# 4.031 Water-soluble diacids and related compounds in PM2.5 aerosols in eastern central India: influence of biomass burning and atmospheric processing.

Early Career Scientist

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Abstract:

Water-soluble organic aerosols are important constituents of fine particles and have been recognized as unique fingerprints to identify atmospheric processes. Fine aerosol samples ($PM_{2.5}$) were collected at a rural site in eastern central India (Ambikapur: 23.12°N and 83.20°E) during March to June 2017. The samples were analyzed for water-soluble dicarboxylic acids ($C_2$-$C_{12}$), glyoxylic acid ($\omega C_2$), glyoxal (Gly) and methylglyoxal (MeGly) as well as organic carbon (OC), elemental carbon (EC) and water-soluble organic carbon (WSOC). Oxalic acid ($C_2$) was detected as the most abundant species followed by succinic and malonic acids. The peak concentrations of $C_2$ and related compounds were observed during early to late April when biomass burning episodes prevailed in eastern central India. Fire images and strong positive correlations of $C_2$ and related compound with levoglucosan (R = 0.83-0.99) suggest that biomass burning is the main source of water-soluble organic aerosols in eastern central India. The mass ratio of malonic to succinic acid suggests a greater contribution of photochemically unprocessed aerosol particles derived from biomass burning over photochemically aged aerosols whereas phthalic to azelaic acid ratios implied the atmospheric processing of unsaturated fatty acids is more significant than that of aromatic hydrocarbons in the atmosphere of eastern central India. Water-soluble organic aerosols derived from biomass burning contribute significantly to the solar radiation balance as they can act as cloud condensation nuclei and may have an impact on the hygroscopic behavior of aerosol particles and the lifetime of clouds in the atmosphere. Intense biomass burning emission and atmospheric processing of biomass burning derived organic precursors in Ambikapur increased the atmospheric burden of water-soluble organic compounds in eastern central India and may affect the regional climate. Biomass burning in this region may also affects the air quality and climate in the outflow region of Indian aerosols.