

## Atmospheric Processing of Combustion Aerosols as a Source of Soluble Iron to the Open Ocean

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Atmospheric processing of combustion aerosols may promote transformation of insoluble iron into soluble forms. Here, an explicit scheme for iron dissolution of combustion aerosols due to photochemical reactions with inorganic and organic acids in solution is implemented in an atmospheric chemistry transport model to estimate the atmospheric sources of bioavailable iron. The model results suggest that deposition of soluble iron from combustion sources contributes more than 40% of the total soluble iron deposition over significant portions of the open ocean in the Southern Hemisphere. A sensitivity simulation using half the iron dissolution rate for combustion aerosols results in relatively small decreases in soluble iron deposition in the ocean, compared with the large uncertainties associated with iron solubility at emission. More accurate quantification of the soluble iron burdens near the source regions and the open ocean is needed to improve the process-based understanding of the chemical modification of iron-containing minerals.

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