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What caused the glacial/interglacial CH_4 changes? Carbon isotopic constraints on methane sources from the EDML ice core

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The glacial/interglacial changes in atmospheric methane concentrations are characterized by a strong increase from 350 ppbv during the Last Glacial Maximum (LGM) to values as high as 700 ppbv during the early and late Holocene . In addition global atmospheric CH_4 concentrations change in phase with rapid climate variations in the North Atlantic region during last glacial period and show a pronounced local minimum during the Holocene Climate optimum. With tropical and boreal wetlands, living biomass (both plants as well as animals) as well as biomass burning all contributing to the atmospheric CH_4 level, an unambiguous source attribution remains difficult. Carbon (and hydrogen) isotopic studies on CH_4 in ice cores may allow to narrow down the impact and amplitude of individual CH_4 source changes. Here we present first preliminary $\delta^{13}CH_4$ data from the EPICA (European Project for Ice Coring in Antarctica) ice core drilled in Dronning Maud Land (EDML). Using a simple box model of the global atmosphere driven by source emissions in a forward Monte Carlo mode we are able to constrain the potential changes for individual CH_4 sources in the past.