

## **Assessment extreme hydrometeorological conditions in the Gulf of Bothnia, the Baltic Sea**

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Extreme hydrometeorological conditions in the Gulf of Bothnia, the Baltic Sea, are estimated paying a special attention to the area of the future construction of nuclear power plant (NPP) "Hanhikivi-1" (24° 16' E, 64° 32' N). To produce these estimates, long-term observations and results from numerical models of water and ice circulation and wind waves are used. It is estimated that the average annual air temperature in the vicinity of the station is +3° C, summer and winter extreme temperature is equal to 33.3° C and -41.5° C, respectively. Model calculations of wind waves have shown that the most dangerous (in terms of the generation of wind waves in the NPP area) is a north-west wind with the direction of 310°. The maximum height of the waves in the Gulf of Bothnia near the NPP for this wind direction with wind velocity of 10 m/s is 1.2-1.4 m. According to the model estimates, the highest possible level of the sea near the NPP is 248 cm, the minimum level,  $-151$  cm, respectively for the western and eastern winds. These estimates are in good agreement with observations on the sea level for the period 1922-2015 at the nearest hydrometeorological station Raahe (Finland). In order to assess the likely impact of the NPP on the marine environment numerical experiments for the cold (2010) and warm year (2014) have been carried out. These calculations have shown that permanent release of heat into the marine environment from the operating NPP for the cold year (2010) will increase the temperature in the upper layer of 0-250m zone by 10°C in winter - spring and by 8°C in summer - early autumn, and in the bottom layer of 0-250m zone by 5°C in winter - spring and 3°C in summer - early autumn. For the warm year (2014), these temperature changes are smaller. Ice cover in both cases will disappear in two - kilometer vicinity of the NPP. These effects should be taken into account when assessing local climate changes in the future