Geophysical Research Abstracts
Vol. 18, EGU2016-16827, 2016
EGU General Assembly 2016

Assimilation of measurement data in hydrodynamic modeling

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This study focuses on developing methods to combine ground-based data from operational monitoring with data from satellite imaging to obtain a more accurate evaluation of flood inundation extents. The distributed flow model MIKE 11 was used to determine the flooding areas for a flood event with available satellite data. Model conditioning was based on the integrated use of data from remote measurement techniques and traditional data from gauging stations. Such conditioning of the model improves the quality of fit of the model results. The use of high resolution satellite images (from IKONOS, QuickBird e.t.c) and LiDAR Digital Elevation Model (DEM) allows information on water levels to be extended to practically any chosen cross-section of the tested section of the river. This approach allows for a better assessment of inundation extent, particularly in areas with a scarce network of gauging stations. We apply approximate Bayesian analysis to integrate the information on flood extent originating from different sources.
The approach described above was applied to the Middle River Vistula reach, from the Zawichost to Warsaw gauging stations. For this part of the river the detailed geometry of the river bed and floodplain data were available. Finally, three selected sub-sections were analyzed with the most suitable satellite images of inundation area.

ACKNOWLEDGEMENTS
This research was supported by the Institute of Geophysics Polish Academy of Sciences through the Young Scientist Grant no. 3b/IGF PAN/2015.