Geophysical Research Abstracts, Vol. 8, 03934, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03934

Decline of solar dimming reveals full extent of global warming

M.Wild

Swiss Federal Institute of Technology, Universitaetsstr. 16, CH-8092 Zurich, Switzerland (martin.wild@env.ethz.ch)

Recent evidence suggests that solar radiation reaching the Earth surface exhibits significant decadal variations, whose effects on global warming are currently disputed. The reported dimming of surface solar radiation, partly attributed to increasing air pollution, lead to concerns that this effect has largely masked the full dimension of greenhouse warming in the past. On the other hand, new evidence for a reversal from solar dimming to brightening since the mid-1980s may lead to speculations that solar brightening rather than the greenhouse effect was responsible for the recent rapid global warming. Here we show that the masking of global warming due to solar dimming was in effect up to the mid-1980s in line with the only marginal temperature increase between the 1960s and 1980s (0.036°C/decade) over land areas. The substantial temperature rise observed over land areas since the mid-1980s (0.38°C/decade) is, however, no longer dampened by solar dimming, but also not substantially enhanced by solar brightening, and thus may be a more genuine reflection of greenhouse warming than in previous decades. These findings are based on an analysis of radiation and temperature records over land surfaces as well as the evolution of the diurnal temperature range, which shows a distinct tendency to level off since the mid-1980s, after decades of decline. The separation of solar and thermal radiative effects on global warming may allow to narrow down the uncertainty in the sensitivity of the climate system to increased levels of greenhouse gases, which to date hampers accurate climate predictions with global climate models.