

Recent oceanographic and marine environmental studies at FERHRI

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Dr. Alexander Tkalin has been a member of the PICES Marine Environmental Quality Committee since 1994, and served as the Chairman from 1998 to 2000. His specialty is marine environment pollution, and while at FERHRI, he was involved in a few international projects with the International Atomic Energy Agency (IAEA), IOC UNESCO, NATO, Office of Naval Research (ONR) and United Nations Environment Programme (UNEP) covering the Sea of Japan, Okhotsk Sea and other areas of the North Pacific. From 2000 till 2002, he worked for the Global Environment Facility/United Nations Development Programme (GEF/UNDP) project in Beijing, China. He has published a few papers on distribution of radionuclides, organochlorines and trace metals in the marine environment.



The Far Eastern Regional Hydrometeorological Research Institute (FERHRI) of the Russian Federal Service on Hydrometeorology and Environmental Monitoring was established in 1950. FERHRI carries out extensive research on meteorology, oceanography, land hydrology, climate and ecology of the Russian Far East, Eastern Siberia, northwest Pacific Ocean and its marginal seas. The scientific fleet of FERHRI consists of a few research vessels of different classes (Fig. 1). Having this fleet, FERHRI undertook systematic studies in various parts of the Atlantic, Pacific and Indian Oceans. The Institute took part in numerous national and international research programs. In addition to field studies, FERHRI oceanographers have developed methods for prediction of the basic ocean parameters (ice characteristics, thermal conditions, storm surges, tsunamis, etc.). FERHRI researchers were also involved in tropical cyclone studies, including compiling typhoon catalogues and developing forecast methods for typhoon formation, transport and evolution.

The Institute consists of five main scientific departments:

- Department of Meteorology and Tropical Cyclones;
- Department of Long-Term Weather Forecasts and Climate Studies;
- Department of Mathematical and Automated Methods for Information Processing;
- Department of Oceanography and Marine Ecology;
- Department of Engineering Oceanography and Ecological Designing.

Meteorology and tropical cyclones. Studies of tropical cyclones and their prediction is one of the most important FERHRI research directions. FERHRI specialists develop analog and regression techniques and numerical methods

for prediction of southern cyclones, typhoons and related hydrometeorological phenomena. The Institute also provides consultative forecasts of typhoon origin, intensity and movement, data on precipitation, wind intensity and damages for the given area (Fig. 2). Users can also get electronic manuals, catalogues and recommendations containing tropical cyclone characteristics that affect weather conditions in the Russian Far East and southeast Asian countries.



Fig. 1 FERHRI research vessel "Pavel Gordienko".

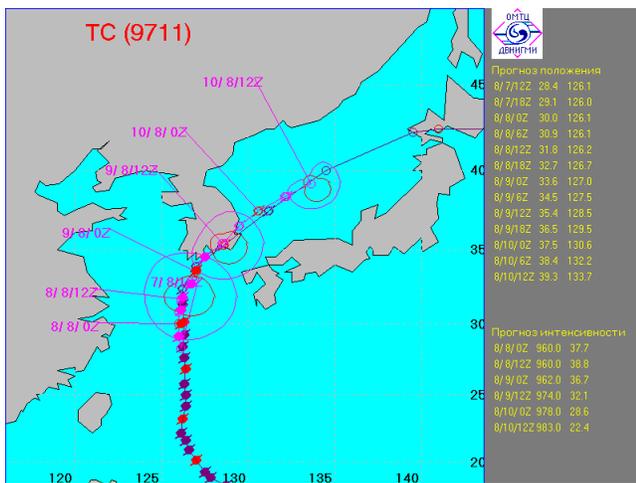


Fig. 2 An example of tropical a cyclone forecast.

Long-term weather forecasts and climate studies. Key activities in this field are aimed to develop and improve long-term forecast methods for hydrometeorological parameters, and to develop and improve techniques for the collection, storage and processing of hydrometeorological data. In addition, studies of global climate, interaction between ocean and atmosphere, El Niño phenomenon and blocking effects in atmosphere which influence human activities to a large extent are carried out.

Oceanography. FERHRI researchers carry out scientific studies on the following problems:

- physical properties of sea water;
- oceanographic data collection and processing;
- water circulation;
- oceanography of coastal areas;
- tides, tsunamies, waves and storm surges;
- ice properties; and
- development of forecasting methods and numerical modeling.

Geographically the main areas of investigation are: the subarctic Pacific Ocean, the Japan Sea, the Okhotsk Sea (including Sakhalin Island shelf), the Bering Sea, the South China Sea (including Vietnam shelf) and the Indian Ocean. Practical results of long-term oceanographic investigations are compiled in various books, manuals, atlases, catalogues, maps and reviews that include data on temperature, salinity, density, wind, wave height, currents, ice characteristics, etc. Electronic versions of most publications are also available. In addition, FERHRI specialists provide recommendations to fisheries, marine transportation and engineering organizations. In 1994, the Regional Oceanographic Data Center (RODC) was established in FERHRI. RODC is a branch of the World Data Center B (Obninsk).

FERHRI specialists are involved in several multi- and bilateral research projects in the North Pacific Ocean. To

name a few, Circulation Research of the East Asian Marginal Seas (CREAMS) has been implemented in collaboration with Japanese, Korean and US researchers since 1994, and resulted in a few international symposia and numerous publications. In 1998-2000, three Japanese-Russian expeditions in the Sea of Okhotsk had been carried out. New data on circulation and water exchange between the Sea of Okhotsk and the Pacific Ocean were obtained.

Since 2002, the Institute has been involved in the Argo project. FERHRI has bought and deployed a few PALACE floats already. 14 floats are planned to be deployed by the Russian Federation by 2005. The Russian Argo web page developed by FERHRI presents general information on the project, informs on the results of Russian activities under this project, and provides data obtained from the floats (Fig. 3). Access to the database is allowed through the national Argo web server (<http://rus.hydromet.com/~argo/>). The national Argo Center is under development now. The Institute is also maintaining the Russian NEAR-GOOS Real Time Data Base. This database contains data obtained aboard the voluntary observing ships and at coastal observation stations (<http://www.hydromet.com/project/near-goos/>).

In recent years, FERHRI specialists have been involved in large-scale national program entitled “*Integrated Information System of World Ocean Conditions*” (Fig. 4). The system will combine databases of various Russian ministries and maritime organizations. The information included in the system will cover hydrography, meteorology, biology, geology and other related data. The data products, diagnosis and forecasts will be available via Internet for users (Russian version is available at: <http://rus.hydromet.com/~esimo/>). Access to some data (e.g., for military use) might be restricted. Now the program is at the second stage of implementation (2003-2007).

Marine ecology. FERHRI specialists are actively involved in marine pollution studies in the Northwest Pacific Ocean including its marginal seas and coastal zone. During the last years, for example, bottom sediment pollution by trace metals, chlorinated hydrocarbons and other anthropogenic pollutants in the Chukchi and Bering seas, in some coastal areas of Russia and D.P.R. Korea, in Lianyungang Harbour and Hainan Island (People’s Republic of China) and along Vietnam shelf have been investigated.

Joint Japanese-Korean-Russian investigations of radioactive waste dumping areas in the NW Pacific were carried out aboard FERHRI research vessels in 1994-1995. No effects of radioactive waste dumping were found so far. Nevertheless, in 1999-2002, joint Japanese-Russian expeditions were continued. As a result, new data on radionuclide distribution and transport were collected. In addition, the formation of new bottom waters in the Sea of Japan was detected.

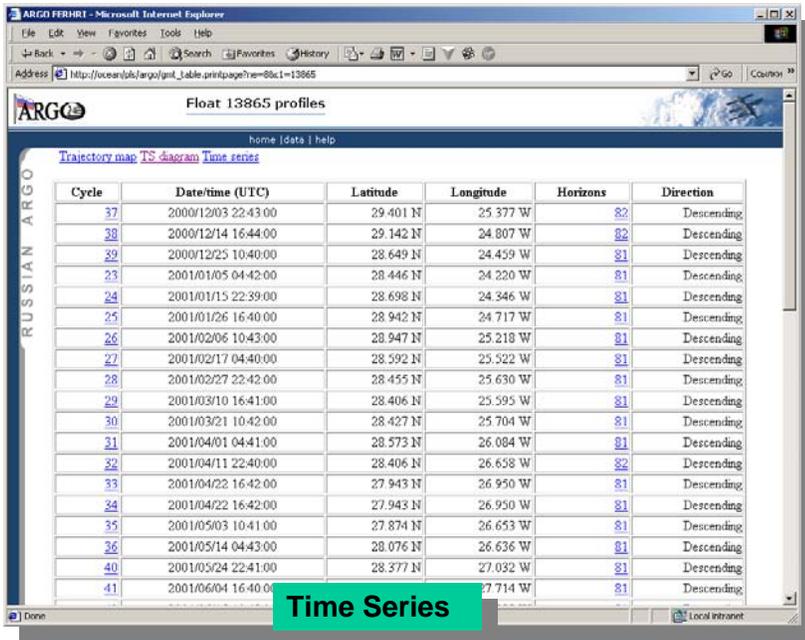


Fig. 3 An example of time series from the Russian Argo website.

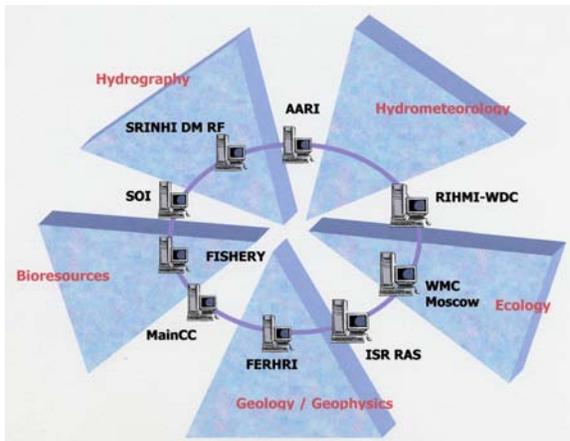
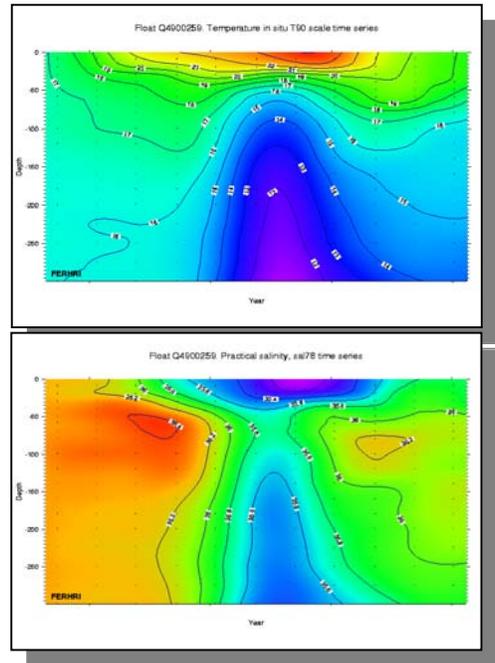


Fig. 4 The structure of the Integrated Information System of World Ocean Conditions.



Fig. 5 Installation of the "Moliqpak" oil production platform.

Background ecological surveys (including measurements of pollutant content in seawater and bottom sediments, plankton and benthos characteristics, etc.) have been carried out at oil and gas fields along Sakhalin Island shelf since 1990. From 1998, FERHRI has started regular (annual) monitoring at the Piltun-Astokh field (contracted by the Sakhalin Energy Investment Company). So far, changes in the marine environmental parameters were registered only within very limited areas around the drilling rigs or production platforms (about 250 m), and these changes were temporary.

FERHRI specialists are also working for other Sakhalin Island shelf projects in developing new methods, models and techniques that allow assessments necessary for Environmental Impact Assessment (EIA). From 1995 to 2000, the Institute prepared several volumes of documents as the general EIA contractor for the drilling/production platform "Molikaq" (Fig. 5) and for the appraisal drilling programs under Sakhalin-2 and Sakhalin-4 projects. Since 2002, the Institute has been developing technical documentation for the Sakhalin-1 project (contracted by Exxon-Mobil). FERHRI specialists also have experience in the modeling of oil spills and drilling discharge transport as well as calculating the Maximum Permissible Discharges and Emissions (MPD and MPE).