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Global Dimming and Brightening: an update beyond 2000

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This study investigates recent variations in downwelling surface solar radiation inferred from a comprehensive set of ground-based observational records updated for the period 2000-2005. Surface radiation data beyond the year 2000 are particularly interesting as they can provide independent and complementary information to the ambitious satellite programs which became operational with the beginning of the new millennium. The surface records suggest a continuation of the upward tendency in surface solar radiation ("brightening") beyond 2000 at numerous stations in Europe and the US, as well as parts of East Asia (Korea). Insolation variations in Europe after 2000 are dominated by a large positive anomaly in the year 2003 with its unprecedented summer heatwave, exceeding 10 Wm-2 on an annual and 20 Wm-2 on a summer mean basis in Central Europe. However, the brightening in Europe remains evident also after eliminating the year 2003 data. The brightening seen at sites in Antarctica during the 1990s, influenced by a recovery from the low atmospheric transparency after the Mount Pinatubo volcanic eruption in 1991, fades after 2000. The brightening tendency also seems to level off at sites in Japan. In China there is some indication for a renewed dimming, after the stabilization in the 1990s. A continuation of the long lasting dimming is also noted at the sites in India. Overall, the available data suggest continuation of the brightening beyond the year 2000 at numerous locations, yet less pronounced and coherent than during the 1990s, with more regions with no clear changes or declines.

Related references:

Wild, M., Trüssel, B., Ohmura, A., Long, C.N. König-Langlo G., Dutton, E.G., and Tsvetkov, A., 2009: Global Dimming and Brightening: an update beyond 2000. J. Geophys. Res., 114, D00D13, doi:10.1029/2008JD011382.

Wild, M., 2009: Global dimming and brightening: A review. J. Geophys. Res. 114, D00D16, doi:10.1029/2008JD011470.