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- CNKI
- DOAJ
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- GBA
- Gale/Cengage
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Impact of a new condensed toluene mechanism on air quality model predictions in the US

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Abstract. A new condensed toluene mechanism is incorporated into the Community Multiscale Air Quality Modeling system. Model simulations are performed using the CB05 chemical mechanism containing the existing (base) and the new toluene mechanism for the western and eastern US for a summer month. With current estimates of tropospheric emission burden, the

new toluene mechanism increases monthly mean daily maximum 8-h ozone by 1.0–3.0 ppbv in Los Angeles, Portland, Seattle, Chicago, Cleveland, northeastern US, and Detroit compared to that with the base toluene chemistry. It reduces model mean bias for ozone at elevated observed ozone concentrations. While the new mechanism increases predicted ozone, it does not enhance ozone production efficiency. A sensitivity study suggests that it can further enhance ozone if elevated toluene emissions are present. While it increases in-cloud secondary organic aerosol substantially, its impact on total fine particle mass concentration is small.

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