# 2D-MODELLING OF FLOOD PLAINS USING OPTIMIZED INPUT DATA

## LARGE SCALE APPLICATION AND DISSEMINATION STRATEGIES

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## INITIAL SITUATION

The new German water legislation and the foreseen EU Flood Directive demand more detailed and extensive preparation of flood maps. Furthermore the high frequency of flood events in the last years shows an increasing need to offer precise and extensive information for the public to prevent future damages. As detailed hydraulic modelling is very time and cost intensive, the concept of data processing has to be enhanced.

## PRELIMINARY STUDIES

Starting in 2002 the Bavarian Environment Agency (LfU) began to implement several feasibility studies to develop a technology which enables precise, time and cost efficient hydraulic 2d-modelling. Hydraulic 2d-modelling represents the most modern method to receive information on flood plains and flood hazard areas, as the models provide precise information not only on flood borders but also on water depth, flow velocity and flood duration. Furthermore hydraulic 2d-models can be quickly adjusted if any other hydraulic parameter (e.g. hydrologic data) changes. One of the key factors for high quality hydraulic 2d-modelling is the provision of very precise digital input data, e.g. on surface relief and land cover.

In the last few years digital terrain models (DTM) derived from airborne laser scanning (ALS) deliver excellent information on the surface structure. However, the immense data density of airborne laser scanning data made it impossible to facilitate time and cost efficient state-of-the-art hydraulic 2d-modelling based on ALS data, as this required considerable manual re-work. Hence the LfU initiated the development of a special software prototype, which allows an automatic reduction of the ALS data and the compilation of an optimized mesh for 2d-modelling. Hereby a data reduction rate of 98% without hydraulically relevant decline in quality could be achieved, starting from a one meter grid. The prototype of the software was successfully tested in an area of the Danube River with exceptional model character.

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## LARGE SCALE APPLICATION

In 2006 the LfU started with the European Project *FloodScan*, supported by the Life Environment programme. Partners are the Bavarian Agency for Surveying and Geographic Information and Munich University of Technology. Within *FloodScan* data processing and software development will be optimized and adjusted for large scale application. As a first step the software algorithms for laser scanner data reduction were refined and enhanced with additional features and functionalities. The data base will comprise (laser scan) data of various character and quality to ensure the functionality of the new technology in demonstration areas, with diverse landscape and topographical structures (e.g. alpine, pre alpine, low-range mountain rivers). The laser scan data are post-processed with the new software. The experiences made hereby will be used as further input for the refinement of the technology. An innovatory approach is also pursued for the classification of land cover. Therefore aerial stereo pair images and ortho images, as well as satellite images of different origin and quality are used to provide information on surface roughness.

Furthermore there will be elaborated best practice flood hazard maps in consideration of national and international concepts (e.g. provided by the German Länderarbeitsgemeinschaft Wasser, LAWA, or the European Exchange Circle on Flood Mapping, EXCIMAP) and in co-ordination with (inter)national experts. This will include the calculation of disaster scenarios (e.g. malfunction of technical flood protection measures). Subsequent sensivity analysis will ensure the optimization of all important input parameter necessary for 2d-hydraulic modelling (in combination with laser scan data).

## DISSEMINATION STRATEGIES

To guarantee an extensive, easy-understandable and target-group specific provision of information on flood plains and flood hazard areas, the results are visualized in a web mapping service. In 2004 LfU has launched a web mapping service for the public, showing detailed information on flood plains (http://www.iug.bayern.de). Improvements have to be realized in consideration of latest research experiences (preliminary studies have been conducted by TUM) regarding the foreseen European initiative INSPIRE.

To raise awareness for flood hazards and promote personal precaution measures to reduce negative impacts of floods the whole project will be flanked by appropriate dissemination measures, using professional and general communication channels.