



“HC-1+HC-3” a long-term data set of daily solar radiation at surface

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The HelioClim databases contain satellite-derived estimates of the shortwave solar radiation at surface. The HelioClim-1 database (HC1v4) covers the period from 1985 to 2005. The HelioClim-3 database (HC3v5) starts from Feb 2004. Estimates from both databases were compared to qualified measurements performed in meteorological networks. Access to the HelioClim databases is provided by the SoDa Service (www.soda-pro.com). The databases differ in the temporal and spatial supports of information. The temporal resolution is 1 day for HC1v4 and 15 min for HC3v5. The spatial resolution is approximately 5 km for HC3v5. The situation is a bit more complex for HC1v4 where the estimates are computed on pixels of approximately 5 km in size, but pixels are spaced by approximately 30 km. Fusing both databases to get a long-term time-series starting in 1985 and spanning more than 30 years is appealing but challenging.

Estimates in HC3v5 have been converted into daily irradiation. Then, HC1v4 and HC3v5 were compared to each other for the common period Feb 2004 to Dec 2005. Several methods were tested to adjust HC1v4 onto HC3v5 as the latter is more accurate than the former. In other words, the processing aims at improving the accuracy of HC1v4. In situ measurements from 17 stations were used to assess the performances of each method compared to what is obtained with the original HC1v4. No method clearly surpasses the others. The method based on a quantile mapping technique applied to the clearness index exhibits better results than the others and than the original HC1v4 for all indicators: correlation coefficient, median, standard deviation and root mean square of the errors. The bias is an exception: it is improved in 12 stations out of 17 and exhibit a slight degradation in the 5 remaining cases.

Once the HC1v4 database adjusted onto HC3v5 for the period Feb 2004 – Dec 2005, the same adjustment function is applied to HC1v4 for the period Jan 1985 – Jan 2004. Eventually, the adjusted HC1v4 is concatenated to HC3v5 to yield a consistent time-series of daily shortwave irradiation at surface spanning more than 30 years.