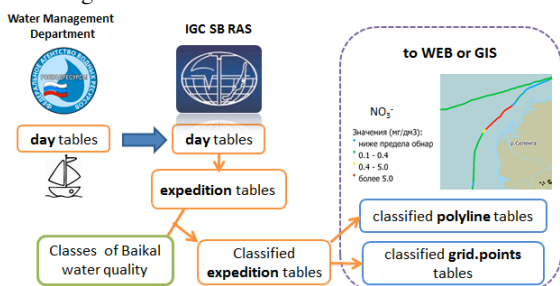


Spatial database for the hydrochemical monitoring of Lake Baikal

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Lake Baikal is a unique geosystem requiring its preservation in its original form. Since 1965, environmental monitoring of Baikal water is based on researching physical and chemical parameters. Currently used two types of sensors: ship-based measurement systems and analysis of water samples in chemical laboratories. To solve the problems of environmental control, the investigators from IGC SB RAS in cooperation with specialists of Russian Water Management developed a distributed spatial database, to provide the task of collecting, storing, analyzing, interpreting and reporting monitoring data.



In the ship-based part of the database is stored the information coming from the chemical analyzers. This data aggregates with the coordinates in the tables "day", which are transmitted to the data center IGC SB RAS. "Day" tables forms the "expedition" tables. After that, the data is subjected to automatic classification based on the tables of regional classes of water quality "background concentrations-MPC" [1]. Classes are the result of specialized four-year study of Lake Baikal hydrochemistry.

Collected database currently contains more than 2.5 million georeferenced sampling points. For fast display of such data on the web and GIS interfaces require additional treatment. Geodata are transformed into two types of tables: the point of sampling, calculated on the regular network, and sample profiles presented in the form of classified polylines. These tables are linked to the thematic geoportals intended for informing involved agencies, interested professionals and ordinary citizens.

[1] Parshin *et al* (2013) ISSN 2072-8158, 4.

Dissolution of Arsenopyrite under Geologic Carbon Storage Conditions

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Geologic carbon storage (GCS) in saline formations may induce increased dissolution of many metals including arsenic from reservoir rock minerals and from caprock and overlying rock minerals, in case of leakage of CO₂ or CO₂-saturated brine. Preliminary experiments on metal mobilization on carbonate rocks upon contact with CO₂-saturated brine have indicated arsenic release in excess of the U.S. EPA standards for drinking water. The most common sources of arsenic in sedimentary geologic formations are arsenopyrite (FeAsS) and arsenian pyrite. This study aims to determine the maximum long-term dissolution rates of arsenopyrite under a range of conditions representative of deep and shallow geologic formations. For this purpose, a small-scale flow-through system was developed and used to simulate the dissolution of arsenopyrite under a wide range of temperature, pressure and solution chemistry conditions. The effects of flow rate, pressure and different oxidants on arsenopyrite were separately tested. The dissolution studies focused on determining the mineral dissolution rate based on total As release with the system at steady state operation. However, measurements of Fe and S were also collected for comparison with previous studies. The dissolution rate computed from steady state As concentrations resulting from reaction of the mineral with 10⁻⁴ M Fe³⁺ as oxidizing agent at ambient conditions was 10^{-8.3} mol/m²s, which is comparable to reported rates of arsenopyrite dissolution rates under similar conditions. Ongoing dissolution experiments with CO₂-saturated NaCl solution at high pressure and temperature show the effect of CO₂ and brine on the release of As.