



The climate impact of anthropogenic black carbon: A summary of recent advances

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Human activities annually emit vast amounts of black carbon (BC) to the atmosphere. Recent scientific literature leaves no doubt that these emissions strongly affect the climate, both globally and regionally. Beyond that, however, our knowledge is limited. The amount of emissions is uncertain, as are the optical properties and atmospheric residence time of BC. Its strong shortwave absorption sets it apart from other drivers of climate change, and act to lower its net radiative forcing relative to that from the direct aerosol radiative interaction alone. The temperature response of the climate system to BC sources is also poorly known, as are its impacts on precipitation.

Here we summarize the recent, rapid developments in our understanding of the role of BC in the climate system. We focus on updated emission inventories and constraints placed by recent observations, the ageing of BC particles under various conditions and how this affects its atmospheric residence time, and possible systematic issues with recent studies comparing models to ground and aircraft based observations. We also discuss recent progress in understanding the net radiative forcing of anthropogenic BC emissions, and the resulting impact on surface temperature and precipitation over the industrial era.