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Gas Hydrate Mounds in the Eastern Slope of the Chukchi Basin, Arctic Ocean: Indicators of Methane-rich Focused Fluid Flow

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While the origin and distribution vary across geological conditions, there have been numerous reports on the occurrence of natural gas hydrate in the continental margins over the world ocean. However, *in situ* gas hydrate in the Chukchi Basin has not yet been found despite a favorable condition for its occurrence. Here we document, for the first time, the discovery of mound morphologies containing gas hydrate as well as methane-derived authigenic carbonate (MDAC) in the Chukchi Basin obtained during the IBRV Araon Expedition ARA07C in 2016. We analyzed high-resolution multibeam and sub-bottom profiler images, and radioactive isotopes ($\delta^{13}C_{CH4}$, δD_{CH4}) of gases from both the retrieved cores and dissociated hydrate to unravel the origin of the mounds. The mounds were found solitarily along certain water depth intervals and characterized by a circular shape, sizing up to tens of meters in width and a few meters in height. Acoustic turbidity is common below thin hemipelagic sediment layer, indicative of shallow accumulation of gas. The isotopic signatures suggest that thermogenic methane may migrate to the shallow depth although its migration pathway cannot be clarified. Our findings bring new insight on the occurrence of gas hydrate mounds in the Chukchi Basin, and their development linked to methane-rich focused fluid flow from deep. We will further investigate microbial characterization from the MDAC with analyses of the lipid marker and 16s rRNA to demonstrate methane flux variation with geological time.