P-03

Poster Session Day 1

The use of $\delta^{13}C$ in CO to determine removal of CH_4 by Cl radicals in the atmosphere

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The reaction of CH_4 with chlorine (Cl) radicals in the atmosphere is associated with an extraordinarily strong isotopic fractionation, where $^{12}CH_4$ reacts about 70 ‰ faster with Cl than $^{13}CH_4$. Therefore, although the Cl-based sink of CH_4 constitutes only a small contribution to its total removal rate, the uncertainty in this small sink has been identified as one of the two largest uncertainties of isotope-based CH_4 source apportionment at the global scale. The uncertainty arises from the fact that Cl levels in the atmosphere are so low that they cannot be detected directly. One very sensitive indirect method to identify and quantify the CH_4 + Cl reaction in the atmosphere is the detection of the extremely ^{13}C-depleted reaction product carbon monoxide (CO) from this reaction. This presentation reviews the concept of this approach, its successful application in the atmosphere, its challenges and opportunities for identifying and quantifying Cl-based removal of CH_4 at the regional and global scale and its potential to detect and evaluate possible attempts to enhance CH_4 removal from the atmosphere.