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Source apportionment of airborne particulate matter using organic compounds as tracers

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A chemical mass balance receptor model based on organic compounds has been developed that relates source contributions to airborne fine particle mass concentrations. Source contributions to the concentrations of specific organic compounds are revealed as well. The model is applied to four air quality monitoring sites in Southern California using atmospheric organic compound concentration data and source test data collected specifically for the purpose of testing this model. The contributions of up to nine primary particle source types can be separately identified in ambient samples based on this method, and approximately 85% of the organic fine aerosol is assigned to primary sources on an annual average basis. The model provides information on source contributions to fine mass concentrations, fine organic aerosol concentrations and individual organic compound concentrations. The largest primary source contributors to fine particle mass concentrations in Los Angeles are found to include diesel engine exhaust, paved road dust, gasoline powered vehicle exhaust, plus emissions from food cooking and wood smoke with smaller contributions from tire dust, plant fragments, natural gas combustion aerosol, and cigarette smoke. Once these primary aerosol source contributions are added to the secondary sulfates and nitrates present, virtually all of the annual average fine particle mass at Los Angeles area monitoring sites can be assigned to its source origin.

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