Caution

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“Monitoring of ecological conditions of the Far East Seas”

- Evgeny Karasev ekarasev@ferhri.ru

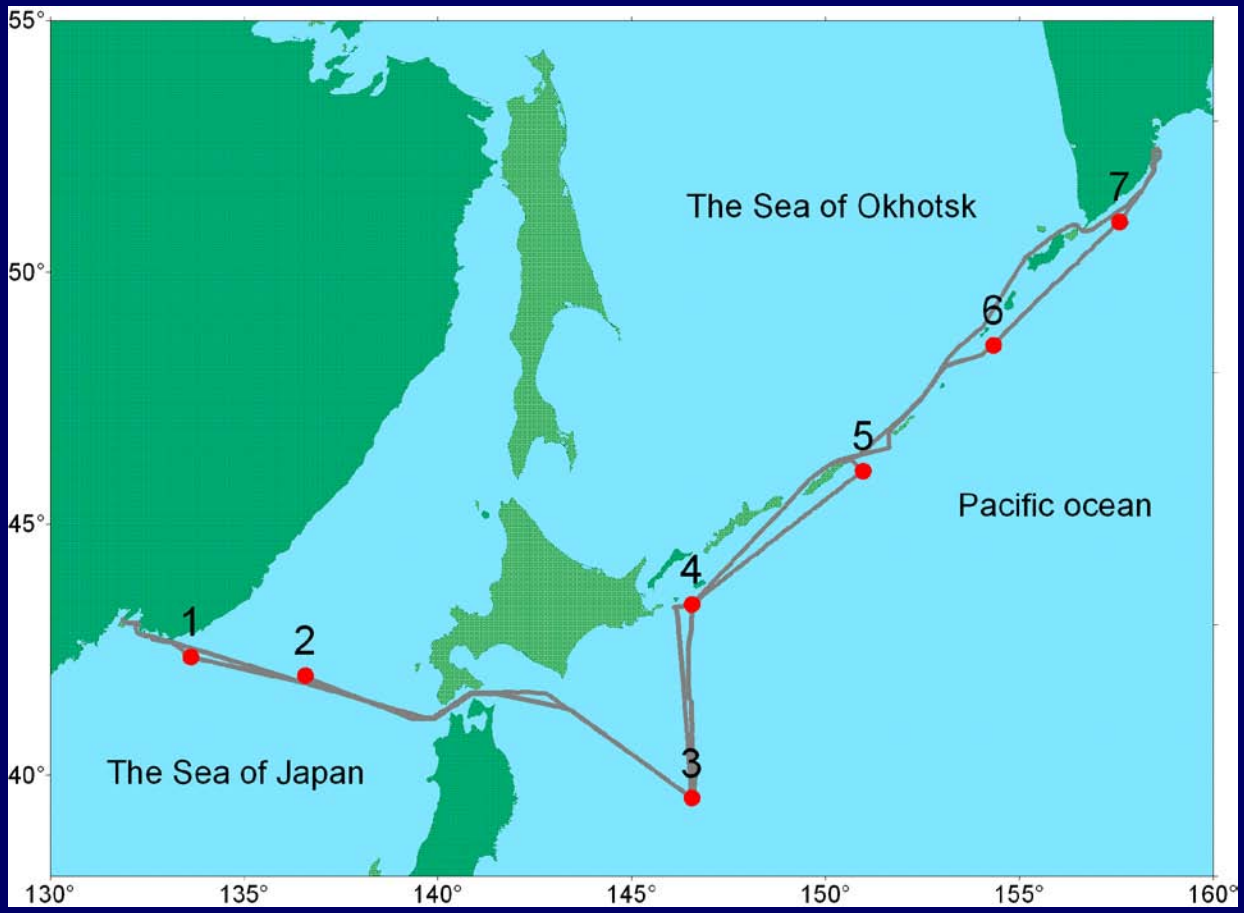
FERHRI

Far Eastern Regional Hydrometeorology Research Institute (FERHRI)

- Under the National Regulation, the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet) carries out the national ecological, including radioactive, monitoring of the continental shelf and the state of exclusive economic zones of the Russian Federation.
- In accordance with the policy of Roshydromet, and in connection with the accident at Fukushima-1 nuclear plant, several vessel-based surveys were made with the Pavel Gordienko and Mirage, the research vessels, to assess the radioactive contamination of the air and water in the coastal area of The Japan and Okhotsk Seas.
- The specialists of Roshydromet and other National Organizations of the Russian Federation took part in the surveys. The main objective of the research was sampling of the sea water and air for in situ vessel-based and subsequent shore-based radionuclide analysis.

ДВНИГМИ

1. Results of Monitoring



The route of survey done by the Pavel Gordienko, in April-May 2011
(under patronage of the Russian Geographic Society)

ДВНИГМИ

1.1. April–May, 2011

- The dose rate of gamma-radiation on the surface of the sea water during the survey was in the range of 0.03-0.08 μSv/h, with an average of 0.07 μSv/h, which is less than the typical values in Russia and equal to 0.10-0.12 μSv/h above land surface.
- The presence of ^{131}I, ^{134}Cs and ^{137}Cs (the main gamma emitters of emissions at Fukushima-1 nuclear plant) in the samples of atmospheric aerosols was detected only near the coast of Japan (during crossing of the Tsugaru Strait and in the north-western part of the Pacific Ocean in front of Hokkaido Island).
- Maximal values of the radioactive decay registered were equal to $4 \cdot 10^{-4}$ Bq/m^3 for ^{131}I, $29 \cdot 10^{-4}$ Bq/m^3 for ^{134}Cs and $32 \cdot 10^{-4}$ Bq/m^3 for ^{137}Cs, which are more than 10,000 times less than the standards effective in Russia (7.3 Bq/m^3 for ^{131}I, ^{134}Cs for 19 Bq/m^3 and 27 Bq/m^3 for ^{137}Cs).

1.2 . April–May, 2011

- ^{134}Cs and ^{137}Cs were found in the sea water in all points of sampling.
- The highest values of radioactive decay of ^{134}Cs and ^{137}Cs in the sea water were in the range of 20-30 Bq/m^3 and were found in the north-western part of the Pacific Ocean on the northern boundary of the Kuroshio Current, approximately in 400 kilometres from the accident-related nuclear plant.
- The results of measurements on board showed the penetration of products of the accident at Fukushima-1 nuclear plant into deep layers of the sea (50-100 m).
- The contents of radionuclide in the sea water are not standardized in the Russian Federation. The maximal recorded values of the radioactive decay of cesium radionuclides in the sea water were compared with the levels of intervention in drinking water (11,000 Bq/m^3 for ^{137}Cs and 7,200 Bq/m^3 for ^{134}Cs). The maximal values of radioactive cesium isotopes in the sea water registered in the coastal areas of the Far East of Russia were about a thousand times below the levels of intervention.

2. Results of Monitoring

The route of surveys done by the Pavel Gordienko in June and the Mirage in July 2011

ДВНИГМИ

2.1. Results of Monitoring on the shelf of Sakhalin

The concentrations of anthropogenic radionuclide ^{90}Sr and ^{137}Cs in the surface layer of water on the shelf of Sakhalin in The Sea of Okhotsk 1994-2011.

Year	Radionuclide, Bq/m^3	
	^{90}**Sr**	^{137}**Cs**
1994−2004	0.96±0.21	1. 5±0.4
2009	0.97±0.12	1.4±0.2
2011	1.04±0.20	1.3±0.4

^{90}Sr was within the range of 0.82-1.2 Bq/m^3, ^{137}Cs was within 1.0-1.8 Bq/m^3. The concentrations of artificial radionuclide ^{90}Sr and ^{137}Cs in the surface water in The Okhotsk Sea in 2011 were well matched with the analysis data of previous years shown in the table.

2.2. Results of Monitoring on the shelf of Sakhalin

The concentrations of anthropogenic radionuclide ^{137}Cs in the surface bottom sediments in the shelf of Sakhalin Island in The Sea of Okhotsk in 2009 and 2011.

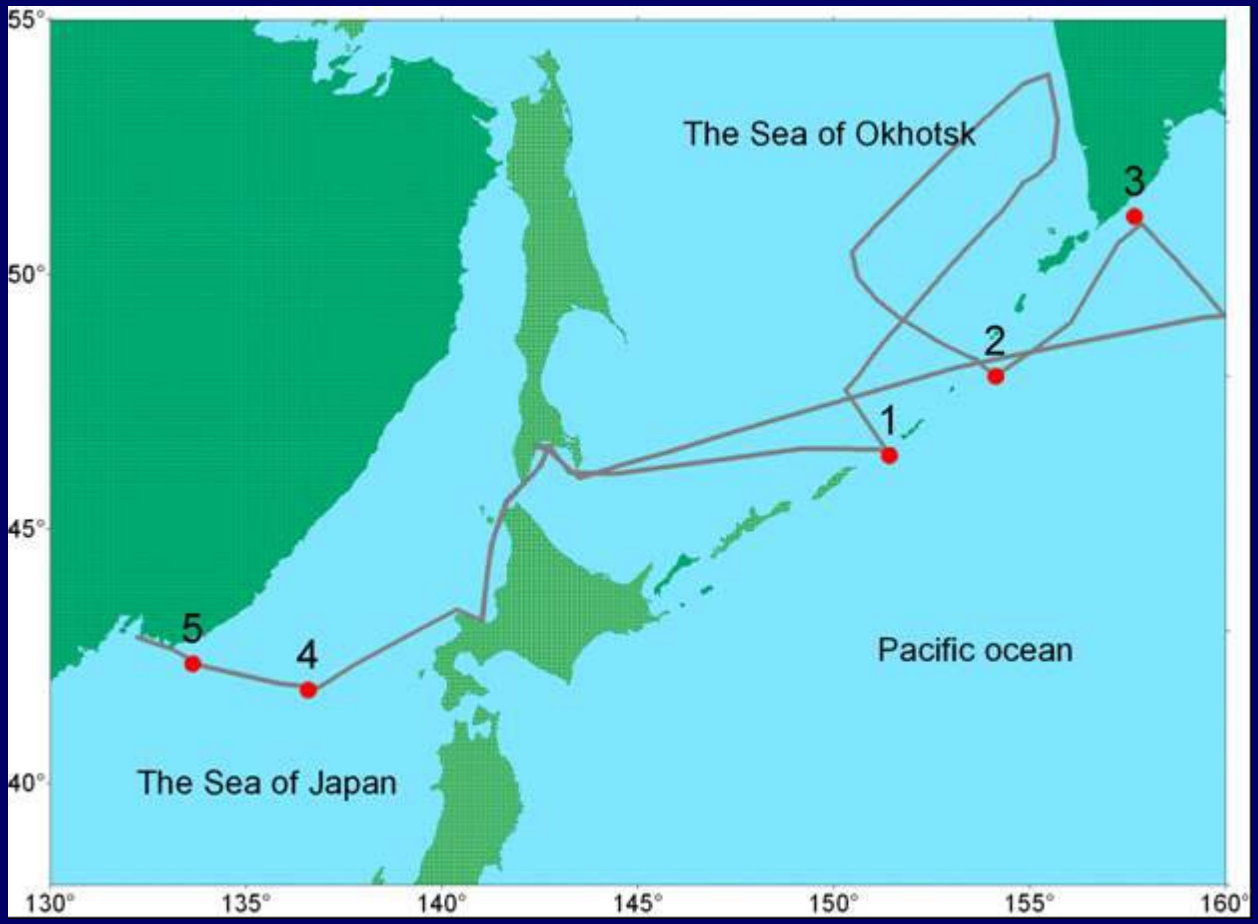
Station of sampling	Concentration, Bq/кg)	
	2009 г.	2011 г.
1. Aniva bay	2,1±0,4	1,8±0,3
2. PA-A platform	1,1±0,2	1,1±0,2
3. LUN-A platform	0,90±0,28	1,0±0,2

Anthropogenic radionuclide ^{137}Cs was found in all the samples of bottom sediments of the eastern shelf of Sakhalin (1.0-1.8 Bq/kg; dry weight).

Other gamma-emitting radionuclides of artificial origin in bottom sediments were not found.

The level of gamma radiation in air near the Kuril Islands was in the range 0.04-0.13 μSv/h which corresponds to the natural background.

3. Results of Monitoring



The route of surveys done by the Pavel Gordienko in July - August 2011

3.1. The analysis of concentration of ^{134} Cs and ^{137}Cs in sea water in the spring and summer

The concentrations of cesium radionuclides in The Sea of Japan and the north-western part of the Pacific Ocean in the area adjacent to the Kuril Islands in surface water.

Station	Date	Coordinates		Concentrations, Bq/м^3	
		Lat (N)	Long(E)	^{134}Cs	^{137}Cs
St.№ 1rgs	24,04	42º 21`	133 º 38`	Not detected	1,7
St. № 5rj	25,08	42º 21`	133º 38`	0,36+0,06	2,1+0,2
St.№ 2rgs	24,04	41º 50`	136º 35`	0,2	1,6
	17,05	41º 50`	136º 35`	0,3	1,8
St. № 4rj	25,08	41º 50`	136º 35`	0,36+0,08	2,2+0,3
St.№ 3rgs	28,04	39º 33`	146º 33`	21	24
St.№ 3rgs	14,05	39º 33`	146º 33`	16	17
St.№ 4rgs	30,04	43º 24`	146º 33`	1,2	2,2
St.№ 4rgs	11,05	43º 24`	146º 33`	0,7	1,7
St.№ 5rgs	01,05	46º 03`	150º 58`	2,9	3,6
St.№ 1rj	30,07	46º 26,50`	151º 25`	1,6+0,2	2,9+0,2
St.№ 6rgs	04,05	48º 33`	154º 20`	1,6	2,8
St.№ 2rj	12,08	47º 59,98`	154º 07,94`	0,8+0,1	1,9+0,1
St.№ 7rgs	06,05	51º	157º 33`	0,4	1,4
St.№ 3rj	13,08	51º 08,57`	157º 40,33`	0,24+0,06	1,6+0,1

ДВНИГМИ

3.2. Comparison (April – May – July – August)

1. Russian sea coast of the Sea of Japan: there was found the lowest values of the radioactive decay of man-made radionuclide ^{134}Cs (<0.36 Bq/m3) and ^{137}Cs (<2.2 Bq/m3).
2. The Kuril Islands: the content of ^{134}Cs was higher than in The Sea of Japan (0.24-2.9 Bq/m^3). The radioactive decay of ^{137}Cs in the area ranged from 1.4 to 3.6 Bq/m^3. Maximal concentrations of both ^{137}Cs and ^{134}Cs were observed in the middle part of the Kuril Islands and were 2.9 and 3.6 Bq/m^3, respectively. In the same area increased activity of the analyzed radionuclides were recorded both in May and July.
3. The maximal concentrations of values of ^{134}Cs and ^{137}Cs in the water were observed at stations located in the north-western part of the Pacific Ocean on the northern boundary of the Kuroshio Current, about 400 kilometres from the accident-related Fukushima-1 nuclear plant .
4. The radiation dose rate of gamma-ray in the air has background value and was equal to 0.04-0.13 μSv/h.

Conclusion

1. The dose rate of gamma radiation on the surface of the sea water during the observations did not exceed the background level.
2. The presence of gamma emitters in samples of atmospheric aerosols is not recorded practically in the coastal areas of the Far East of Russia. The influence of the accident at the Fukushima-1 nuclear plant in samples of atmospheric aerosols was traced only near the coast of Japan.
3. ^{134}Cs and ^{137}Cs (a product of an accidental emission) was detected in most samples of sea water. The lowest concentrations were found near the Russian coast of The Sea of Japan.
4. The highest concentrations of the radioactive decay of134Cs and 137Cs in the water were registered in the north-western part of the Pacific Ocean on the border of Kuroshio in about 400 km eastward of Japan.
5. The concentrations of anthropogenic radionuclides in seawater and bottom sediments on the shelf of Sakhalin Island were well matched with the analysis data of previous years.

Thank you for your attention!