### Concentrations and compositions of aliphatic and polycyclic hydrocarbons in bottom sediments of the offshore Sakhalin island

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Bottom sediments accumulates the results of long term biochemical processes and unlike water that characterize seasonal or even casual effects for the studied area, the data get from the bottom sediments study gives us the true ecological picture of the Sea



## Analysis

analyses were performed on GCMSOP5050A (Schimadzu), than included chromatograph Varian 3400.

**Concentrations and compo**sitions of the aliphatic hydrocarbons (AHC) and polyciclic aromatic hydrocarbons (PAH) in surface sediments of Sakhalin Island shelf were studied in years 1994 and 2002.

#### The hydrocarbons' content and composition in the upper layer of bottom sediments in the Sakhalin island's shelf (1994)

Area	C <sub>organic</sub>		Aliphatic hydrocarbons			Polyaromatic hydrocarbons		
	x*	interval	concentration, mkg/g		% of C	concentration, mkg/g		% of
			х*	interval	<b>X</b> 10 <sup>-1</sup>	х*	interval	10 <sup>-4</sup>
Sakha- lin bay	0.25	0.09-1.56	7.5	3.5-20.5	3	2.1	0.5-10.3	0.9
Lozin	0.06	0.03-0.12	3.0	1.0-7.6	5	1.8	1.5-3.9	3.2
Bautin	0.10	0.06-0.14	3.4	2.0-6.2	3	2.1	1.6-3.1	2.1

# The hydrocarbons' content and composition in the upper layer of bottom sediments in the Sakhalin island's shelf (2002)

Area	C <sub>organic</sub>		Aliphatic hydrocarbons			Polyaromatic hydrocarbons		
	х*	interval	concentration, mkg/g		% of C <sub>arc</sub>	concentration, mkg/g		% of C <sub>ora</sub> x
			Х*	interval	<b>X</b> 10 <sup>-1</sup>	х*	interval	10 <sup>-4</sup>
All sampl- es	0.39	0.03-1.85	19.5	3.4-89.9	0.50	15.8	3.1-58.7	3.1
silts	1.07	0.59-1.89	29.5	11.9-89.9	0.28	34.7	15.9-58.7	3.2
sands	0.12	0.03-0.32	16.4	3.4-54.4	1.23	13.1	3.1-33.4	10.9

### It was shown that concentrations of hydrocarbons changed a little comparing with previous years: **1994 - C<sub>org</sub> - 0.03-0.14%;** AHC - 1.0-10 ppm; **PAH – 0.4-10 ppb**; 2002 - C<sub>org</sub> - 0.03-1.85%; AHC - 3.4-89.9 ppm; PAH = 3.1-58.7 ppb.

The higher AHC and PAH concentration found in offshore sediments of the Sakhalin Island in 2002, as compared with those in 1994, are most likely related to the different lithological types of analyzed sediments, because hydrocarbon concentrations (5.4 times, on average) simultaneously increase with changes in Corg contents (6.5 times, on average).



### THE QUANTITY OF THE HYDROCARBON ATOMS

The alcane's distribution in Sakhalin shelf's bottom sediments. 1 – transformed allochthonic 2 – indigenously allochthonic 3 – transformed oil

**Biogenic sources are mainly** responsible for the AHC concentration in muddy sediments (50 ppm) and coarse-grained fractions (3-7 ppm). Their concentrations in the analyzed samples do not exceed these background values.

Hydrocarbons are dominated by allochthonous natural components, which are more stable among the AHCs. At the same time, the presence of transformed anthropogenic petroleum alcanes, which were not detected previously, implies increased pollution related to intensified economic activity in the area under consideration.

At the same time, the presence of transformed anthropogenic petroleum alcanes, which were not detected previously, implies the increased pollution related to the intensified economic activity in the area of the oil and gas development.

The composition of hydrocarbons in bottom sediments reflects their differentiation during sedimentation, i.e., sorption and biotransformation rather than genesis of initial organic matter. Therefore, the composition of alcanes in bottom sediments and that of the spilled oil differ from each other.

In conclusion, it should be noticed that the lithological type of sediments and natural geochemical background of hydrocarbons (concentration of hydrocarbons and their composition) should be taken into the consideration when interpreting data on oil pollution in bottom sediments.

This is of principal importance when estimating the results of ecological monitoring in areas of marine oil and gas deposits where petroleum hydrocarbons of both natural and anthropogenic origin can occur.