Report of the Russian Federation to the 15th Session of the IOC Group of Experts on the Global Sea Level Observing System

June 2017

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National tide gauge network

The Russian state marine tide gauge network consists of more than 100 active stations, which are located at the coast and islands of 13 seas surrounding Russia and the Russian coast of the Pacific Ocean. About half of them are hard-to-reach stations, which is difficult to support. Some of the stations work only in free of sea ice cover periods of the year. This national sea level network is maintained by the Federal Service for Hydrometeorology and Environmental Monitoring (FSHEM). Sea level data from the stations are collected by regional centers of FSHEM and in 1-2 years after preliminary processing and quality control are delivered to the Russian oceanographic data center (RNODC) in Obninsk (Kaluga region). The gauge devices used in these stations are visual tide stuffs (mostly) and piles, float operated gauges (including digital floating gauges) in stilling wells and gauges with hydrostatic pressure sensors.

Observations of sea level with the help of tide staffs are carried out four times a day as a rule; accuracy of observations equals 1 cm. Data of observations from the automatic tide gauges are stored in RNODC with one hour discreteness.

Heights of all benchmarks in Russia are measured from the Kronshtadt datum (plate with a horizontal line in the stone bridge abutment in Kronshtadt) which was equal in past to the long-term mean level of the Baltic Sea in the region of Kronshtadt - the so called Baltic normal height system. Sea level is measured according to the reference horizon located 5 m below the Kronshtadt datum at all seas surrounding Russia except the Caspian Sea where the reference horizon located 28 m below the Kronshtadt datum is used. The values of 5 and 28 m were chosen in order to avoid negative sea level values at measurements of sea level.

Russian GLOSS core network stations

According to the GLOSS Station Handbook the Russian part of the GLOSS tide gauge network consists of 12 coastal stations:

CODE	LON	LAT	NAME	DATA IN PSMSL
231	$14^0$15’ E	$78^0$04’ N	Barentsburg (Spitsbergen)	1948 – 2015
274	$33^0$03’ E	$68^0$58’ N	Murmansk	1952 – 2015
92	$150^0$42’ E	$59^0$44’ N	Nagaevo	1957 – 2015
93	$158^0$39’ E	$52^0$59’ N	Petropavlovsk-Kamchatsky	1957 – 2015
98	$39^0$04’ E	$44^0$06’ N	Tuapse	1917 – 2015
312	$80^0$39’ E	$73^0$32’ N	Dikson	1950 – 2012
97	$20^0$29’ E	$54^0$42’ N	Kaliningrad	1926 – 1986
313	$128^0$45’ E	$71^0$40’ N	Tiksi	1949 – 2010
90	$145^0$52’ E	44^0 01’ N	Yuzhno-Kurilsk	1948 – 1994
309	$173^0$11’ W	$64^0$30’ N	Providenya	1951 – 1983
99	$62^0$35’ E	$76^0$14’ N	Russkaya Gavan	1953 – 1993
25	$93^0$01’ E	$66^0$33’ S	Mirny (Antarctica)	---------

For many years on the regular basis, once per year RNODC sends monthly mean values of a sea level from the active Russian GLOSS stations to the Permanent Service for Mean Sea Level (PSMSL). From Petropavlovsk-Kamchatsky station RNODC also sends monthly mean values of a sea level every month to the Hawaiian University in Honolulu.

At Barentsburg, Murmansk, Nagaevo and Petropavlovsk-Kamchatsky the sea level is measured by automatic sea-level meters in stilling wells.

Due to dredging works in port of Tuapse, the float operated gauge and stilling well were destroyed in June 2013. However, soon in 2013 sea level measurements at Tuapse port were resumed with the help of the automatic hydrostatic pressure tide gauge GMU-4. In 2015 the additional tide gauge based on an ultrasonic sensor was installed near GMU-4.

Automatic sea-level meter (Priliv-2D) at Dikson was destroyed during a severe storm on 10.10.2011. Since then, the sea level at the Dikson station is being measured visually by a tide stuff four times per day. Monthly mean values of sea level variations at Dikson from 1950 up to 2017 are available at the website of the Arctic and Antarctic Research Institute: http://ocean8x.aari.ru/item5/data/level/buildtable.php?pos=45.

In March 2016, after a long break, sea level measurements by the automatic sea-level meter (hydrostatic pressure recorder) were resumed at Kaliningrad.

A float operated gauge and stilling well were destroyed in November 2010 at Tiksi port. It is quite difficult to resume sea level measurements at Tiksi: port is now a private territory, coastal waters out of the port are shallow, plus there are severe Arctic ice and weather conditions.

Due to the destructive earthquake on the southern Kuril Islands on 4-5 of October 1994, a stilling well at Yuzhno-Kurilsk station was damaged and the delivery of sea level data to PSMSL was stopped. Observations were continued till 2013 (data are available at RNODC), however quality of measurements from time to time was doubtful. Instead of Yuzhno-Kurilsk, another nearby place may be suggested – Malokurilskoe (146°50', 43°53'), where the float operated gauge in a stilling well works well.

Sea level measurements at Providenya were closed in 1991 and at Russkaya Gavan – in 1993. There are no plans now to resume sea level measurements at these sites.

In Antarctica only episodic sea level measurements were carried out several months per year. One example is a comparative study of the sea level at Mirny with automatic hydrostatic pressure tide gauges Priliv-2 (Russian production) and Solinst 3001 LT Levelogger Edge M100 (Canadian production) from April to December of 2013 as described at http://loggers.ru/info/urovnennye_nabljudenija_v_antarktike.

An overview of the GNSS technology in the network

For the last 12 years, short-term measurements of heights and horizontal coordinates of benchmarks near points of sea level observations at Azov, Baltic, Black, Bering, Caspian and Okhotsk seas were carried out with the help of GPS/GLONASS-receivers.

Stationary GPS-receivers have been working in the vicinity of GLOSS tide gauges in Murmansk, Nagaevo, Petropavlovsk-Kamchatsky, Tuapse and Tiksi.

An overview of the data availability. Web, email etc. addresses of data banks and of sources of further information

A lot of historical monthly mean sea-level data from Russia were delivered in the past to the PSMSL. In total, the data (RLR&Metric) from 112 Russian stations are in the database of the PSMSL.

Monthly mean values of sea level variations at many dozens of Russian Arctic stations for all historical period of observations are possible to download from the website of the Arctic and Antarctic Research Institute: http://ocean8x.aari.ru/index.php?id=507 (section 4).

Graphs of current or annual variation of a water level at coastal stations in Azov, Baltic, Black, Japan and Okhotsk seas and the Russian coast of the Pacific Ocean are displayed at several Russian websites.

The latest description of the Russian tsunami warning system is at http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=14938

Contact point for international sea-level data and information exchange

Nicolay Mikhailov,
Head, Oceanographic Data Centre, All-Russia Research Institute of Hydrometeorological Information – WDC, Federal Service for Hydrometeorology and Environmental Monitoring, Obninsk, Kaluga Region, E-mail: nodc@meteo.ru

National contact points of Russian Federation for sea-level observations and GLOSS

Dr. Oleg Nikitin,
State Oceanographic Institute (SOI), Federal Service for Hydrometeorology and Environmental Monitoring, Moscow, opnikitin@mail.ru
- National coordinator and contact point for sea-level observations in seas of the European part of Russia (Baltic, White, Azov, Black and Caspian sea)

Dr. Igor Ashik,
Arctic and Antarctic Research Institute (AARI), Federal Service for Hydrometeorology and Environmental Monitoring, St.Petersburg, ashik@aari.ru
- Contact point for sea-level observations in Arctic seas (Barents, Kara, Laptev, East-Siberian and Chukchi sea)

Dr. Yuri Volkov,
Director, Far-Eastern Hydrometeorological Research Institute (FEHRI), Federal Service for Hydrometeorology and Environmental Monitoring, Vladivostok, hydromet@online.ru
- Contact point for sea-level observations in Far-Eastern seas (Bering, Okhotsk and Japan sea) and Pacific Ocean

SOI, AARI and FEHRI are responsible for periodical inspections and quality control of sea-level measurements made by regional and local subdivisions of FSHEM in the above listed seas.