Radiative forcing of iron oxides from combustion sources

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Combustion aerosols affect the climate by absorbing and scattering radiation. Iron (Fe) oxides emitted from combustion sources largely reside in supermicron aerosols. Fe oxides on aerosols are known to absorb sun light and heat the atmosphere. However, supermicron aerosols from combustion sources are ignored for radiative forcing in climate models. Here, we use a global chemical transport model and a radiative transfer model to estimate the radiative forcing of Fe oxides from combustion sources. The model results suggest that Fe oxides from combustion sources significantly contribute to a warming effect at the top of the atmosphere over the air polluted regions such as China and India as well as biomass burning source regions. However, the estimates strongly depend on chemical speciation of Fe oxides, which is also important for bioavailability. These results suggest comprehensive observations are needed to fully understand the effects of Fe oxides on the net radiative forcing and ecosystems.