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Anthropogenic and natural sources of methane in the Japan-Sea area and Primoriye polluting the atmosphere

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One of the most important problems today is an investigation of anthropogenic pollution of environment. Since 1990 the laboratory of gasgeochemistry POI FEB RAS carried out research in the sea water and in the sediments of the Expeditsiya bay and Novgorodskaya bay, and also in the drilled wells bore on the coast of the Hasanskiy region. Since 2000 the laboratory was engaged in research in the Shcotovskiy region on the coast of the Sukhodol bay. One more object of research is the coal mine "Amurskaya", "Smolyaninovskaya", "Kapital'naya", "Artem".

Since 2000 the laboratory carried out research distribution of the hydrocarbon and carbonic gases in the hydrogeological wells on the coast of the Sukhodol bay. It was found anomalous concentration of methane (10000-30000 nl/l), ethane (3000 nl/l), propane (200 nl/l), butane (300 nl/l), and carbonic acid gas (30-50 ml/l) in the wells. The quantity of the hydrocarbon gases exceed their background concentrations 1000 times as much, methane 100 times as much, carbonic gas 30-50 times as much. During sampling from the wells it was exuding gas bubbles. The background of methane in the water is 100 nl/l. Also it was carried out research of subsoil gases and gases adsorb by the snow in this region. As a result it was found anomalous flow of methane (7.4 ppм), anomalous concentrations of carbonic acid gas - 0.69 nl/l. It was found anomalous concentrations of methane and carbonic acid gas almost in the all extraction points of the 1 and 2 profiles in the gases consisting adsorbed by the snow. They located in the Sukhodol river region and crossed each other. This break control diorite porphyriets and confine Smolyaninovskaya on the south Palaeogene –Neogene sedimentary basin. Hydrocarbon gases migrate from ancient paleobasin with the water. The sources of the carbon acid gases are possibly the canals of diorite porphyriets which is break through secondary sedimentary.

The natural gages investigated in the Hasanskiy region since 1990. The composition of gages of the underground water was stated in the 17 hydrogeological wells drilled on the coast of the Hasanskiy region. The depth of the wells is 30 to 100 m. Anomalous concentrations of methane were found in the wells drilled on the break region, which expose erosion granite and andesite. This granites and effusive rocks form foundation of the Novgorodskaya bay. The concentrations of methane amount 100000 - 4700000 nl/l (4.7 ml/l), ethane, propane, butane (1000 nl/l). These anomalous concentrations exceed the background concentrations of gases 1000-100000 times as much. In one of a number wells on depth 85 m it was found anomalous concentrations of the carbonic acid gases – 35.9 ml/l. Thus there is carbohydrates flow from the Earth's interior to the surface. That form confirmed by anomalous concentrations of the hydrocarbon gases.

In the northern coastal part of the Exspeditsiya bay it was found concentration of methane 180 nl/l. In the Expeditsiya bay the concentration of methane increase 10 times as much (1500 nl/l) in the region of fresh water decrement. These concentrations 1.5 times as much of background. The concentrations of methane in the sediments in the coastal part of the bay near Pos'et are 0.3-0.5 nl/l. There are anomalous of methane 3000-4000 nl/l in the near-bottom water. The near-bottom waters are saturated by gases (methane) in the period of stratification sheets of water and slowed water cycle. As a result there are periods of stagnation and destruction of the fish. It is possible that the source of methane in the Exspeditsiya bay is basis of gassy rock.

The gasgeochemestry investigation of the mine "Amurskaya" it was found methane, heavy hydrocarbon, hydrogen, carbonic acid gas, argon, nitrogen and helium in the underground water and in the free gas. The "Amurskaya" mine is in the first stage of the flooding. The thickness of the gas erosion zone until the mine was closed varied from 150 to 260. There is a gas reservoir in the coal-bearing series which have natural and man-caused origin. At present a great deal of methane are located in the man-caused collector. Thus, the mine fields not just a dangerous object, but also it is a potential region for gas production. The content of methane in the coal-bed "Artem" mine not exceed -38,3%; "Smolyaninovskaya" mine – 15,3%. The volume of methane of the coal-bed mine "Artem" are not exceed 2 $м^3/т$; "Smolyaninovskaya" – 0,3 $м^3/т$. The concentration of methane in the "Artem" mine reach 74%. The explosive methane concentration in 2003 was fixed by the quarter 6, 13, 15 и 6 times. The gas monitoring in the coal mine "Artem" and "Smolyaninovskaya" was stopped in 2001. In this area in 2003 was carried out gasgeochemical investigation. As a result it was found the objects where the concentrations exceeds background and varied 1,65-3,33%. In the "Smolyaninvskaya" mine was found the concentrations of carbonic acid gas 2,83%, in the place of self-heat and place of self-ignition – 2,8 –5,65% CO_2 – carbon oxide от 0,012 до 0,204%. In the coal-bed of the "Kapital'naya" mine in the bearing strata in the gas phase of the underground water and in the free gas was found: methane, hydrocarbon, carbonic acid gas, argon, nitrogen and helium. The thickness of the gas erosion zone is 140 to 250 m. In the gasdrainage wells the composition of gases are testify there are gasdynamic connection between coal-bearing series and bottom gas-bearing deposit which is generate natural gases. As a result observations in the several gasdrainage wells it was determine that content of methane increase from 57,7% to 70%. In content of the gases, which was collected from the wellhead it was found hydrocarbon gases (ethane 0,24%, propane 0,06% and other), what shows considerable power of the degas coal thickness and the possibility of the inflow of hydrocarbon from the underlying gas generating deposit. The presences of the helium in the gas mixture are confirm this. The tectonic break of the mine field and the presence of the drain zone in the place of way out of excavation result in gas dangerous situation in the region of the garage and summer residence. The content of methane in the garage reaches more than 5 %, carbonic acid gas more than 2 %. Also it was selected the samples of the subsoil gases on the 9 summer residence and it was found methane which concentration reach 0,06 - 26,49%; carbonic gas 0,5 - 15,72%. As everybody knows the flooding of the mine result in complication ecological balance, concerned with natural and mine gas make on the surface, underflooding of the territories, rivers pollution.

Thus in the Japan-sea area and Primoriye there are anthropogenic and natural sources of the carbonic acid and hydrocarbon gases. The Hasanskiy region (Novgorodskaya and Exspeditsiya bay), Suhodol bay of the Ussuriyskiy gulf are the natural sources. The coal mines are the anthropogenic sources, especially after closing coal mine. The anomalous concentrations of carbonic and hydrocarbon gases are influenced on the global process of change climate. Besides, anthropogenic and natural sources of the gases are dangerous under caring out of the engineering-geological works, building and conducting of the economical activity.

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