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Using ^{14}C , ^{13}C , ^{18}O and ^{17}O isotopic variations to provide insights into the high northern latitude surface CO inventory

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Abstract. Measurements of the complete isotopic composition of atmospheric CO (^{13}CO , ^{14}CO , C^{17}O , C^{18}O) have been carried out at the high northern latitude stations Spitsbergen, Norway, and Alert, Canada. The annual changes of the isotope signatures reflect the seasonally varying contributions from the individual CO sources and the OH sink. Short-term variability is small at the remote sampling locations. Nevertheless, the interannual variability is considerable, in particular for the summer minimum. The most prominent event was a strong increase in CO in 1998 that persisted for several months. Using the isotope signatures it is possible to clearly identify extraordinarily strong biomass burning during that season as the cause for this large-scale CO anomaly. In 1997, on the other hand, biomass burning emissions were very low, leading to an unusually low summer minimum and corresponding isotope signatures. The results underscore that monitoring of CO and its isotopic composition at remote high latitude stations is a valuable tool to better understand long-term variations of CO that are representative for the whole high northern latitude region.

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