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The Whitehouse Effect: Shortwave radiative forcing of climate by anthropogenic aerosols

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Loadings of tropospheric aerosols have increased substantially over the past 150 years as a consequence of industrial activities. These aerosols enhance reflection of solar radiation by the earth-atmosphere system both directly, by scattering light and, indirectly, by increasing the reflectivity of clouds. The magnitude of the resultant decrease in absorption of solar radiation is estimated to be comparable on global average to the enhancement in infrared forcing at the tropopause due to increases in concentrations of CO<sub>2</sub> and other greenhouse gases over the same time period. Estimates of the aerosol shortwave forcing are quite uncertain, by more than a factor of two about the current best estimates. At the high end of the uncertainty range the aerosol forcing is comparable to the anthropogenic greenhouse forcing, and substantially greater in industrialized regions. Even at the low end of the range the aerosol forcing cannot be neglected in considerations of influences on climate over the industrial period.