Aerosol carbon isotopes at Alert, Canada: Understanding emission sources of black carbon transported to the Arctic

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Carbonaceous aerosols, including black carbon (BC), play important roles in Earth's climate system, particularly for the Arctic region. To understand the sources of BC transported to the Arctic, carbonaceous aerosol observations, including elemental carbon (EC) content as BC mass, carbon isotopes as a source tracer, & light absorption coefficient as BC's optical property, are conducted at Alert, Canada (82°27'N, 62°31'W).

Here, nearly a decade of measurements is presented, focusing on the isotope results in EC (the data from Beijing is also shown for the purpose of comparison). Seasonal & interannual variations in $^{13}C/^{12}C$ are observed. Relatively depleted $^{13}C/^{12}C$ values during winter-spring seasons support gas flaring contributions to the BC at Alert. Opposite seasonal patterns in $^{13}C/^{12}C$ at Alert & Beijing suggest that the aerosol BC transported to Alert is not much influenced by the sources from East Asia. Measurements of $^{14}C/^{12}C$, conducted for a sample subset, provide some insight into the relative contribution from fossil fuel and biomass burning.