



A Revisit of Global Dimming and Brightening Based on Sunshine Duration

Yanyi He, Kaicun Wang, and Chunlue Zhou

College of Global Change and Earth System Science, Beijing Normal University,
Beijing, China (201621490027@mail.bnu.edu.cn)

Observations show that the surface incident solar radiation (R_s) decreased over land from 1950s to 1980s over land and increased thereafter, which is referred to global dimming and brightening. This claim has been questioned due to inhomogeneity and low spatial-temporal coverage of R_s observation. In this study, we shown that sunshine duration (SunDu), which is of higher spatial-temporal coverage and is less sensitive to inhomogeneity issue, can be used to estimate decadal and long-term trend of R_s at approximately 200 paired stations. SunDu-derived R_s at approximately 2600 stations globally confirms a global dimming from 1950s to 1980s (i.e. $-2.0 \text{ W}\cdot\text{m}^{-2}/\text{decade}$ for China, $-1.4 \text{ W}\cdot\text{m}^{-2}/\text{decade}$ for Europe and $-1.1 \text{ W}\cdot\text{m}^{-2}/\text{decade}$ for U.S.) and brightening from 1980s to 2010s (i.e. $2.2 \text{ W}\cdot\text{m}^{-2}/\text{decade}$ for China and $1.5 \text{ W}\cdot\text{m}^{-2}/\text{decade}$ for Europe). Earlier trends in R_s before 1950s are further estimated ($1.5 \text{ W}\cdot\text{m}^{-2}/\text{decade}$ for Europe and $-1.1 \text{ W}\cdot\text{m}^{-2}/\text{decade}$ for U.S.).