Size-resolved characterisation of organic atmospheric aerosols collected at Welgegund, South Africa with GCxGC-TOFMS

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Novelty

Two-dimensional gas chromatography with a time-of-flight mass spectrometer (GCxGC-TOFMS) is a powerful instrument used to chemically characterise organic compounds [1]. Size-resolved characterisation and semi-quantification of ambient organic aerosol compounds were performed with a GCxGC-TOFMS for the first time in South Africa.

Results and Discussion

24-hour aerosol samples were collected for one year for three different size ranges at Welgegund – a regional atmospheric monitoring station situated approximately 100 km west from Johannesburg that is impacted by the major pollutant sources in the interior of South Africa (e.g. the megacity, NO_2 hotspot) [2] [3]. A combined total of 1 056 different organic compounds could be tentatively characterised. The largest number of organic compounds tentatively identified was $PM_{2.5-1}$, while this size fraction also had the highest total number of normalised response factors. On average 52%, 26%, 6%, 13% and 3% of species tentatively identified were oxygenated species, hydrocarbons, halogenated compounds, N-containing compounds and S-containing compounds, respectively. Oxygenated compounds were the most abundant species. The major sources of organic compounds measured at Welgegund were considered to be biomass burning and aged air masses moving over the anthropogenically impacted source regions [2] [3].

[1] Welthagen *et al*. (2003) *J. Chromatogr. A* **1019,** 233-249. [2] Tiitta *et al*. (2014) *Atmos. Chem. Phys*. **14,** 1909-1927. [3] Vakkari *et al*. (2014) *Geophys. Res. Lett*. **41,** 2644–2651.