Gas-Geochemical Criteria of Geological and Ecological Prediction

A.Obzhirov
Pacific Oceanological Institute, Far-Eastern Branch of Russian Academy of Scienses, Vladivostok, Russia.

Keywords: methane, distribution, ecology.

The gas-geochemical laboratory of the Pacific Oceanological Institute has studied distribution of natural gases (methane, heavy hydrocarbons, hydrogen, helium, carbon dioxide, oxygen, nitrogen) within water columns of the West Pacific marginal seas since 1977. Especially extensive studies of gas distribution in water columns of the Sea of Okhotsk were carried out during the Russian-German expeditions in 1997-1999.

In consequence of the works it has been found that: 1. Deep parts of the seas have the same background methane distribution:
10-20 nl/l in the bottom water layer, up to 50-60 nl/l at a depth of 100-150 m and 35-40 nl/l in the surface layer. 2. The arrival of methane into water from anomolous sources located in bottom sediments gives another picture of methane distribution. Abnormal methane concentrations 10000nl/l and more) are observed
within the whole water columns (bottom,intermediate,surface layers).
3. Methane fluxes are formed in fracture zones. The sources of methane are oil and gas deposits, gas hydrates. In the bottom sediments they are associated with carbonate, sulfide mineral assemblages and morphological bottom structures; in the water columns - with sound-scattering bodies (flares). 4. The change in seasonal and cyclic methane distribution in water columns of the Sea of Okhotsk was found. It is likely to be connected with the change in seasonal hydrological conditions, regular seismo-tectonic activity with an opening of the fracture zones. 5. Gases are attractive for searching for oil and gas deposits, tracing of fracture zones, earthquake prediction, making an estimate of the possible influence of methane and carbon dioxide, evolving from water into the atmosphere, on the global climate change.