

Author's Accepted Manuscript

A significant methane source over the Chukchi Sea shelf and its sources

Yuhong Li, Liyang Zhan, Jiexia Zhang, Liqi Chen, Jianfang Chen, Yanpei Zhuang



www.elsevier.com/locate/csr

PII: S0278-4343(17)30363-1
DOI: <http://dx.doi.org/10.1016/j.csr.2017.08.019>
Reference: CSR3661

To appear in: *Continental Shelf Research*

Received date: 11 July 2017
Revised date: 24 August 2017
Accepted date: 29 August 2017

Cite this article as: Yuhong Li, Liyang Zhan, Jiexia Zhang, Liqi Chen, Jianfang Chen and Yanpei Zhuang, A significant methane source over the Chukchi Sea shelf and its sources, *Continental Shelf Research*, <http://dx.doi.org/10.1016/j.csr.2017.08.019>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A significant methane source over the Chukchi Sea shelf and its sources

Yuhong Li¹, Liyang Zhan^{1*}, Jiexia Zhang¹, Liqi Chen¹, Jianfang Chen², Yanpei Zhuang²

¹Key Laboratory of Global Change and Marine-Atmospheric Chemistry, Third Institute of Oceanography, State Oceanic Administration, Xiamen, China;

²Laboratory of Marine Ecosystem and Biogeochemistry, Second Institute of Oceanography, State Oceanic Administration, Hangzhou, China

*Correspondence to: L. Zhan, zhanliyang@tio.org.cn

Abstract

Dissolved methane (CH₄) was measured at various depths in the western Arctic Ocean. The CH₄ concentrations at the surface show an increasing trend northward toward stations at the shelf break and a decreasing trend toward stations in the Canada Basin. The mean sea-to-air flux is estimated to be 10.08 μmol/m²/d, indicates that the Chukchi Sea shelf (CSS) is an active site of CH₄. Methane concentrations at the shelf stations increase from the surface to the bottom, and the maximum nutrient concentrations occur in the bottom layer. Strong correlations exist between CH₄ and PO₄³⁻, SiO₄²⁻, or NO₂⁻, suggesting that the production of CH₄ is likely related to the degradation of organic matter in the sediment, supporting a biogenic source. At the slope and basin stations, the maximum values were observed in the subsurface of the upper halocline layer (UHL), and the concentrations decrease with increasing depth. The CH₄ concentrations are elevated by ~7.9 nmol/L in the UHL compared with the homogeneous CH₄ concentrations observed in the deep water. The elevated values in the UHL result primarily from northward spreading of CH₄-rich water from the shelf. A mass balance model was used to calculate the CH₄ budget in the CSS. The results show that effluxes of CH₄ from the sediment-water interface and the in situ production of CH₄ represent the major sources of CH₄ over the CSS (95%). The main outputs for CH₄ in the CSS are the sea-to-air flux and oxidation of CH₄ in the water column, which account for 95% of the CH₄ exports.

Keywords: methane; Chukchi Sea Shelf; sea-to-air flux; biogenic source; box model; sediment emission

Download English Version:

<https://daneshyari.com/en/article/5764535>

Download Persian Version:

<https://daneshyari.com/article/5764535>

[Daneshyari.com](https://daneshyari.com)