Jørgensen, B.B., D'Hondt, S.L., Miller, D.J. (Eds.)
*Proceedings of the Ocean Drilling Program, Scientific Results* Volume 201

# Determination of In Situ Methane Based on Analysis of Void Gas[1]

Arthur J. Spivack,[2] Craig McNeil,[2] Nils G. Holm,[3] and Kai-Uwe Hinrichs[4]

## ABSTRACT

A method for quantifying in situ dissolved methane concentrations in sediment cores that have gas voids is described. The method relies on normalizing methane ($CH_4$) in the gas voids to nitrogen ($N_2$) and/or argon (Ar). The principles of the method are presented. The method was tested during Ocean Drilling Program Leg 201, and preliminary results indicate that it can be used to generate reproducible and accurate dissolved methane values if argon and nitrogen are both measured or if one is measured along with pressure of the gas void.

## INTRODUCTION

Methane ($CH_4$) is a major product of subseafloor microbial metabolic activity, and quantification of its abundance in sediments is necessary to understand subseafloor biology and biogeochemistry (Martens and Berner, 1974). However, often it is not possible to accurately determine in situ abundances by the standard technique of sediment headspace analysis (Kvenvolden and McDonald, 1986). This problem occurs when gas voids form during core retrieval and sampling, stripping $CH_4$ from the pore fluid. The formation of gas voids can occur when the total gas pressure exceeds the confining pressure within the core liner. Thus, as confining pressure decreases during core retrieval and sampling, gas voids and bubbles commonly collect within the liners of cores recovered from sediments with high $CH_4$ concentrations. The pressure core

[1]Spivack, A.J., McNeil, C., Holm, N.G., and Hinrichs, K.-U., 2006. Determination of in situ methane based on analysis of void gas. *In* Jørgensen, B.B., D'Hondt, S.L., Miller, D.J. (Eds.), *Proc. ODP, Sci. Results,* 201, 1–11 [Online]. Available from World Wide Web: <http://www-odp.tamu.edu/publications/201_SR/VOLUME/CHAPTERS/119.PDF>. [Cited YYYY-MM-DD]
[2]NASA Astrobiology Institute, Graduate School of Oceanography, University of Rhode Island, Narragansett RI 02882, USA. spivack@gso.uri.edu
[3]Department of Geology and Geochemistry, Stockholm University, 10691 Stockholm, Sweden.
[4]DFG-Research Center Ocean Margins, Department of Geosciences, University of Bremen, P.O. Box 330440, 28334 Bremen, Germany.

Initial receipt: 18 January 2005
Acceptance: 1 February 2006
Web publication: 10 July 2006
Ms 201SR-119