The long-term impact of aerosol emissions on photovoltaic power generation in China
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Abstract

Anthropogenic aerosol emissions and changes in cloud cover affect solar radiation in China, with significant impacts on photovoltaic (PV) electricity production. Here we use homogenized observational radiation data between 1960 and 2015 to quantify the impact of changes in solar radiation on PV electricity generation. We find significant trends across China and large reductions in PV generation in densely populated provinces in eastern and southern China, as well as on the Tibetan Plateau. The simultaneous rise in aerosol emissions and decline in surface radiation over the last 50 years suggests that strict air pollution control measures combined with reduced fossil fuel consumption, especially coal in power generation, would let surface radiation increase. We compute PV electricity generation from our radiation dataset to show that reverting back to 1960s radiation levels could yield TWh-scale additional electricity generation benefits.