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Effect of cloud cover changes on solar dimming/brightening at worldwide GEBA sites

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Multidecadal changes in surface downward shortwave radiation flux and cloud cover are examined globally during 1965-2004 using Global Energy Balance Archive (GEBA) radiation measurements, synoptic cloud reports, and International Satellite Cloud Climatology Project (ISCCP) data. In order to quantify the radiative impact of cloud cover changes in the pre-satellite era, shortwave radiation anomalies caused by cloud cover anomalies are estimated from synoptic cloud reports. This is accomplished by multiplying monthly cloud cover anomalies by the ratio of climatological shortwave cloud radiative forcing divided by climatological cloud cover. Previous results for Europe indicate that cloud cover variability dominates radiation variability on monthly to subdecadal time scales. On longer time scales, GEBA measurements show that downward shortwave radiation flux exhibits changes that are unrelated to variations in cloud cover but are instead likely to be due to changes in anthropogenic aerosol concentrations.