МЕЖДУНАРОДНЫЙ ЦЕНТР ДАННЫХ
ПО ГИДРОЛОГИИ ОЗЁР И ВОДОХРАНИЛИЩ

INTERNATIONAL DATA CENTRE
ON HYDROLOGY OF LAKES AND RESERVOIRS

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Dear reader! You are presented with the next, thirteenth issue of the bulletin, at the beginning of which information about the status and updating of the Center's database, as well as the development of its information technology complex. In 2023, the Center's database was supplemented with both in-situ observations, which constitute its main part, and satellite data on water levels from the Laboratory of Study of Geophysics and Oceanography from Space (LEGOS) at the National Center for Space Research (CNES, France). The Center was provided with satellite observation data on water levels at 37 Russian water bodies for 2021-2023.

The HYDROLARE website posted an Integrated (in-situ and satellite data) database (IBD) on average annual and average monthly water levels of the 29 largest lakes and reservoirs in the world. Satellite data for the IDB were kindly provided by LEGOS Laboratory.

In November 2023, the Eighth meeting of the International Steering Committee of the HYDROLARE was held. This issue provides brief information on the results of the meeting, held via videoconference.

In conclusion, as always, I express my sincere gratitude and appreciation to the representatives of both international and national organizations collaborating with the Center.

Prof. Valery Vuglinsky
Director of HYDROLARE

Lake Baikal (Russia)

WWW.HYDROLARE.NET

DEVELOPMENT OF THE IT-IFRASTRUCTURE OF THE CENTER

L. Barinova, G. Barinova, E. Kuprienok (HYDROLARE, Russia)

In 2023, the Center continued to collect, analyze and prepare data and convert it into a unified form necessary for uploading to HYDROLARE. Searches, recognition and collection of data on the levels and temperatures of water bodies were carried out on the websites of the relevant services in Slovenia, the USA, Canada and Sweden.

The Centre's database is replenished with information on water levels at stations in Belarus (10), Slovenia (2), Sweden (6), USA (43), Canada (23), Russia (266), as well as the average water levels of lakes in Russia (10) and the Great Lakes of Canada and the USA (5).

Data on average monthly and maximum water temperatures for stations in Belarus (10), Slovenia (2), Russia (111), as well as data on maximum ice thickness for the stations of Belarus (20) and Russia (114) were prepared and loaded.

In addition, data on the water level and temperature of the Caspian Sea, measured at 24 stations of the Caspian countries - Azerbaijan (5), Iran (5), Kazakhstan (4), Russia (5), Turkmenistan (5) have been updated.

As part of an international collaboration with the Laboratory of Study of Geophysics and Oceanography from Space (LEGOS) at the National Centre for Space Research (CNES, France), the Center was provided with satellite observation data on water levels at 37 water bodies in Russia for the period 2021-2023 in addition to those received earlier.

The development of the Centre's IT-infrastructure continued. An Integrated Database (IDB) was created on the average annual and average monthly water levels of water bodies. It presents the results of both in-situ and satellite observations of water levels in 29 of the world's largest lakes and reservoirs (at 169 hydrological stations). Satellite data for the IDB was kindly provided by the LEGOS Laboratory.

The following types of data are presented in the IDB: in-situ data on water levels averaged for water surface, in-situ data on water levels at stations and satellite observation data.

The list of water bodies and periods of data availability are given in Table 1.

Table 1. Observation periods for water levels on water bodies presented in the IDB

Water body name	Satellite observations	In-situ observations*	Water body name	Satellite observations	In-situ observations*
Europe			Bratskoye rsv.	1992 – 2023	1992 – 2019
Russian Federation			Lake Chani	1992 – 2022	*1992 – 2021*
Lake Ilmen	1995 – 2003	1992 – 2020	Krasnoyarskoye rsv.	2002 – 2023	1992 – 2022
Kamskoye rsv.	2008 – 2021	1992 – 2019	Novosibirskoye rsv.	1992 – 2022	1992 – 2022
Lake Kubenskoye	2016 – 2023	*1992 – 2021*	Ust-Ilimskoye rsv.	2016 – 2022	1992 – 2019
Kuibyshevskoye rsv.	1992 – 2023	1992 – 2019	Zeiskoye rsv.	1992 – 2023	*1992 – 2021*
Kumskoye rsv.	2008 – 2023	*1992 – 2021*	Kazakhstan		
Lake Lacha	2008 – 2020	*1992 – 2021*	Lake Balkhash	1992 – 2020	1992 – 2016
Lake Ladoga	1992 – 2023	1992 – 2020	Киргизия		
Lake Onega	1992 – 2023	1992 – 2020	Lake Issyk-Kul	1992 – 2020	1992 – 2017
Rybinskoye rsv.	1992 – 2023	1992 – 2022	**Europe/Asia**		
Saratovskoye rsv.	1992 – 2023	1992 – 2019	Azerbaijan, Iran, Kazakhstan, Russian Federation, Turkmenistan		
Segozerskoye rsv.	2008 – 2023	*1992 – 2021*	Caspian sea	1992 – 2023	*1992 – 2021*
Lake Syamozero	2016 – 2021	*1992 – 2021*	**America**		
Tsimlyanskoye rsv.	1992 – 2023	1992 – 2021	Canada, USA		
Lake Upper Kuyto	2008 – 2021	*1992 – 2021*	Lake Ontario	1992 – 2020	1992 – 2022
Vodlozerskoye rsv.	2018 – 2021	*1992 – 2021*	Lake Superior	1992 – 2020	1992 – 2022
Lake Vygozero	2008 – 2021	1992 – 2020	USA		
Asia			Lake Erie	1992 – 2020	1992 – 2022
Russian Federation			* Italics indicate observation periods that are available only at the stations (without the average water levels for the water body).		
Lake Baikal	1992 – 2023	1992 – 2019			

To inform users about the contents of the IDB, a convenient cartographic interface has been created on the hydrolare.net website (Figure 1).

Figure 1. Cartographic interface demonstrating the contents of the IDB using the example of Lake Onega

On the first screen, the water body is selected from the list. On the second screen on the map, markers indicate stations on the selected water body, and on the left is a table with the names of these stations. When you click on the title of the station, a window opens with data from in-situ observations of water levels. The names "Satellite observations" (satellite observation data) and "Water levels averaged over a reservoir" (in-situ data on water levels averaged over a water surface) are also active.

Figures 2 and 3 show examples of screens with data from in-situ and satellite observations of the water level of Lake Onega.

Water levels averaged for the station

Onega (Verkhne-Svirskoe rsv) - Kondopoga

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1992	33,46	33,43	33,32	33,28	33,61	33,71	33,57	33,40	33,35	33,24	33,18	33,13	33,39
1993	33,09	33,03	32,97	32,93	33,24	33,37	33,42	33,51	33,57	33,57	33,52	33,42	33,30
1994	33,32	33,22	33,12	33,10	33,47	33,56	33,52	33,40	33,29	33,31	33,33	33,27	33,33
1995	33,23	33,16	33,12	33,16	33,62	33,78	33,70	33,56	33,41	33,29	33,23	33,14	33,37
1996	33,06	32,97	32,87	32,77	32,96	33,10	33,22	33,21	33,08	32,96	32,90	32,90	33,00
1997	32,88	32,89	32,87	32,88	33,21	33,49	33,49	33,37	33,26	33,19	33,14	33,06	33,14
1998	32,99	32,89	32,82	32,72	33,04	33,31	33,47	33,43	33,37	33,32	33,34	33,25	33,17
1999	33,18	33,09	32,97	32,96	33,19	33,28	33,24	33,11	32,97	32,93	32,84	32,76	33,04
2000	32,75	32,73	32,72	32,78	33,13	33,26	33,31	33,34	33,34	33,30	33,30	33,29	33,04
2001	33,23	33,16	33,07	33,09	33,34	33,50	33,44	33,27	33,07	32,95	32,93	32,85	33,16
2002	32,77	32,74	32,74	32,71	33,08	33,21	33,22	33,10	32,97	32,87	32,79	32,71	32,91
2003	32,64	32,61	32,55	32,54	32,79	32,90	32,92	32,88	32,93	32,96	33,08	33,09	32,82
2004	33,07	33,02	32,90	32,83	33,09	33,28	33,37	33,36	33,38	33,40	33,41	33,39	33,21
2005	33,32	33,23	33,11	33,14	33,58	33,72	33,58	33,41	33,21	33,07	32,96	32,96	33,27
2006	32,92	32,86	32,81	32,79	33,00	33,19	33,20	33,15	33,08	33,02	33,07	33,21	33,03
2007	33,25	33,20	33,12	33,14	33,32	33,44	33,53	33,53	33,47	33,38	33,22	33,12	33,31
2008	33,03	32,96	32,93	32,99	33,28	33,37	33,40	33,40	33,46	33,46	33,67	33,78	33,31
2009	33,73	33,65	33,52	33,36	33,45	33,51	33,52	33,49	33,39	33,27	33,22	33,26	33,45
2010	33,20	33,13	33,02	32,98	33,25	33,36	33,34	33,21	33,12	33,05	33,10	33,07	33,15
2011	33,02	32,96	32,83	32,79	33,17	33,28	33,21	33,16	33,15	33,17	33,09	33,07	33,07
2012	33,11	33,05	32,96	32,90	33,25	33,40	33,45	33,40	33,26	33,18	33,18	33,18	33,19
2013	33,13	33,05	32,95	32,86	33,13	33,16	33,11	33,10	33,01	32,93	33,04	33,09	33,05
2014	33,17	33,14	33,08	33,03	33,18	33,27	33,28	33,17	33,09	32,99	32,91	32,84	33,10

Figure 2. Water levels at the station

Satellite observations

Onega (Verkhne-Svirskoe rsv)

St_dev* - Standart deviation.

Year	Month	Day	Hour	Minute	Level_stl	St_dev*
1992	10	15	9	47	33,65	0,05
1992	11	16	23	34	33,54	0,08
1992	12	21	9	15	33,46	0,06
1993	1	18	21	14	33,52	0,11
1993	4	23	1	19	33,44	0,09
1993	5	20	19	4	33,75	0,07
1993	6	21	21	57	33,82	0,05
1993	7	15	15	21	33,81	0,05
1993	8	18	22	47	33,97	0,04
1993	9	11	7	26	33,98	0,05
1993	10	16	17	9	33,93	0,07
1993	11	12	8	38	33,94	0,07
1993	12	17	9	35	33,78	0,13
1994	1	18	3	43	33,71	0,16
1994	4	19	9	43	33,66	0,11
1994	5	21	12	35	33,93	0,08
1994	6	17	21	36	34,00	0,06
1994	7	20	9	14	33,95	0,05
1994	8	17	20	31	33,81	0,07
1994	9	16	10	4	33,70	0,05
1994	10	16	17	9	33,69	0,06

Figure 3. Satellite data observations

THE EIGHTH MEETING OF THE INTERNATIONAL STEERING COMMITTEE OF THE HYDROLARE

V. Vuglinsky (HYDROLARE, Russia)

The Eighth meeting of the International Steering Committee of the HYDROLARE was organized by the State Hydrological institute via videoconference and took place on November 8, 2023. The head of the HYDROLARE V.S. Vuglinsky, made a report on the activities of the Center from October 2021 to November 2023. Information about the formation and maintenance of the database and the development of the IT-infrastructure and the Center's website was presented by the Center's employees E.I. Kuprienok and L.N. Barinova. Among the main achievements of the Center were noted:

- continue to collect and download new portions of historical data and metadata from WMO Members;
- development of the IT-infrastructure and website of the Center;
- continuation of long-term cooperation with the French LEGOS laboratory on the exchange of in-situ and satellite data and correction of satellite data on lake levels;
- participation of the Centre in hydrological programs of WMO, GCOS (Global Climate Observing System) and other international organizations;
- participation in scientific research.

Meeting participants welcomed the presentations and noted the significant progress made by the Centre during the intersessional period.

A presentation on the decisions of the WMO Congress and Executive Council and new hydrological structures was made by D. Berod, the Head of the Division "Basic Systems in Hydrology" of the Department of Climate and Water of the WMO Secretariat. He emphasized the important role of global hydrological data centers in the implementation of the WMO Operational Hydrology Programme. He provided information on the third session of the Commission on Observation, Infrastructure and Information Systems (INFCOM-3), which will be held in Geneva, Switzerland, 15-19 April 2024. One of the issues of this session will be consideration of the state and prospects for the development of global hydrological data centers.

The current status of the Global Terrestrial Network – Hydrology project (GTN-H) was presented by its coordinator S. Dietrich (Germany). He identified the main objectives of the project as coordinating the work of the WMO global hydrological data centers and overseeing the preparation of terrestrial Essential Climate Variables (ECV) for the GCOS program.

The new director of the Global Runoff Data Center (GRDC), S. Michel (Germany), spoke about the current state of and the prospects for its activities. He described the main functions of the Centre, spoke about the international projects and programs to which the Center provides data, and reported on the policy for providing data. He noted that the GRDC operates an online data portal GRDC, based on the new universal software package WISKI 7.

B. Calmettes, representative of the LEGOS laboratory (Toulouse, France) reported on its activities. She noted that the Hydroweb web service provides information products on lakes, rivers and floodplains based on satellite altimetry data. These products include water level data for 525 lakes around the world. As part of a joint cooperation, the Laboratory and the State Hydrological Institute are participating in the Climate Change Initiative (CCI) project. The goal of the collaboration is to develop a methodology for correcting satellite observations based on their comparison with in-situ data. B. Calmettes also informed about the scientific results of the Laboratory's activities, in particular regarding the assessment of changes in surface temperature of lakes for the period 1995-2020. B. Calmettes paid special attention to the new satellite mission SWOT (Surface Water and Ocean Topography), the implementation of which began in 2023.

After listening to reports and presentations, a general discussion took place on various aspects of HYDROLARE's activities. It was noted that the decisions taken at the previous Steering Committee meeting have been largely implemented. The meeting participants discussed and agreed on the main activities of HYDROLARE for the period 2023-2025.

The report on the eighth meeting of the International Steering Committee of the HYDROLARE is located on the official website of the center: www.hydrolare.net