Isotopic Tracers of Microbial Processes in Methane Cycling. (S10-chanton105844-Oral)

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Abstract:

Recently several studies have questioned the idea that variation in methane production mechanisms can cause variations in the D isotopic composition of methane. We report an antipathetic variation in delD and del-13C from boreal, temperate and tropical wetlands. Within both Minnesota and Alberta boreal wetlands, both delD and del-13C of methane are similar in bogs and at depth in fens and different from methane found in the surficial zone of fens. The patterns observed are consistent with acetate fermentation being of greater importance in the surficial zones of both fens, while CO2 reduction appears to be of greater importance at depth in the fens and within the bogs. These data do not fall on a single line due to latitudinal variations in the pore water delD content. The following sites also yield this robust pattern: data from depth variation in an Ontario Typha marsh (Hornibrook et al., 1997), spatial variation across the Everglades (Burke et al., 1988a), a seasonally varying marine sediment (Cape Lookout Bight, Burke et al. 1988b) and data across a tropical floodplain (Smith et al, 2000). The slopes of the lines fit to CH4 delD plotted versus del-13C vary from -3.1 to -6.6 with a mean of -4.5 +/- 1.2, n = 6. Natural abundance radiocarbon data will be presented which are consistent with our interpretations.

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