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**Methane Discharge at High Northern Latitudes: Past and Present**

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Climate is intimately tied to Earth’s hydro- and cryo-spheres. To understand the consequences that predicted global warming can have on biogeochemical cycling and mass inventories in the Arctic Ocean, I will present results on two study sites: the Svalbard margin and the Chukchi Sea, that provide information on present-day methane discharge and evidence for the likelihood that groundwater flow during the Early Holocene Thermal Maximum (EHTM). I will review how data collected in the water column and shallow sediment can be used to constrain sources, transport, transformation and timing of methane fluxes, including the potential role of gas hydrate dissociation. Specifically I will discuss the concentration and isotopic composition of various dissolved species and modeling approaches that are valuable to interpret these data in the context of geophysical surveys.