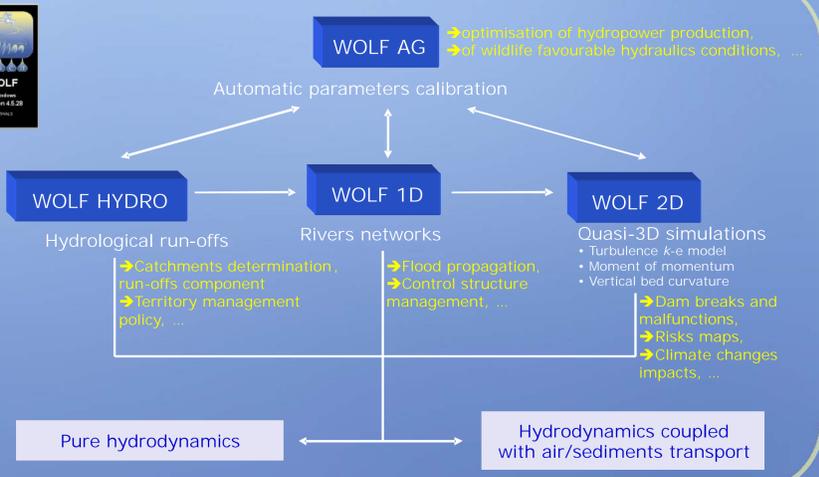


Innovative WOLF modules devoted to environmental investigations of hydrodynamics 2D modelling

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Single user interface for pre- and post-processing



WOLF : an integrated package of free surface flow models

The software package WOLF has been developed for almost ten years at the University of Liege (HACH). WOLF includes a complete set of numerical models for simulating free surface flows.

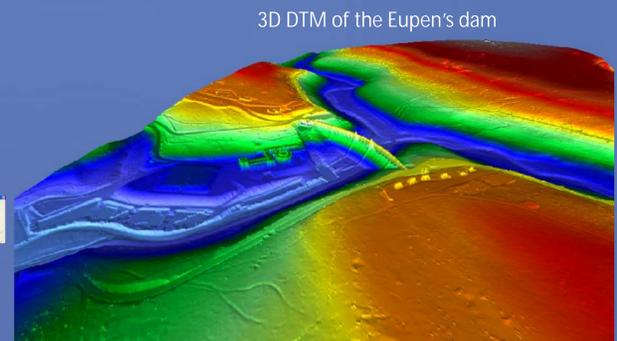
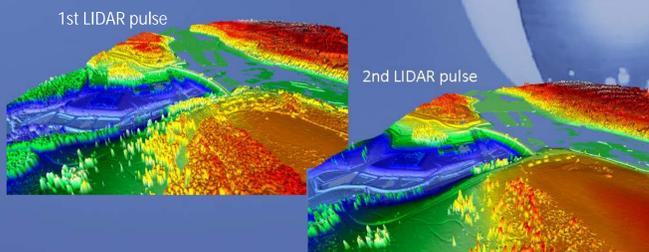
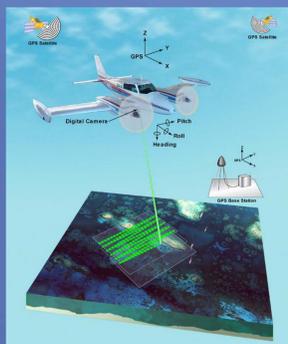
A user-friendly GIS interface makes the pre- and post-processing operations very convenient. Import and export operations are easily feasible from and to various classical GIS tools. Different layers of maps can be handled to analyse information related to topography, ground characteristics, vegetation density and hydrodynamic fields.

The validation of the models has been performed continuously for many years and is still running. Further researches are also currently undertaken.

A new pre-processing WOLF module : removal of obstacles not relevant to the flow. Automated elimination process of residual vegetation from LIDAR data (2nd pulse).

LIDAR (Light Detection and Ranging) is a remote sensing technology. Like the similar radar technology, which uses radio waves instead of light, the distance to an object is determined by measuring the time delay between transmission of the pulse and detection of the reflected signal.

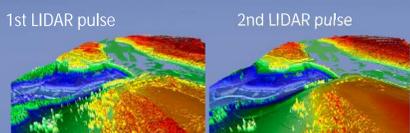
The algorithm is based on a slope analysis and on the hypothesis that the wooded area are more permeable to LIDAR pulses than others over grounded



DTM generation

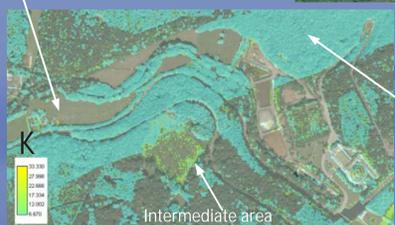
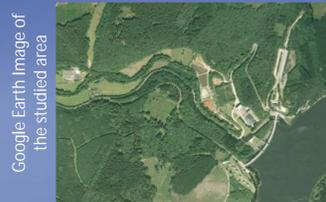
Manning roughness coefficients setting from land use maps in the framework of dam breaks and malfunctions. Illustration of the very extensive information contained in this kind of data.

Manning coefficient setting depends on LIDAR pulses differential : 3 classes are handled



Classification depends on the differential in meters :
 - <- - ; 1 { n = 0.03 ou K = 33.33
 - } ; -> n = 0.15 ou K = 6.67
 - { ; 2 } linear interpolation

Non wooded area K=33.33



Wooded area K=6.67

Manning coefficient setting depends on land use maps : 10 classes are handled

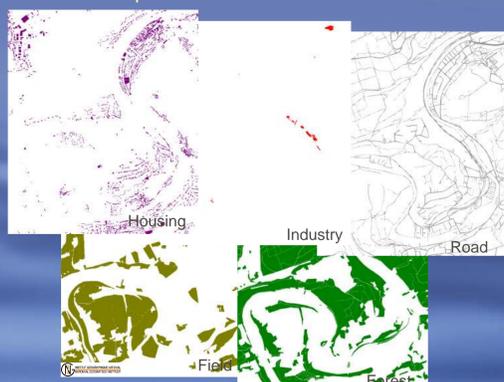
- Forest
 - Broad-leaved trees (0.09)
 - Conifers (0.15)
 - Mixed (0.12)
- Brushwoods, ... (0.05)
- Lawn, fields, ... (0.04)
- Nude ground (0.028)
- Roads (0.02)
- Railways (0.033)
- Hydrographic network (0.029)
- Buildings (0.025)



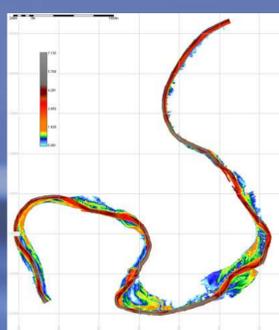
Roughness setting

Economic loss estimation with the application of a specific damage function using land use maps and WOLF 2D hydrodynamic modelling. This research is carried out in the framework of the climate changes impacts.

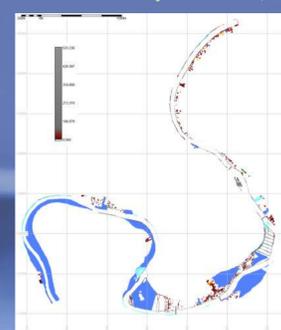
Land use maps



Water depth (WOLF 2D)

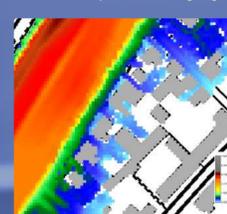


Damage map (economic loss estimation caused by a flood event)

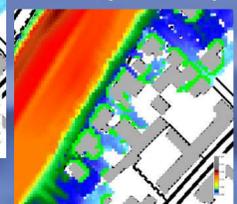


Methodology used for buildings

Water depth - buildings (grey)



Water depth interpolation inside the buildings from the edge



Damage map



Economic assessment