Atmos. Chem. Phys. Discuss., 12, C2300–C2302, 2012
www.atmos-chem-phys-discuss.net/12/C2300/2012/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Decadal variations in estimated surface solar radiation over Switzerland since the late 19th century" *by* A. Sanchez-Lorenzo and M. Wild

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Received and published: 9 May 2012

GENERAL COMMENT I recommend publication of this interesting and well presented article after the authors have responded to the following comments.

SPECIFIC COMMENTS

Section 3 dealing with the homogenization of the Swiss series of sunshine duration measurements requires clarification. The methods adopted ensure spatial rather than instrumental homogeneity; however as the authors point out (line 56, page 10820) the latter source of non- homogeneity is of special importance because the change of instrumentation from the Campbell-Stokes to the Haenni sunshine recorders in the late

1970's coincided with the change in sunshine to cloud relationship referred to in the manuscript.

It is known from the Japanese and UK networks that the replacement of sunshine duration instruments, whose records are subjectively evaluated, by instruments with automatically evaluated outputs, leads to a reduction in sunshine duration. One comparison of the two instruments used in the Swiss network shows that the reduction varied seasonally between 16% in a mid-summer month to 3% in a mid- winter month (Major, 1985). The authors need to present evidence that the change in instruments was not responsible for the changes they report.

Section 4 where possible the non-dimensional relationship between global radiation and sunshine duration presented in Table 3 should be supplemented with the conventional analysis to allow their results to be compared with previous studies and enable the uncertainties in the estimates of all and clear sky irradiances to be expressed in W m^{-2}

Section 5 more detail is needed concerning the non-parametric Mann Kendall test of trend significance used. In particular were the data series pre-whitened as recommended (von Storch,1999) to remove the effect of auto-correlation common to most climate series and shown to exist in sunshine duration series?

Section 6 Clear sky irradiance. The authors could compare their results with those obtained using the more direct approach suggested by Galindo Estrada and Fournier D'Albe (1960), an approach supported by evidence for a common linear relationship between sunshine duration and direct beam irradiance in two very different radiation climates (Stanhill,1998).

References

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 10815, 2012.