Geophysical Research Abstracts
Vol. 14, EGU2012-11054, 2012
EGU General Assembly 2012


# Combined molecular biomarker – microbial incubation approach to investigate organic matter mineralization in the East Siberian Shelf Sea sediments

E. Karlsson (1), V. Brüchert (2), A. Charkin (3), O. Dudarev (3), I. Semiletov (3,4), and Ö. Gustafsson (1)

(1) Stockholm University, Applied Environmental Science (ITM), Stockholm, Sweden (emma.karlsson@itm.su.se), (2) Stockholm University, Department of Geological Sciences (IGV), Stockholm, Sweden., (3) Pacific Oceanological Institute, Russian Academy of Sciences, Vladivostok, Russia, (4) International Arctic Research Center, University Alaska Fairbanks, Fairbanks, AK, USA

The largest continental shelf in the world –The East Siberian Shelf (ESS) – receives substantial inputs of terrestrial organic matter (terrOM) both from the large Russian rivers and from coastal erosion. Previous studies of the molecular-isotopic composition of terrOM received by Arctic coastal waters have suggested a different propensity of terrestrial source materials towards bacterial degradation. We addressed this issue by comparing lipid biomarker patterns, specific mineral surface area with laboratory-derived microbial degradation rates. We selected surface sediments of varying degradation state from the Kolyma Paleoriver transect in the ESS and the river Lena outlet/erosion hot spot Buor-Khaya Bay in the southeastern Laptev Sea for aerobic and anaerobic degradation experiments. Degradation rates were calculated from formation rates of evolving $CO_2$ from a total of eleven stations. The anaerobic degradation rates corresponded well to biomarker-based degradation state proxies. Rates of anaerobic degradation were highest were the terrOM was least degraded as indicated by high HMW n-alkanoic acid/HMW n-alkane levels and high n-alkane CPI – carbon preference index and where the terrestrial signal was strongest as indicated by high HMW/LMW n-alkanes. Generally, anaerobic degradation rates were lower in Buor-Khaya Bay sediments than in offshore Kolyma sediments. Aerobic degradation rates were higher than the anaerobic rates, but were poorly correlated with the lipid degradation state indicators. Organic carbon content over specific surface area (OC:SA) values were similar to or high compared to other continental margin sediments, with ranges of 0.36-0.96 off Kolyma and 0.69 to 2.15 in SE Laptev Sea. The good correlation between the lipid biomarker degradation index and anaerobic degradation rates suggest a dependence of the degradation rate by the lipid substrate state. By contrast, aerobic mineralization readily degrades other compounds and would thus not be directly related to the amount of available undegraded n-alkanes. This comparison of molecular analysis and degradation rate measurement suggest that the terrOM lipid content is an important source for the anaerobic degradation in the surface sediments from the East Siberian Shelf.