Resturcturring Methane Hydrates in Clay Sediments : Role of Interlayer Ions

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Natural methane hydrates occurring in deep-sea clay sediments exhibit peculiar phase behavior such as high complexity, particularly in the negatively-charged interlayer region. The real clay-interlayer effect on natural methane hydrate formation and stability still remains unknown. In this study we for the first time present experimental evidences regarding the occurrence of methane hydrate structure with high complexity and abnormal methane popularity established in the deep-sea floor clay sediments(intercalation behavior). The present findings reveal few noteworthy features. First, the natural methane hydrate sediments can be discovered at shallower regions compared to the expected depth for stability. Second, the genuine methane amount in the deposits should be reevaluated via a geochemical clay analysis, significantly leading to 10-12 % methane reduction. Third, this research outcome greatly implies that the ionic methane hydrate structure should be seriously taken into account for developing the in-situ methane production technologies from the deep-ocean sediments.