Geophysical Research Abstracts
Vol. 13, EGU2011-292-1, 2011
EGU General Assembly 2011

Storm surge on Lithuanian coasts: past experience and future perspectives

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Almost every year storm surges strike Lithuanian coasts. It affects people lifestyle, their behavior, and private property. Most severe storm surges have significant economical, financial and social impacts on tourism, fishery, transportation, infrastructure, real estate etc. sectors. Moreover, storm surge change coastal lines, geomorphologic and sedimentologic processes, ecosystem structure, and natural habitats.
Data from historical storms of 20th ant the beginning of 21st centuries are presented in this topic. Statistical temporal data of storm frequency, maximum wind speed, sea level height and their trends during last sixty years are presented. Most severe storm surges during hurricanes Anatoly and Erwin are analyzed more detailed using additional information about synoptic circulation, wave height, etc. Furthermore, study also involves some examples of damage assessment and reparation costs after largest storm surges over last 50 years, including: re-cultivation of natural wildlife habitats; nourishment of sand dunes and beaches; restoration of damaged buildings, cultural and historical heritage.
At least one time per year sea level was 50 cm higher than the 20th century average. The highest sea level (186 cm) near Klaipeda was recorded during storm on 17 of October in 1967. Also during hurricanes Anatoly (1999-12-04) and Erwin (2005-01-05) sea level raised 165 and 154 centimeters respectively. Meanwhile, probability of such extremes (>100 cm) will be much higher in the end of the century. Sea level rise (in 2100) according to different greenhouse gases emission scenarios will vary from 25 to 86 centimeters for Lithuanian coasts. Futher calculations were made using average value – 52 centimeters. Furthermore, potential flooding zones of Klaipeda port/city territory during severe storm surges in the end of 21st century were determined. More attention turned to southern part of Klaipeda city and Smelte river basin. This city part could be more frequent flooded during storm surge because of sea level rise.
There is conflict between socio-economical potential of the city stakeholders and needs of municipality; expectations of local community; etc. Therefore BaltCICA project enabled to launch flood prone area feasibility study. Possible adaption measures evaluation was made. Results showed that two types of adaptation measures: direct and indirect should be implemented collectively. Direct water balance measures include technical adjustment of the river basin. And indirect measures – controlling urbanization extent at river basin territory with legislation acts. Problematic of dealing with uncertainties and stakeholders involvement, are also pointed out in this topic. Cost/Benefit Analysis (CBA) and Multi Criteria Decision Analysis (MCDA) methods could be the key solution for substantiation of adaptation measures implementation in the coastal area.