Geophysical Research Abstracts
Vol. 16, EGU2014-7591-1, 2014
EGU General Assembly 2014

Reassessment of the long-term trends in surface solar radiation over Europe by means of a homogenized dataset (1939-2011)

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A widespread reduction of surface solar radiation (SSR) has been well established and documented from the 1950s to the 1980s, and an opposite trend has been detected in many regions of the world since the 1980s. This decrease and increase in SSR has been defined as “global dimming” and “brightening” periods, respectively. Nevertheless, the importance of the availability of high-quality SSR data in order to estimate long-term trends is well known, particularly with respect to the quality and homogeneity of the databases. This work presents a reassessment and update until December 2011 of the trends in SSR over Europe, which is based on the 56 longest and homogenized series available at the Global Energy Balance Archive (GEBA). The mean annual SSR series show an increase from the late 1930s to the early 1950s, followed by a reduction until mid-1980s, and ending with an increase up to 2011. During the period 1939-2011 the trend is negative and significant on annual basis, with a decrease of 3.6 Wm-2 over the whole period. This implies that the trend in SSR cannot be at the origin of the warming over Europe observed during this time. Similar results are obtained in different regions, especially in Central and Eastern Europe. On the other hand, updated records until 2013 in Potsdam (Germany) confirm that the winter 2013 was the least sunny one since the beginning of measurements in the 1930s.