISCCP). Continuous cloud information from APCADA allows identifying cloud free situations, and hence calculating the cloud free shortwave transmittance and the longwave apparent emittance of the cloud free atmosphere. This enables the determination of continuous time series and the investigation of monthly and annual averages of cloud free shortwave and longwave downward radiation, which are presented.