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A δ^{13}C record of paleoatmospheric CH_4 from 75-95 kyr before present

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We analyzed the carbon isotopic composition of CH_4 in ice core samples and present a record that covers the time between 75 and 95 kyr before present, which is marked by strong variations in temperature and CH_4 mixing ratio. We observe a strong variability in δ^{13}C-CH_4 of 3.5 ‰ throughout the study period. Between 75 and 85 kyr before present, the δ^{13}C-CH_4 varies while also the CH_4 mixing ratio shows a strong change over Dansgaard-Oeschger event (DO) 21. In contrast, the CH_4 mixing ratio varies little during DO 22 and is rather stable between 90 and 95 kyr before present while the δ^{13}C-CH_4 exhibits a strong variability of 3.5 ‰. The variability of δ^{13}C-CH_4 is therefore not necessarily controlled by changes in the CH_4 mixing ratio. It has been observed that the δ^{13}C-CH_4 is largely correlated with the CO_2 mixing ratio and the global ice volume/relative sea level change (Hubertus Fischer, pers. comm. 2012). We will discuss possible reasons for the link between these parameters which suggest that fully coupled climate models are needed to accurately disaggregate the sink and source partitioning.