Transport of terrestrial organic compounds to coastal zone by the East Japan Earthquake in 2011

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Background

Large amounts of terrestrial materials, including natural and anthropogenic compounds, were supplied to coastal zone through the tsunami caused by the East Japan earthquake in 2011. The object of the study is to investigate transport mechanisms of anthropogenic organic compounds by the tsunami using lignin as a marker of the terrestrial organic compounds. The sediment samples were collected from the coastal area off and in Otsuchi Bay in 2012-2014.

z 142°0	0′ 142	2°10′	142°20'	142	°,30′	142°40'	142	°50' E
St. 8 St. 2 OT3 OT3-3 St. 6 OT4				OT5				от6
og Otsuchi Bay						0	15 	30 km
Figure 1: Sampling locations of sediment samples.								
0	S t. 8	St.6	S t. 4	St.2	0 T 3	0 T 4	0 T 5	0 T 6
anthopogen ic organ ic com pounds (ng/g-dw)								
ΣPCBs	5.5	2.0	0.71	2.3	1.9	0.35	1.6	1.7
ΣLABs	59	12	1.5	16	5.4	0.0	1.8	1.3
∑PAHs	3100	2400	1000	3000	2300	140	360	340
∑hopanes	510	330	90	330	330	60	240	190
Lign in phenols								
Σ8 (µg/g-dw)	1200	510	170	700	580	68	130	110
∧8 (m g/100m g)	3.6	2.3	2.8	3.2	2.8	1.5	0.45	0.42

 Table 1: Concentrations of anthrpogenic organic compounds and Lignin phenols in surface sediments of each location.

Results and Discussions

The concentrations of lignin phenols (Σ 8) in OT4-OT6 were lower than that in the bay and OT3. Anthoropogenic organic compounds showed similar spatial trend to lignin phenols. These indicate that tsunami-induced offshore transport of terrestrial organic compounds reached to at least OT3. It is supported by decrease in δ^{13} C in sediment at OT3 from -22.5 ‰ in 1989 [1] to -25.0 ‰ in 2012.

[1] Ishiwatari et al.(2009) 24th International Meeting on Organic Geochemistry (P-238)