



Solar irradiance changes in Switzerland since 1981

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Within the MeteoSwiss automatic meteorological network (ANETZ) solar radiation has been measured at 54 stations since 1981. These measurements have been elaborately homogenized and quality checked. With this database we investigate trends in solar irradiance, which will help to understand the rapid temperature rise in Europe. Solar irradiance under all situations increased about $2.3 (\pm 2.5) \text{ Wm}^{-2}/\text{decade}$ from 1981 to 2005. The increase is significant smaller in the alpine region (stations above 1000 m a.s.l.) than in the lowland. These trends are mainly caused by the extreme summer 2003 and its reduced cloud amount, which is also confirmed by synoptic cloud observations. The increase under cloud-free situations is $1.3 (\pm 0.65) \text{ Wm}^{-2}/\text{decade}$ at the lowland stations for the respective time period; this increase seems to level off since around 1995. The positive trend in clear-sky solar irradiance is likely due to the aerosol reduction, observed in Central Europe. MODTRAN model calculations show, that the effect of the reduced aerosol concentration on changes in solar irradiance is more than 5 times larger than the effect of the increased amount of water vapor.