

Radiation closure under broken cloud conditions at the BSRN site Payerne: A case study

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Clouds have a substantial influence on the surface radiation budget and on the climate system. There are several studies showing the opposing effect of clouds on shortwave and longwave radiation and thus on the global energy budget.

Wacker et al., 2013 show an agreement between radiation flux measurements and radiative transfer models (RTM) under clear sky conditions which is within the measurement uncertainty. Our current study combines radiation fluxes from surface-based observations with RTM under cloudy conditions. It is a case study with data from the BSRN (Baseline Surface Radiation Network) site Payerne (46.49°N, 6.56°E, 490 m asl). Observation data are retrieved from pyranometers and pyrgeometers and additional atmospheric parameters from radiosondes and a ceilometer. The cloud information is taken from visible all-sky cameras. In a first step observations and RTM are compared for cases with stratiform overcast cloud conditions. In a next step radiation fluxes are compared under broken cloud conditions. These analyses are performed for different cloud types.

Wacker, S., J. Gröbner, and L. Vuilleumier (2014) A method to calculate cloud-free long-wave irradiance at the surface based on radiative transfer modeling and temperature lapse rate estimates, Theor. Appl. Climatol., 115, 551–561.