Geophysical Research Abstracts
Vol. 19, EGU2017-52, 2017
EGU General Assembly 2017

Storm surges in the White and Barents Seas: formation, statistics, analysis

Anastasia Korablina and Victor Arkhipkin

Lomonosov Moscow State University, Faculty of Geography, Department Oceanology, Moscow, Russian Federation (anastasia.korablina@gmail.com)

Arctic seas storm surges investigation are high priority in Russia due to the active development of offshore oil and gas, construction of facilities in the coastal zone, as well as for the navigation safety. It is important to study the surges variability, to predict this phenomena and subsequent economic losses, thus including such information into the Russian Arctic Development Program 2020.

White and Barents Seas storm surges are caused mainly by deep cyclones of two types: "diving" from the north (88% of all cyclones) and Atlantic from the west.

The surge height was defined as the excess of the level that was obtained as the difference between the observed level and subtracting tide level and low-frequency level. The period of low-frequency level oscillation was determined by spectral analysis of the in-situ data.

ADCIRC model is used for calculating the storm surge height. We did the calculations on unstructured grid with variable step from 50 to 5000 m. The ADCIRC model was based on the data on wind field, the sea level pressure, the concentration of ice reanalysis CFSR (1979-2010) in increments 0.3°, CFSv2 (2011-2015) in increments 0.2°. On the boundary conditions harmonic constants from Finite Element Solution tide model 2004 (FES2004) in increments 1/8° were set. The following stations on the coast Varandey, Pechora Bay, Chosha Bay, Severodvinsk, Onega, Solovki and other were selected for the storm surges statistical analysis in the period 1979-2015.

The number of storm surges (> 0.3 m) long-term variability was obtained, the number of surges at a height (m) range (0.3-0.6, 0.6-0.9, 0.9-1.2, >1.2) was estimated. It shows that 1980 and 1998 are the years with the fewest number storms. For example, the largest number of storm surge (53) was observed in 1995 in Varandey. The height of the surge, possible only once in 100 years, is counted. This maximum height (m) of the surge was noted in Varandey (4.1), Chosha Bay (3.4), Barents Sea, Onega Bay (2.4), White Sea. Quantitative assessment of the pressure and wind contributing to the surge formation was made. The analysis has shown that the wind has a larger contribution (90%) to surge formation in the study area.

The study was performed in the framework of the Russian Science Foundation (project 14-37-00038).