



Analysis of small-scale spatial variations of shortwave downwelling radiation

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DWD/Meteorological Observatory Lindenberg is operating a small-scale ground-based network of measurement sites for precipitation and shortwave radiation. The area is located roughly 60 km southeast of Berlin city. The landscape was stamped by the ice-ages with quite flat topography ranging from 34 to 140 m asl. Landuse is dominated by agriculture and forest (both about 40% ratio), lakes (6%) and urban areas. Concerning soil types sand and loam are prevailing. The extent is about 400 km².

8 measurement sites are equipped with high quality instruments CM21/CM11 by Kipp & Zonen. Maintenance and logger readout cannot be performed more frequent than in a monthly cycle. Therefore careful and comprising quality checking of the data is crucial.

The quality assessment routinely applied takes into account the basic astronomical and empirical considerations as well as some interdependencies like total to diffuse flux ratio and cross checking with sunshine duration. Possible shading due to growing vegetation is taken into account, too.

This is complemented by an approach that is utilizing time-series of clear sky radiative transfer simulations for every site. For that purpose a link to cloud coverage obtained from Meteosat second generation geostationary satellite data, highly resolved in time and space, was established. Longer-term (with respect to the predefined calibration cycle of 30 month for automatic stations) analysis allows for the detection of sensor degradation or local disturbances of measurements. Furthermore using satellite cloud mask enables the identification of larger clear sky regions characterized by similar atmospheric conditions.

The paper provides an overview of the surface radiation network and the current activities to improve automatic quality assessment using remotely sensed data and clear sky modelling for the upgrading of radiation data.

Focuses are set on the effects of using measured and/or forecasted profiles of temperature, humidity, ozone and aerosol instead of standard profiles. Secondly, aspects of using different models to simulate broadband shortwave radiation will be discussed.

First evaluation effort covered one year of data.

Comparison with satellite based irradiation product showed very good agreement at gridpoint Lindenberg, but a slight less correspondence for the surrounding sites.