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Solar radiation over Sweden 1983-2005

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Since 1983 a Swedish network of 12 solar radiation stations, measuring global and direct irradiance, is operated by SMHI. The stations are located at latitudes between 55.7˚N and 67.8˚N. During the 23 year period 1983-2005, for which a homogenous radiation database has been built up, some clear features in the surface radiation climate show up. Generally, the annual mean global irradiance decrease with increasing latitude. The nearness to open sea or big lakes is also very important due to the summertime sea breeze effect on cloudiness along the coasts. The highest mean global irradiance, 119.2 Wm^{-2}, is measured in Visby on the island of Gotland. The lowest mean global irradiance, 91.3 Wm^{-2}, is measured in Kiruna, northern Lappland. During 1983-2005 there is a positive trend in global radiation at all stations. Averaged over all stations the trend is about +4 Wm^{-2}/decade. This is due to a strong increase in the mean direct (horizontal) radiation of +5 Wm^{-2}/decade, which outweighs the slight negative trend in mean diffuse radiation of about -1 Wm^{-2}/decade.
Observed global radiation has been compared with the modelled global radiation from ECMWF's reanalysis project ERA40 for 1983-2001. Averaged over the whole period and all stations mean global irradiance from observations and ERA40 were 105.1 Wm^{-2} and 103.5 Wm^{-2} respectively. While the mean bias difference between ERA40 and observations is small, the clear positive trend during 1983-2001 in observed global irradiance is not captured by ERA40 which instead give a weak negative trend.