Fluvial <> Pluvial



Where are flash flood endangered areas? - fluvial inundation areas mostly well known

- how to delineate spontanous overland flow induced by heavy rainfall? - after calculating hazard, can we estimate the damage risk?

- and what can we do against it?

Data & Hydraulics



Rainfall: Design precipitation values (T100 / 60 min duration) from Austrian Hydrological Service as basis for rainfall event

DEM: resolution freely selectable - FFRM based on 25m DEM (resampled ALS data), refined with WFD stream network (heights from 10m DEM) as breaklines. Maps for planning purposes based on 1m/0,5m ALS DEM.

Rainfall-Runoff model: two different approaches (SCS-CN, initial and continous loss), based on soil type, landcover and degree of impervolusness

Landcover: CORINE / Urban Atlas Soil: Austrian Soil Map (1:25.000)



flow process in FFRM = pure water flow (No debris transport and deposition)

Hydraulics:

2d finite difference scheme, calculation stepwise by 1. calculating effective netto rain with temporal and spatial variation, 2. applying on every node 3. hydraulic calculation leads to water depth and velocity

=>input water depth for next step starting again at point 1

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Using an extended 2D hydrodynamic model for evaluating damage risk caused by extreme rain events: Flash Flood Risk Map Upper Austria

European Geosciences Union - General Assembly 17–22 April 2016, Vienna Günter Humer, Andreas Reithofer, Dipl.- Ing. Günter Humer GmbH

Damage Risk Assessment





function of base damage, building density and max. water depth per category

12 different categories, derived and reclassified from:

- zoning plan maps
- vector layers for streets and railways
- VHR landcover products (Urban Atlas, LISA)

Different damage functions per category

Based on proposed algorithm of Austrian Federal Ministry for cost-benefit-analysis for flood protection works:

Dtot = Dmin + 1000 * B * sqr(wd) * density

(B: "use-specific factor"; corresponds to damage in 1000€ at water depth of 1m without Dmin)



risk = function (max. water depth, landuse category, damage function)









- Highly professional identification of endangered areas (2D hydraulic model)

- Fully customizable in scale and detail according to your needs from whole states to small communities

- Generated from Open Government Data

- Available for State of Upper Austria (~ 12.000 km²) within SWITCH-ON or any other place worldwide on demand!



Tools for stormwater management derived from FFRM methodics: - inundation maps at high detail level

- action plan for possible protection measures

Validation

Parameters have been tested and validated with rain gauge and discharge measurements of a rainstorm event in June 2012 for areas of Waldzell and Micheldorf, Upper Austria:







Stormwater management

- hazard analysis considering buildings, garden walls, tubings etc.