

Interactive  
Comment

***Interactive comment on “***

**Carbon isotopes and lipid biomarker investigation  
of sources, transport and degradation of  
terrestrial organic matter in the Buor-Khaya Bay,  
SE Laptev Sea” by E. S. Karlsson et al.**

**A. Vetrov (Referee)**

vetrov@ocean.ru

Received and published: 14 April 2011

GENERAL COMMENTS Interesting paper and very interesting region of investigations. The work is devoted to study of peculiarities of sedimentogenesis of organic matter (OM) supplied to the sea from different sources. This work is of particularly interest to development of the method of OM genesis assessment by of organic-geochemical

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



indicators in the case of multiple OM sources. From this point of view the Buor-Khaya Bay is unique region due to power inflow of river water supplied by one of biggest river of the East Siberia, intensive process of coastal abrasion (the coast retreats up to 11 m/yr), and high primary production at research period (August–September, 200–800 mg C m<sup>-2</sup> day<sup>-1</sup>; Sorokin et al., 1993; Vetrov et al., 2008). The total supply of Corg to the Buor-Khaya Bay is so big, that in some years anoxic conditions arise in the bottom depressions bringing to death of benthic animals (Gukov et al., Oceanology, 1999). These conditions arise due to oxygen consumption for OM degradation and a clearly pronounced density stratification. This process of degradation of OM also was a subject of consideration. Complex approach was used to investigate sedimentation including assessment of genesis as SOC as POC, dependence of their composition on seaward expansion, a comparison of SOC composition with POC one. General difficulty in the estimation of the ratio of OM fraction from different sources in samples arise over the selection of value of organic-geochemical indicators (here isotopic composition) of concrete sources, which often impossible to measure for some reason or other. Authors considered characteristic values of organic-geochemical indicators of the sources in similar environment conditions and fulfilled statistical analysis of the material. As a result not only the contributions of different sources (phytoplankton, river runoff, coastal abrasion) to SOC and POC were estimated, but also behavior of different origin OM in sedimentogenesis was revealed. It was found, that OM of yedoma permafrost, coating on mineral particles, more rapidly settles to seafloor than river OM. As a result POC is depleted by this fraction in the seaward way. An assessment of OM degradation rate by the n-alkanoic acids / n-alkanes ratio showed that degradation of OM mainly is realized in water column, therefore yedoma-OM, which more rapidly reaches seafloor, less undergoes degradation in the anoxic conditions than river OM, that was confirmed by chemical analysis. Thus, authors come to the conclusion, that yedoma- and river(soil)- OM may represent different propensities to contribute to a positive feedback to climate warming by converting OC into CO<sub>2</sub>.

## SPECIFIC COMMENTS

C570

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

1. As remark could be noted, that authors don't try to estimate fractions of OM from different sources by percent of HMW n-alkanes in OM to compare that results with results obtained with isotopes consideration.

2. Page 3474, line 23 and further pages: To my mind it is incorrect to use "depleted d13C" as it is shift, it is better to use "depleted 13C".

3. Page 3469, line 11: As a rule filtration on GFF are performed by gravity with difference of levels about 2-2.5 m. As vacuum filtration was used, it is necessary to mention a value of vacuum.

## TECHNICAL CORRECTIONS

In References:

there isn't (Semiletov, 1999a, b), there is only (Semiletov, 1999);

there isn't (Semiletov et al., 2005);

page 3466, line 23: (Grigoryev, 2000) replace to (Grigoryev and Kunitsky, 2000);

there isn't (Jakobsson et al., 2004), but there is (Jakobsson et al., 2008);

there isn't (van Dongen et al., 2008a), but there are two (van Dongen et al., 2008);

there isn't (van Dongen et al., 2008b), but there are two (van Dongen et al., 2008);

there isn't (Vonk et al. 2010a,b), but there are two (Vonk et al. 2010);

there isn't (Rachold et al., 1999), there is (Rachold et al., 2000);

there isn't (Macdonald et al., 2006);

there isn't (Mayer, 1994a, b), but there are two (Mayer, 1994).

---

Interactive comment on Biogeosciences Discuss., 8, 3463, 2011.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)