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Trends of surface solar radiation in a mountain region of Central Europe since the late 19th century

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A widespread reduction of surface solar radiation (SSR) from the 1950s to the 1980s has been well established and documented. Since the 1980s the trend has revered in many regions of the world. This decrease and increase in SSR has been defined as "global dimming" and "global brightening", respectively. However, both global dimming and recent brightening involve uncertainties in relation to their geographical extension, their quantification, and their causes. Using a dataset with 19 sunshine duration series, a climatic variable that can be considered an excellent proxy measurement of SSR, we study the trends of estimated SSR from 1885 to 2010 over Switzerland, in Central Europe. The temporal evolution of the mean all-sky SSR annual series for the whole area shows a non-trend during the first half of the 20th century, with a decrease from the 1950s to the early 1980s, and followed by a positive trend up to the present. With the aim of studying the possible direct and indirect effect of anthropogenic aerosols, we also show the SSR mean series for clear-sky and overcast conditions, respectively. The results show interesting significant positive (negative) trends under clear-sky (overcast) state. Finally, in order to assess the possible impact of these decadal changes of SSR on surface temperatures, we complete these analyses with the study of the trends in diurnal temperature range (DTR) under different sky states.