

### Carbon dioxide sequestration in the natural gas hydrate sediments

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A huge amount of CH<sub>4</sub> and other natural gases in the form of solid clathrate hydrates are stored under deep sea and permafrost regions. Marine NGH deposits consist of four main geological conditions: massive NGH, NGH-bearing sediments, water-saturated sediments, and gas-saturated sediments. For NGH production temperature, pressure and chemical variables can be introduced via thermal stimulation, depressurization and inhibitor. Serious concerns about geological and environmental damages arise from adopting such conventional NGH recovery concepts to deep marine sediments. NGH can be converted into CO<sub>2</sub> hydrate, serving double duty as energy source extraction and greenhouse gas sequestration. In particular, we have paid little attention to the clay portion in deep sea gas hydrate sediments that store a tremendous amount of NGH. Here, we first suggest the use of carbon dioxide and nitrogen mixture to pull out methane from more strongly intercalated methane hydrates in clay interlayer. Further, this injected gaseous mixture eliminates the requirement of CO<sub>2</sub> separation/purification. The preliminary findings of this study are expected to provide the physicochemical background required for developing a promising large-scale NGH production approach.