МЕЖДУНАРОДНЫЙ ЦЕНТР ДАННЫХ
ПО ГИДРОЛОГИИ ОЗЁР И ВОДОХРАНИЛИЩ

INTERNATIONAL DATA CENTRE
ON HYDROLOGY OF LAKES AND RESERVOIRS

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Dear Reader!

The next, 8th release of the Annual Newsletter contains a variety of materials related to both the current activities of the International Data Center on Hydrology of Lakes and Reservoirs and the events that took place in 2017, including the Center's international collaboration. Traditionally the Newsletter provides information on the current state of the HYDROLARE database and the development of HYDROLARE IT-infrastructure.

An important event for the Center was the 6th meeting of its International Steering Committee, which was held at the State Hydrological Institute (SHI), St. Petersburg, Russia, on July 18 – 20, 2017. The current issue of the Newsletter features the highlights of the meeting.

Close attention is given to the role of remote observations in the study of hydrology of lakes. J.-F. Crétaux and T. Pavelsky's report is devoted to result of the international seminar "Lakes and Climate: The Role of Remote Sensing", organized by the National Center for Space Studies (CNES), in Toulouse, France, on June 1 – 2, 2017. The seminar was an important stage in joining efforts of the international scientific community in the wider use of remote sensing capabilities for lakes and climate studies.

The reader might also be interested in learning about the climate change indicators (ECVs) development competition for various components of the Earth system, which was announced in 2017 by the European Space Agency as a part of the Climate Change Initiative (CCI +) Program. A brief article, submitted by J.-F. Crétaux and S. Simis, examines the main goals, objectives, and possible directions for implementing this project in relation to the ECV-Lakes.

In conclusion, traditionally, on behalf of the staff of the Center, I would like to express sincere gratitude to the representatives of the countries which cooperate with HYDROLARE.

Prof. Valery Vuglinsky
Director of HYDROLARE

Lake Ilmen (Russia)

WWW.HYDROLARE.NET

FURTHER DEVELOPMENT OF THE HYDROLARE IT INFRASTRUCTURE

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

In 2017, HYDROLARE continued further development of its IT-infrastructure.

The database has been updated with information on the maximum and mean monthly water temperatures at the stations of Armenia, Belarus, Kyrgyzstan, Slovenia, and Estonia.

Moreover, the database has presently refreshed information on the mean monthly water temperatures of the Caspian Sea measured at 19 lake stations of the Caspian Sea countries, namely Azerbaijan, Kazakhstan, Russia and Turkmenistan. The Great Lakes water levels data have also been added for the 23 stations in Canada. In addition, the data on the maximum ice thickness for lake stations in Finland have been uploaded to the database.

The constantly updated catalogue of lakes and reservoirs, featured in the HYDROLARE database, has been added to the Center's website The catalogue contains the list of lakes and reservoirs and their related metadata which includes the following: the region and the subregion of the WMO, the country, the water body coordinates, as well as the observation periods for all data types available in the database, both in terms of lakes and reservoirs and their stations.

Having selected the «Data» option and, subsequently, «Catalogue of lakes and reservoirs» in the navigation menu, the users are redirected to the page where they download the catalog as a Microsoft Excel file. Thus, users can obtain information on the current contents of the database not only by means of the search engine, but also with the help of the data catalogue featured on the website.

Catalogue

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	WMO region	WMO sub_reg	Water body name	Water body type	Country name	Decimal coordinates of water body centre,°		Water body level			Observations at stations		
2						Latitude	Longitude	mean monthly	at the first date of each month	measured by satellite altimetry	mean monthly level	water temperature	maximum ice thickness
66	2	6	Chlya	lk	Russian Federation	53.450001	140.080002				1977-1996		
67	2	6	Chukchagirskoe	lk	Russian Federation	51.980000	136.580002				1963-1991	1963-1991	
68	2	6	Kenon	lk	Russian Federation	52.029999	113.379997				1940-2012		
69	2	6	Khanka	lk	Russian Federation	45.016666	132.416672	1946-2014	1946-2014		1936-2014	1945-2014	
70	2	6	Khokh	lk	Mongolia	49.501137	115.596092				2011-2013	2006-2013	
71	2	6	Zejskoe	rsv	Russian Federation	54.330002	127.629997	1983-1988	1983-1988	1992-2015	1977-2016	1978-2016	1977-2006
72	2	7	Arakhlej	lk	Russian Federation	52.200001	112.870003				1954-2012		
73	2	7	Baikal	lk	Russian Federation	53.216667	107.750000	1959-2013	1959-2013	1992-2015	1922-2013	1945-2013	1944-2012
74	2	7	Gusinoe	lk	Russian Federation	51.200001	106.379997				1950-2012		
75	2	7	Khargal	lk	Mongolia	49.929916	102.754997				1999-2012	1998-2013	
76	2	7	Khovsogol	lk	Mongolia	51.104645	100.476280				1963-2012	1963-2013	
77	2	7	Kotokel'skoe	lk	Russian Federation	52.820000	108.150002				1984-2012		

Catalogue / WMO subregions / Notes

Fig. 1. A sample of the cataloged data available on the HYDROLARE website.

THE INTERNATIONAL SEMINAR "LAKES AND CLIMATE: THE ROLE OF REMOTE SENSING"

J.-F. Cretaux (CNES/LEGOS, France), T. Pavelsky (University of North Carolina, USA)

The international seminar "Lakes and Climate: The Role of Remote Sensing" was organized by National Center for Space Studies, France (CNES) on June 1–2 in Toulouse, France. The seminar was attended by the scientists from many countries of the world, including such countries as France, the USA, the United Kingdom, Russia, Canada, Italy, and Chile. The representatives of international organizations, including the European Commission and European Space Agency (ESA), attended the seminar as well.

The purpose of the seminar was to unite the efforts of international community for the wide use of opportunities of remote sensing for studying lakes and climate. Discussions which took place during the seminar were led on three main aspects of the problem in question: capacity of satellite equipment and satellite surveillance data, organization of international cooperation in the field of lakes studying and, finally, the key scientific issues which need to be addressed, inter alia, with the aid of remote sensing data.

Fig. 2. Toulouse, France. The City of Space.

At the seminar, the attention was directed to the necessity of creation of the global network of *in-situ* observations of lakes variables for the purpose of solution of a wide range of tasks, including the following:

- calibration and validation of satellite-derived data;
- evaluation of the models;
- preparation of data for the models;
- identification and tracking of the long-term changes via multiple variables and data sets.

The seminar attendees have resolved to organize an international working group on the topic of "Lakes and Climate: The Role of Remote Sensing" for improvement of the present representations of natural properties of lakes on the global scale and expansions of the use of satellite information for the achievement of this goal. To this end, we invite all interested colleagues to join the working group. We also hope for the support from such international organizations as UN Environment Program (UNEP), Group on Earth Observations (GEO), Food and Agriculture Organization of the United Nations (FAO), World Meteorological Organization (WMO), and space agencies, e.g. European Space Agency (ESA).

THE "CLIMATE CHANGE INITIATIVE – CCI+" PROJECT AND THE ROLE OF HYDROLARE

J.-F. Cretaux (CNES/LEGOS, France), S. Simis (Plymouth Marine Laboratory, UK)

At the end of the summer of 2017, the European Space Agency (ESA) launched a contest on development of the Essential Climate Variables (ECVs) for various components of the Earth system within the "Climate Change Initiative – CCI+" project. Among them is ECV-Lakes which had been previously proposed as a part of the indicators for the Global Climate Observing System (GCOS) project. The primary objective of the CCI+ project is determination and validation of some variables included in ECV-Lakes, which are received with the aid of satellites. The project is aimed at the long-term coordinated satellite surveillance, along with designing and development of technological units of satellite data processing in its initial stages with subsequent unification of these units into a uniform sustainable technological system.

Various indicators are included in ECV-Lakes such as a lake water level, lake surface water area, lake surface water temperature, lake ice cover and its thickness, and lake surface reflectance. For determining all the abovementioned indicators, the state-of-the-art approaches will be used including combination of diverse sensors and methodologies of calibration and validation of satellite-derived data. The main goal is the coverage of diverse landscapes of the Earth by satellite observation in which potential users are interested. It will require significant improvements of the existing methods in order to establish particular variables for the lakes, their inter-comparison, and preparation of those indicators application examples. Thus, implementation of this project will allow the scientific community to expand the use of satellite-derived data for solution of limnology tasks.

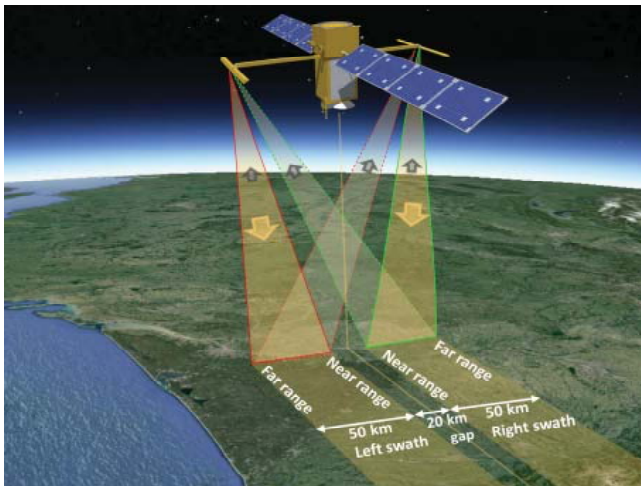

Fig. 3. The principles of operation of a large interferometer.

Another important objective of this project is validation and inter-comparison of satellite-derived data with *in-situ* data. For this task the cooperation with The International Data Centre on Hydrology of Lakes and Reservoirs (HYDROLARE) is necessary. The main aim in this case is to receive feedback from consumers on accuracy and stability of one ECV-Lakes indicators for their further improvements. Unfortunately, there are significant gaps in requirements for a series of variables for lakes, which are featured in the new realization plan of the GCOS program (GCOS-2000). In this regard, the analysis of consumers' requirements towards indicators within ECV-Lakes at the beginning of the current project is a very important stage for further revision and specification of these requirements to reach a consensus between the scientific community studying climate and the community of specialists working on climate indicators.

SIXTH MEETING OF THE INTERNATIONAL STEERING COMMITTEE FOR HYDROLARE

Prof. V. Vuglinsky, HYDROLARE, Russia

On July 18-20, 2017, the 6th meeting of the Steering Committee of the International Data Center on Hydrology of Lakes and Reservoirs (HYDROLARE) was held at the State Hydrological Institute (SHI), St.Petersburg, Russia.

Prof. V. Vuglinsky, the Director of HYDROLARE, reported on the activities of the Center for the period of time from September 2015 to July 2017. Information on creation and maintenance of the Center's database and the development of its technological infrastructure was provided by Lyudmila Barinova and Elena Kuprienok, the Center's employees. Among the main achievements of the center, the following ones were mentioned:

- continuous lakes and reservoirs water levels data acquisition from the WMO Members;
- the launch of processing of new types information – the *in-situ* data on water temperature and ice thickness;
- ensuring the stable functioning of the Center's English-language website, including the means of informing users about the current content of the database through the cartographic interface and the search system;
- continuous collaboration with the Laboratory of Study of Geophysics and Oceanography from Space (LEGOS), at the National Center for Space Studies (CNES), France;
- preparation and publication of the 7th issue of the HYDROLARE Annual Newsletter.

The meeting participants highly praised the progress the Center had made in the period since the fifth meeting of the International Steering Committee of the Center (September 29 – October 1, 2015, St.Petersburg, Russia).

Dr. Wolfgang Grabs, the Head of the GTN-H project (Germany), made a presentation on the current status of the project and the Center's role in accomplishing its tasks. Currently, the main objectives of the project, as Dr. Grabs stated, were monitoring data preparation on terrestrial hydrological climate change indicators (ECVs) for the Global Climate Observing System (GCOS) program, as well as planning and implementation of the global data centers activities in the hydrology field.

Dr. Dominique Bérod, the Head of the Division for Basic Systems in Hydrology of the Department of Climate and Water of the WMO Secretariat, made a report on the current decisions of the WMO Executive Council, GCOS, WMO Commission for Hydrology (CHy), and also on the role of the global hydrological data centers. He noted that currently the main activities within the "Basic Systems in Hydrology" project are as follows: receiving, collecting, processing, storing, ensuring access, as well as disseminating data.

Dr. Ulrich Looser, the Director of the Global Runoff Data Center (GRDC), Germany, presented a report on the current status of the Center and its prospective activities. He described the main functions of the Center, reported on those international projects and programs that the Center provides data for, and informed those present at the meeting of the Center's data providing policy.

Dr. Jean-François Cretaux, the representative of the LEGOS laboratory (CNES, Toulouse, France), made a report on the activities of the laboratory on monitoring lake levels from satellite altimetry. He noted that the Hydroweb database web service currently provides ECV data on changes in the water levels of 160 world lakes. In addition, satellite data are provided on the changes in the water surface extent and water volume variations for approximately 100 lakes worldwide. For 60 lakes in the Hydroweb database, satellite monitoring and processing of the received data is carried out in near-real time, and these data are publicly accessible.

The reports and presentations were followed by a general discussion of the various aspects of HYDROLARE activities. The meeting participants agreed upon the key perspectives on further development of the Center for the period of 2017–2019.

The report on the 6th HYDROLARE International Steering Committee meeting is available on the Center's official website: www.hydrolare.net

Fig. 4. Participants of the 6th HYDROLARE Scientific Steering Committee meeting.