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The speech is devoted to an important problem for Saint-Petersburg: threat of disastrous flood in Saint-Petersburg as a result of permanent water level rising in the Finish gulf even in ice conditions.

Comparing the results of research and computation of hydrological and hydrochemical parameters, current regime in natural conditions with similar results received during construction there has been determined the degree of influence of protective structures on hydrological and hydrochemical regimes and on current regime in location of structures and in intercepted water area.

Nature of level and inclination rising of Baltic water surface in 1981-1990 was studied by plotting diagrams of long-term average annual levels averaged by every 10 years and diagrams of water surface inclination from the estuary of the Neva river up to the south of the Baltic sea.

The studies shows that elimination of water exchange between the Baltic sea and the North sea has led to water freshening in the Baltic sea and its bays.

Besides, abnormal rising of average annual water level in Neva bay for all periods of observations beginning from 1981 up to the present time, also in the area of structures location, is the result of Baltic water level rising caused by global atmospheric processes. It has led to freshening of deep and shallow Baltic sea water including Finish gulf. Because of water freshening the amount of soluted oxigen decreased or it disappeared at all, but the amount of phosphate increased near bottom of the Baltic sea.

Continuing study of ecological water state in Finish gulf and Neva bay it is necessary to take into account the Baltic and Finish gulf water rising.

It is also necessary to take into account that floods in Saint-Petersburg will occur on the background of higher water level in the Baltic sea water area. Therefore, probability of disastrous floods in Neva estuary is increasing.

From 1703 up to 2003 in Saint-Petersburg there were registered 305 floods, 236 (77%) of which happened in September-December when there was maximum cyclonic activity above the Baltic sea. In winter (January-April) cyclonic activity usually is weak.

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Ice cover in water areas of the Finish gulf, Neva bay and Neva estuary eliminates wave fluctuations of water level, and for this period there were stated only 42 floods (14%). During spring-summer period (May-August) cyclonic activity above the sea becomes weak, for this periods there were 28 floods (9%).

Abnormal permanent of water level rising in the Baltic water sea area including Finish gulf and Neva bay has led not only to worse ecological state (freshening of shallow and deep waters, elimination or disappearance of soluted oxygen and increase of phosphate in near bottom layers but to abrupt increasing of a number of floods.

From 1981 to 1990 in Saint-Petersburg there were registered 27 floods, from 1981 to 1994 – 39 floods, from 1981 to 2003 – 46 floods. These are the only periods from 1703 to 2003 in which such number of floods was registered. From 46 floods for the period from 1981 to 2003 12 floods happened in 1983 when there was observed the maximum average annual level 24 cm above average (AA) for the whole period of observations and according to data from water gauge station in Kronstadt and 38 cm AA according to data from water gauge station near Institute of Mines.

Average annual levels were: in Kronstadt for the period of 1841–1980 – minus 1 cm AA, for the period of 1841–1991 – 0 cm AA, for the period of 1981- 2001 - +3 cm AA; near Institute of Mines for the period of 1878-1980 - +11 cm AA, for the period of 1878-1991 - +10 cm AA but for the period of 1981-2001 - +21 cm AA.

Maximum average monthly levels from 1981 to 2001 especially in flood periods (autumn-winter months) also appeared to be above the maximum average monthly levels for the observation period and according to data from water gauge stations in Kronstadt from 1841 to 1980 and for the observation period and according to data from water gauge station near Institute of Mines from 1878 to 1980. In Neva bay (water gauge station in Kronstadt) this excess was: in September – 2 cm, in October – 18 cm, in November – 5 cm, in January – 16 cm, in February – 4 cm, in March – 43 cm and in the estuary of the Neva river (water gauge station near Institute of Mines) – 3cm, 19 cm, 4 cm, 20 cm, 7 cm, 46 cm correspondingly.

For the last 23 years there are picked out two periods 1981-1983 and 1989-1991 when average monthly levels during nearly the whole year exceeded the corresponding values of average monthly long-term levels.

For these two periods with exceeded background of the Baltic sea level there happened 24 floods form 31 observed from 1981 to 1991. I should be noted that during the history of Saint-Petersburg from 1703 to 2003 23 floods happened in January-Mach. From 1981 to 2003 in January-Mach there were 18 floods that indicates the increase of cyclonic activity and in combine with higher background of the Baltic sea level leads to increasing the probability of floods in this period of the year even if there is ice cover. In Neva bay (water gauge station in Kronstadt) the maximum positive deviations of average monthly levels from average monthly long-term levels were in January – 73 cm (1983), in February – 66 cm (1989), in March – 90 cm (1990), in October – 59 cm (1983), and in estuary of the Neva river (water gauge station, Institute of Mines) – 78 cm, 67 cm, 92 cm, 33 cm, 59 cm and 534 cm correspondingly.

The tendency of water level rising was keeping from 1998 to 2003 when there were observed 7 floods. Maximum positive deviations of average monthly levels from average long-term levels were at the flood in 19.10.1998 - 23 cm, at the flood in 30.11.1999 - 25 cm, at the flood in 26.01.2002 - 43 cm, at the flood in 05.02.2002 - 66 cm, at the flood in 10.03.2002 - 55 cm and at the flood in 30.12.2003 - 43 cm.

Intensive melting of continental and sea ice in Arctic seas because of global warming leads to further rising of the Great Oceans. This in its turn confirms beginning from 1981 the permanent tendency to rising of Baltic sea level that significantly increase the probability of disastrous floods in Saint-Petersburg.

The analysis of flood maps in Saint-Petersburg shows that at the total city area of 500 sq.km (1990) there could be flooded at water level rising up to 2,0 m AA - 6%, up to 3,0 m AA - 17,1%, up to 4,0 m AA - 23,9%, up to 5 m AA - 27,2% and up to 5,4 m AA - 30% of the total city area.

At floods with the repetition of one time in 100 years (height 3,5 m AA) there would be flooded the fifth part of the city territory with 1,5 million of residents.

Water rising exceeding 3,0 m AA leads to malfunction of the city sewerage floatable system, transport and subway. A great damage could be done for purifying structures of the city. To a great extent there would be broken heat supply and power supply systems with all heavy consequences especially in autumn-winter period. At flood with the level of 4,0 m AA there would be damaged water supply in the whole city.

All disastrous floods (1824, 1924) ere accompanied by great destruction and people's victims. At the flood in 1824 (height - 4,5 m AA) two thirds of the city territory, 569 people died, 324 houses were destructed. The city of Kronstadt and Kronstadt fortress were destroyed.

In the period of the second disastrous flood on the 29-th of September, 1924 chage of the level from beginning of rising up to the end of abatement continued 24 hours in the estuary of the Neva river in Neva bay. At average intensity of the level rising 29cm/hour the water level at Kronstadt during 11 hours of rising achieved 3,21 m AA and at the Institute of Mines during 11 hours - 3,80 m AA. The level was rising at gale-strength south-west wind with the velocity of 20-22 m/s and with gusts up to 40 m/s. Level falling continued during 12-13 hours at average intensity of 27-38 cm/hour. Maximum intensity of level falling at Kronstadt achieved 84 cm/hour and at the Institute of Mines - 92 cm/hour. One thirds of the city territory was flooded.

The flood in 29.09.1777 with water rising up to 3,21 m AA was the third by its size, it caused a great damage for the city.

The flood fourth by its size happened on the 15-th of October, 1955 (water rising at Kronstadt - 2,41 m AA and at the Institute of Mines - 2,93 m AA). It was accompanied by gale-strong south-west wind of 16-17 m/s, in some regions - up to 28 m/s. At average intensity of level rising up to 50 cm/hour in the estuary of the Neva river during

6 hours the level achieved 3,02 m. In Neva bay level rising continued for 7 hours at average intensity of 36 cm/hour. The value of rising was 2,49 m. Maximum intensity of level rising at the Institute of Mines was 94 cm/hour, at Kronstadt – 78 cm/hour. Level abatement continued for 15 hours at average intensity of 20 cm/hour in the estuary of Neva and 18 cm/hour in the bay, maximum intensity of level falling was 63 and 69 cm/hour correspondingly. During this disaster 34 sq.km of the city territory were flooded.

To save Saint-Petersburg from catastrophic floods of 3,0-5,4 m AA height that could happen in September-December of any year it is necessary to build urgently navigation passes C-1 and C-2, liquidate all gorges in barriers and to repair waterpass structures.

To make sanitary state of Neva bay and the region structures location better it is necessary to organize urgently disinfection of water at the central purifying structures, to substantiate scientifically the discharge places from purifying structures and to take measures to build scientifically substantiated escapes and to organize in Saint-Petersburg ecological commission to check ecological substantiation of building designs on water area of the east part of the Finish gulf, Neva bay and in the city of Saint-Petersburg.