

Atmospheric processes and aerosol sources revealed by carbon isotopes

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Particulate carbonaceous matter (PCM) is a significant contributor to ambient particulate matter originating from intervening sources which contribution is difficult to quantify due to source diversity, chemical complexity of PCM and processes during atmospheric transport.

Carbon isotope analysis of stable and radioactive carbon spun out several techniques for identifying the sources and elucidating processes along atmospheric transport due to the unique isotopic signatures. Three principal sources have been quantified in marine North Atlantic air masses using dual carbon isotope analysis [1]. The technique also identified contribution of marine source in continentally modified air masses during EUCAARI intensive measurement periods at Mace Head on the west coast of Ireland.

Two principal sources have been quantified in an urban environment in Eastern Europe (Vilnius, Lithuania) using stable carbon analysis in size segregated aerosol utilising a cascade impactor [2].

A hypothetical model conceived to describe sea-to-air transfer of oceanic OM was capable of reproducing stable carbon measurements at Amsterdam Island in the Southern Indian Ocean and subsequently linked ocean biology to primary marine aerosol [3]. The hypothetical model suggested that fresh organic matter readily resulted in organic matter enrichment in sea spray particles and likely contained fresh colloidal and nanogel particulate matter.

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- [1] Ceburnis et al. (2011) *Atmos. Chem. Phys.* **11**, 8593–8606. [2] Masalaite et al. (2015) *Atmos. Res.* **158-159**, 1-12.
[3] Ceburnis et al. (2015) *AGU 2015 presentation*.