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Estimation of the Hydrate Gas Content of the Bush Hill Vent Site, Green Canyon Block 185, Gulf of Mexico

The Bush Hill vent is fed by gases from the nearby Jolliet field. The fraction of gas precipitated as hydrate is estimated by adjusting the rate constant of a linear kinetic model so that Jolliet reservoir gas is shifted to the composition of vent gas samples. On average this indicates that about 9% of the vent gas is precipitated as hydrate under the Bush Hill vent. A fairly uniform profile of total hydrate precipitation with depth is predicted. From this profile and estimates of the near-surface hydrate accumulation we infer that the total hydrate gas contained in the fault system that feeds Bush Hill is $\sim 1.3 \times 10^9$ m³, about 1/3 the volume of gas stored (152 Bcf) in the Jolliet Reservoirs. The Bush Hill mound is $\sim 10,000$ years old, as are the faults that trap the Jolliet gases. With 9% of the gas precipitating as hydrate, the gas venting rate has therefore been $\sim 10^6$ m³/year over the last 10,000 years. This estimate is reasonable in the context of other kinds of data. The range in hydrate compositions is predicted to decrease to match the variability in source gas composition where hydrates first begin to precipitate. This could be tested by drilling. Based on 10 years of submersible research and analysis of 3D seismic data, thermogenic hydrate accumulations similar that at Bush Hill should be scattered across the upper and middle continental shelf. Hydrate accumulations in fractures and faults in the Gulf of Mexico could therefore be a substantial resource.