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Source apportionment of combustion aerosols in South Asia using stable and radiogenic isotopes and molecular markers

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South Asia has a large impact from combustion aerosols which can have serious ramifications for climate forcing in the region. Source apportionment is a valuable tool for estimating contributions to atmospheric particulate matter. By combining d13C and D14C isotope analysis of total organic carbon (TOC), elemental carbon (EC) and soot carbon (SC) with characterization of molecular markers including polycyclic aromatic hydrocarbons (PAHs) and n-alkanes, a more comprehensive picture of regional combustion sources emerges. EC (measured by thermal optical analysis) and SC (chemothermal oxidation) are complementary measurements of light absorbing carbon and were both measured in this study. Particulate matter samples were collected at Sinhagad, India and the Maldives Climate Observatory in Hanimaadhoo during the winter dry seasons of 2006 and 2008. Briefly, fossil fuel combustion accounts for roughly one third of the TOC and SC concentrations in the Maldives and is closer to 40% at an Indian background site based on radiocarbon measurements for both campaigns. Qualitative source apportionment using the molecular weight 228-300 PAHs identified in samples from both sites in the 2006 field campaign will be combined with the quantitative radiocarbon apportionment to further characterize combustion sources in the region.