



Enlightening Global Dimming and Brightening

M. Wild

ETH Zurich, Institute for Atmospheric and Climate Science, Zurich, Switzerland (martin.wild@env.ethz.ch)

A fundamental determinant of climate and life on our planet is the solar radiation (sunlight) incident at the Earth's surface. Any change in this precious energy source affects our habitats profoundly. Until recently, for simplicity and lack of better knowledge, the amount of solar radiation received at the Earth surface was assumed to be stable over the years. However, there is increasing observational evidence that this quantity undergoes significant multi-decadal variations, which need to be accounted for in discussions of climate change and mitigation strategies. Coherent periods and regions with prevailing declines ("dimming") and inclines ("brightening") in surface solar radiation have been detected in the worldwide observational networks, often in accord with anthropogenic air pollution patterns.

This synthesis paper, recently published in the *Bulletin of the American Meteorological Society*, provides in a nutshell the main characteristics of this phenomenon, a conceptual framework for its causes, and an overview over potential environmental implications. It further points to substantial inter-hemispheric differences in the impact of dimming/brightening on global warming, with a rather polluted Northern hemisphere on the one hand and a relatively pristine Southern hemisphere on the other hand. These differences in the hemispheric warming trends are not fully captured by current climate models, suggesting a lack of dimming and brightening in these models. Latest developments and remaining gaps of knowledge in this rapidly growing field of research are further highlighted.

Reference:

Wild, M. 2012: Enlightening Global Dimming and Brightening. *Bull. Amer. Meteor. Soc.*, 93, 27–37, doi:10.1175/BAMS-D-11-00074.1