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Atmospheric lifetime of levoglucosan during transport in the Arctic

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Carbonaceous aerosols are a major driver of climate change, especially in the Arctic. Over the last century, the Arctic has undergone warming at a rate almost twice the global mean, triggering sea ice reduction which enables intensified Arctic oil exploration and commercial shipping. Thorough characterization of these changing aerosol sources, composition and processing will improve aerosol parameterization in Arctic climate models. Atmospheric processing, specifically reaction and oxidation of aerosol components during transport, is difficult to assess. In this study, calculated half-lives for levoglucosan measured at Barrow, AK, USA are used to characterize relative levels of atmospheric processing during wintertime in the Arctic. In the current study, the 14C-based apportioned BC was combined with reported ratios for levoglucosan/BC to calculate $\tau 1/2$ for levoglucosan. This enabled examination of relative atmospheric processing over the Arctic winter; processing will likely increase aerosol hygroscopicity. Ambient measurements during the field campaign reveal that the atmospheric half-lives of levoglucosan were inconsistent in mid to late winter, suggesting variability in atmospheric processing during transport.