24 April, 2009 **Global Monitoring Division Hot Items**

ESRL Co-Authored Publication Selected as an AGU Journal Highlight

Global Monitoring Division - **ESRL-GMD**
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A 2-3 Wm-2 per decade global decrease in solar radiation reaching the Earth's surface from the 1960s through the early 1990s became known as "global dimming." This decrease was followed by an increase of 6-7 Wm-2 per decade from the 1990s onward and attained the name "global brightening." The switch from dimming to brightening follows in part a decrease in atmospheric aerosol resulting from environmental regulation and decrease in lingering stratospheric aerosols from the 1991 Mt. Pinatubo volcanic eruption. In an AGU Journal Editor's highlighted paper appearing in JGR-A (2009)* data from a 12-station, long-term ESRL and DOE U.S. surface radiation network show that widespread brightening occurred over the continental United States during the last dozen years. That is three times the rate of the previous dimming. The paper suggests that the decrease in aerosols alone cannot explain the enhanced brightening over the U.S. and that decreasing cloudiness plays a significant role.

Background: Much attention has given to studies (2001, 2002 and 2004) that show shortwave radiation at the surface over the Earth decreased from the 1960s through the early 1990s. Unfortunately, these datasets ended just when the brightening began. The state of the art instrumentation used in the current study measured direct, diffuse and spectral solar radiation separating cloud effects from aerosol effects more definitively, and extended the previous data set to the present.

Significance: This study demonstrates that over the past decade shortwave radiation at the surface in the U.S. has increased by up to 8 Wm-2 due to reduction in atmospheric aerosol loadings and decrease in cloudiness. To put this in perspective, increasing greenhouse gases have added 2-3 Wm-2 over the same decade. The study also demonstrates the importance of sophisticated, well maintained, long-term surface radiation measurement networks a point made by the AGU editors in selecting this paper to be highlighted.

*Long, C. N., E. G. Dutton, J. A. Augustine, W. Wiscombe, M. Wild, S. A. McFarlane, and C. J. Flynn (2009), Significant decadal brightening of downwelling shortwave in the continental United States, J. Geophys. Res., 114, D00D06, doi:10.1029/2008JD011263,"

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