

Joint homogenization of sunshine duration and global solar radiation Spanish series

J.A. Guijarro

AEMET (State Meteorological Agency), Balearic Islands Office, Spain (jguijarrop@aemet.es)

Surface solar global radiation (SSR) series have been studied in recent years to assess their inter-decennial variability as a main component of the energy balance driving surface temperature. Negative (dimming) and positive (brightening) trends have been identified during around 1955-85 and 1985 onwards respectively, that are reflected in the temperature series, and hence a more careful study of the homogeneity and quality control of the SSR data is desirable (Wild, 2009).

On the other hand, a first exploratory study of the homogeneity of 59 long-term European SSR series from the Global Energy Balance Archive (GEBA) performed with the Climatol R package (Guijarro, 2011) showed the frequent presence of anomalous abrupt changes in them. However, the better performance of this homogenization method when applied to denser observational networks pointed at the possibility of using the longer and more numerous sunshine duration series as a proxy of SSR, in order to increase the availability of nearer, better correlated, comparison series.

This has been applied to all available Spanish sunshine duration (178) and global radiation (78) series, with different degrees of completeness. The homogenization has been performed to both variables separately and combined. The results of this pilot homogenization are discussed, showing the benefits of the joint treatment of both kind of series.

Metadata are usually scarce, and therefore the homogenization method does not make any use of them. But the user can check the consistency of the homogenization results with the available metadata, the most important being relocation information and instrumentation changes. Especially dramatic has been the sunshine hours reduction due the the recent substitution of the Campbell-Stokes burned paper heliographs by the radiation over threshold standard method in many Spanish airport observatories.

References:

Wild M (2009): Global dimming and brightening: A review. J. Geophys. Res., 114, D00D16, doi:10.1029/2008JD011470, 31 pp.

Guijarro JA (2011): User's guide to Climatol. <http://webs.ono.com/climatol/climatol-guide.pdf> (40 pp.)

Sánchez-Lorenzo A, Guijarro JA, Brunetti M, Wild M (2011): Towards a homogenization of the long-term surface solar global radiation series over Europe. Poster to the European Geosciences Union General Assembly, Vienna, 03-08/April.