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Continuous Methane Concentration Measurements along the NEEM Core

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Since the early 1980's methane concentrations are measured from ice cores. Air is extracted from individual ice samples by dry or wet extraction techniques and traditionally measured by gas chromatography. Over the past decades a CH4 record has been achieved with sample resolutions of down to decades and typical uncertainties of $\pm$10 ppbv. Methane variations on time scales of decades to millennia show important correlations with climate proxies in ice cores, with remarkable correspondence between stable isotope records from Greenland ice cores and methane concentrations during the last ice age.
Recent developments allow measurements of CH4 concentration directly on the drill site with very high resolution. We coupled two optical instruments and one gas chromatograph to the continuous flow analysis (CFA) system used to analyze the NEEM (NW Greenland) ice core. The air in the CFA melt stream is extracted with a hydrophobic membrane unit, dried, and routed through the three systems in series. We present the first continuous measurements from the NEEM core with an unprecedented resolution. We will focus on the last glacial interglacial transition also comparing the on line data with a high resolution off line record from the same ice core.