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Fade of global dimming reveals full magnitude of greenhouse warming

M. Wild, K. Makowski, and A. Ohmura

Insitut for Atmospheric and Climate Science, ETH Zurich, Universitätsstr 16, CH 8092 Zurich, Switzerland (martin.wild@env.ethz.ch)

Speculations on the impact of variations in surface solar radiation on global warming range from concerns that solar dimming has largely masked the full magnitude of greenhouse warming, to claims that the recent reversal from solar dimming to brightening rather than the greenhouse effect was responsible for the observed warming. To disentangle surface solar and greenhouse influences on global warming, trends in diurnal temperature range are analyzed. The diurnal temperature ranges averaged over global land surfaces show, after decades of decline, a distinct tendency to level off since the mid 1980s. They suggest that solar dimming, possibly caused by increasing air pollution, was effective in masking greenhouse warming, but only up to the 1980s, when dimming gradually transformed into brightening. The reversal from dimming to brightening may be related to more effective air pollution measures and the breakdown of the economy in the former communist countries, leading to cleaner and more transparent atmospheres. With this transition, the uncovered greenhouse effect started to reveal its full dimension, as manifested in a rapid temperature rise (+0.38°C/decade over land since mid-1980s). Recent solar brightening cannot supersede the greenhouse effect as main cause of global warming, since land temperatures increased by 0.8°C from 1960 to 2000, even though solar brightening did not fully outweigh solar dimming within this period.

References:

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