



New tools for LiDAR, forestry, river management and hydro-geomorphology in gvSIG

Andrea Antonello

Silvia Franceschi

gvSIG conference - Valencia 2015/12/03

HydroloGIS Environmental Engineering

HydroloGIS S.r.l. - Via Siemens, 19 - 39100 Bolzano

www.hydrologis.com



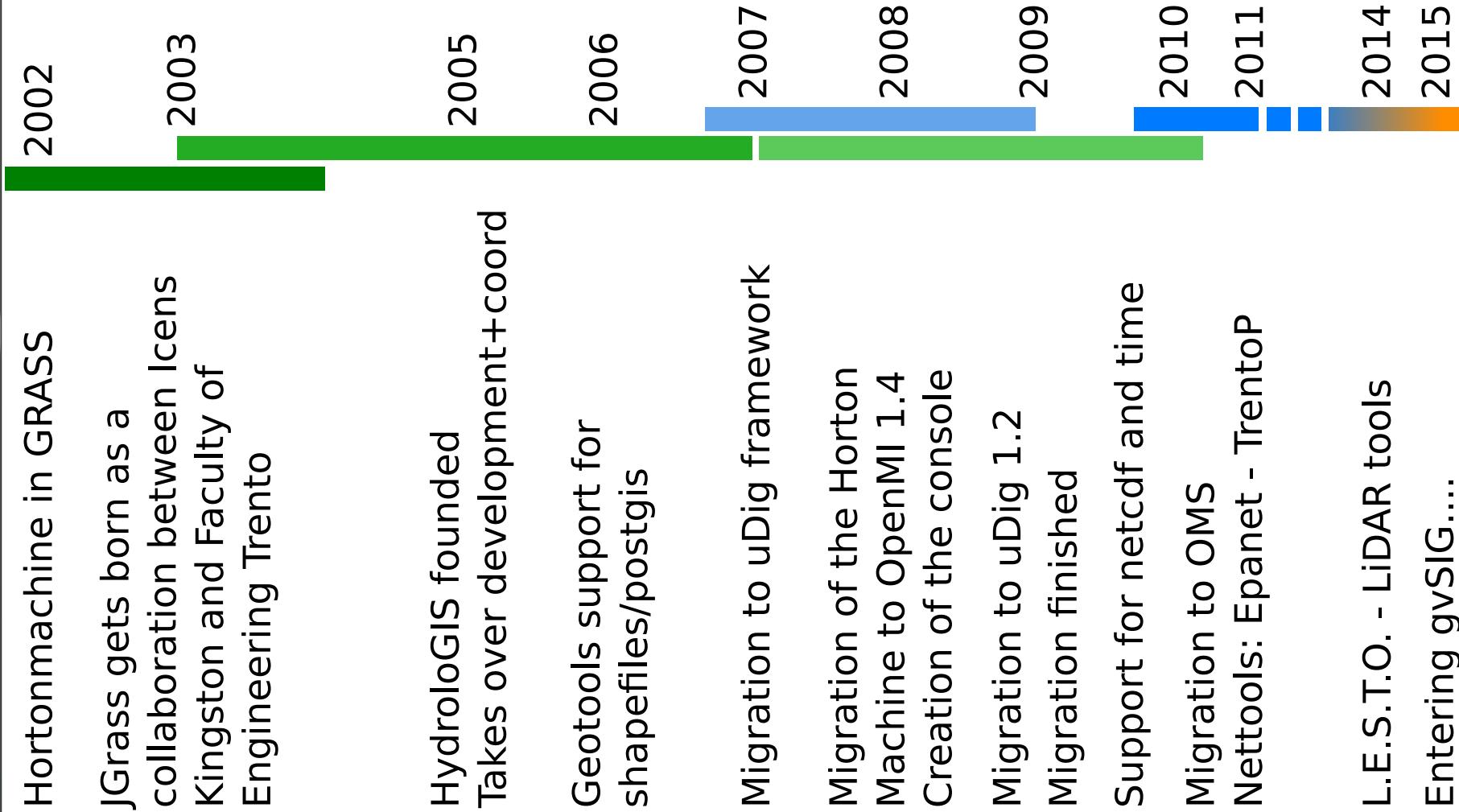


- cofounder of **HydroLoGIS** (www.hydrologis.com)
- **Osgeo** Charter Member and GFOSS advocate
- develop and coordinate **Geopaparazzi**
(www.geopaparazzi.eu)
- develop and coordinate the **JGrasstools** project
(www.jgrasstools.org)
- started integrating JGrasstools and Geopaparazzi in gvSIG



The JGrasstools Library

A library for focused on hydro-geomorphological analyses and environmental modelling in general.



The JGrasstools Spatial Toolbox

JGrasstools inside gvSIG:

Modules List

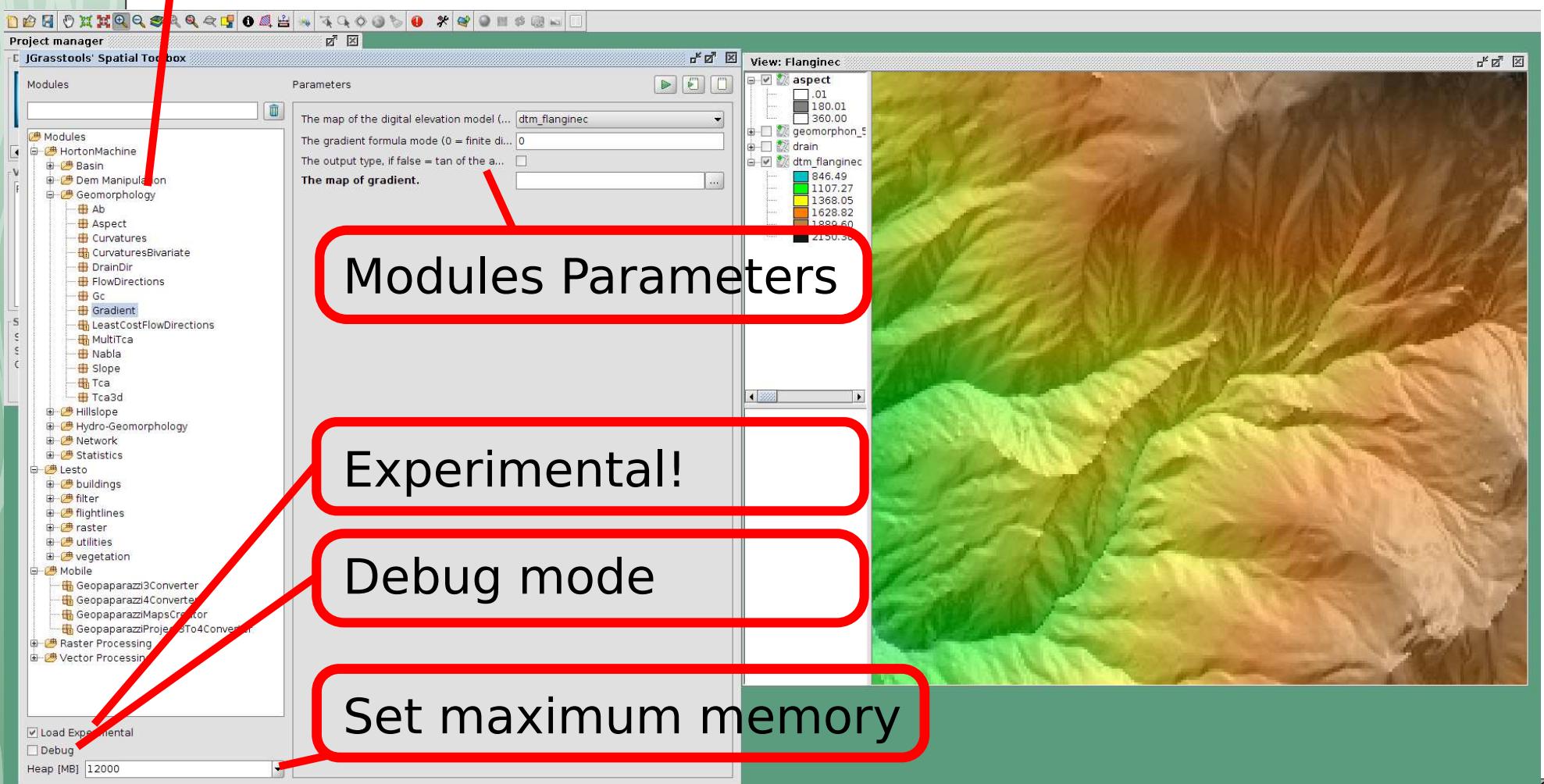


Modules Parameters

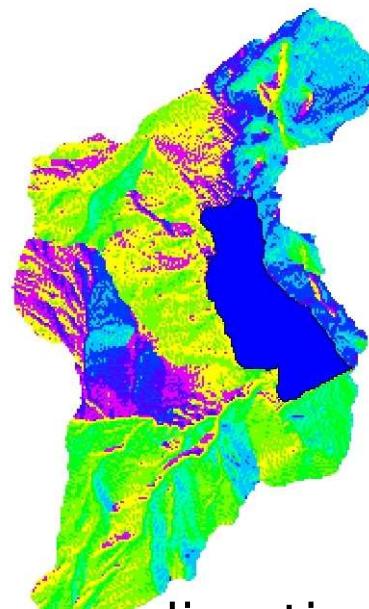
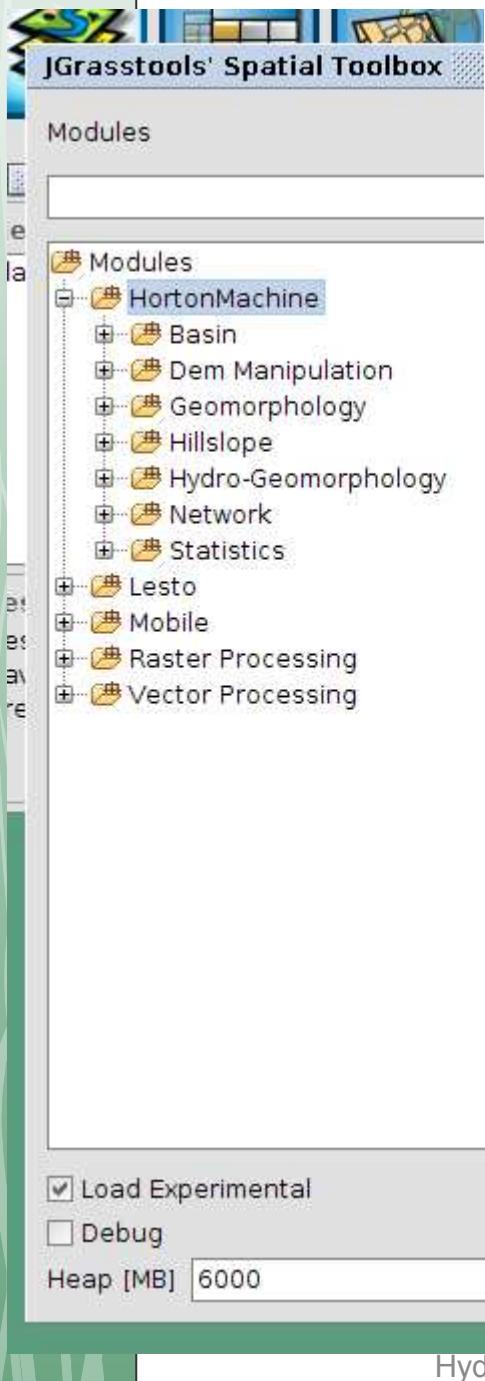
Experimental!

Debug mode

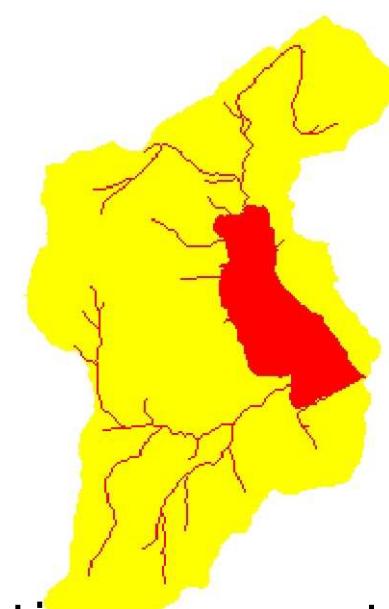
Set maximum memory



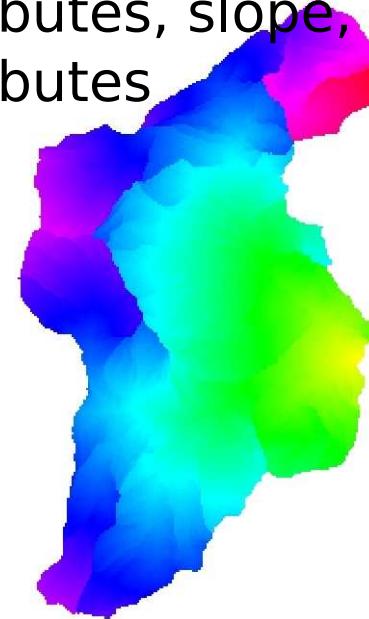
The Hortonmachine: hydro-geomorphology



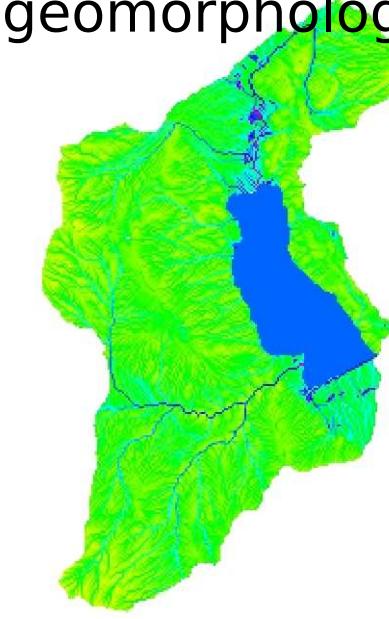
1
2
3
4
5
6
7
8
9
10



drainage direction, total contributing area, network extraction, rescaled distances and hydrologic attributes, slope, curvatures and geomorphologic attributes



13494
10120
6747
3373
0

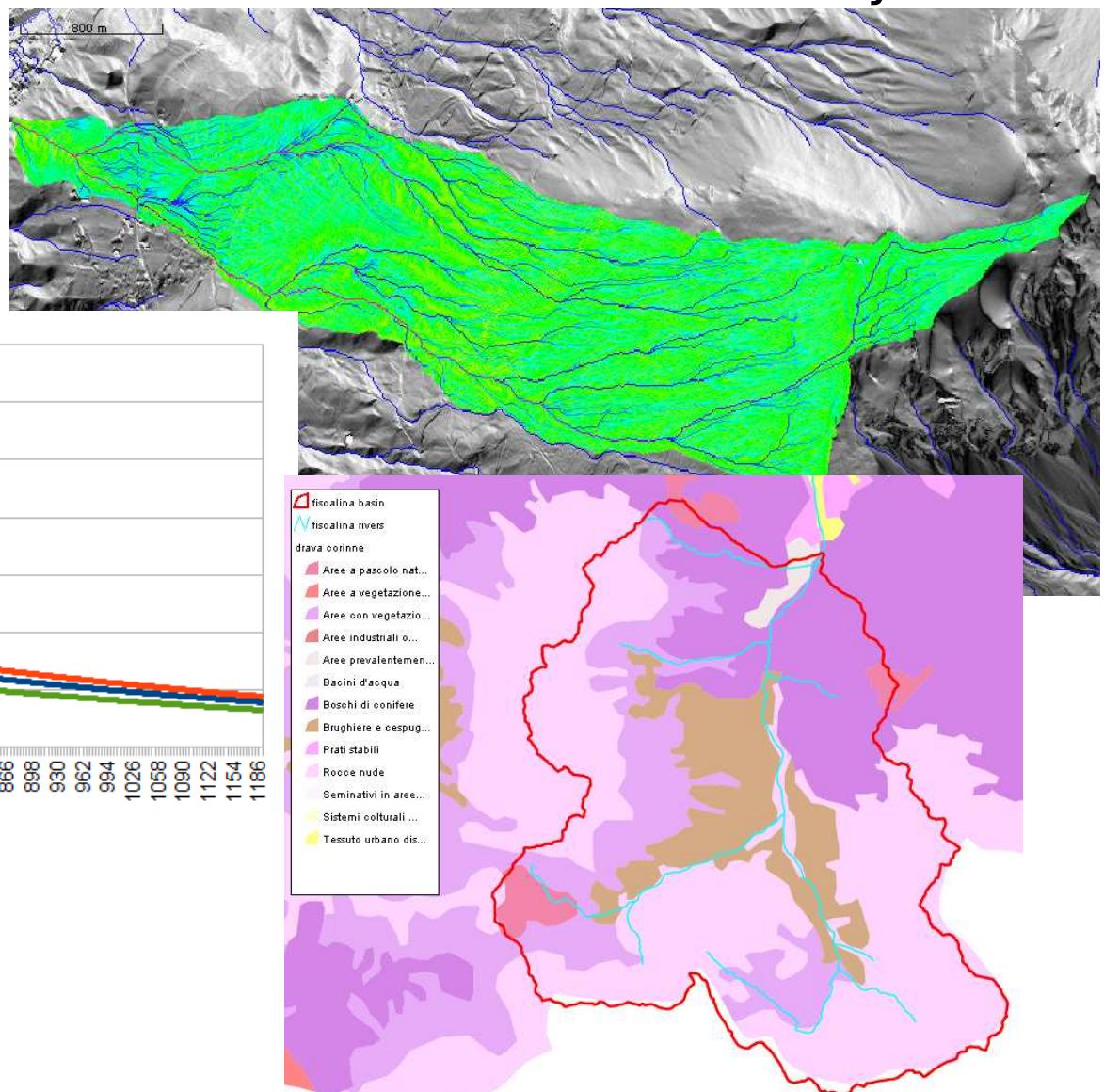
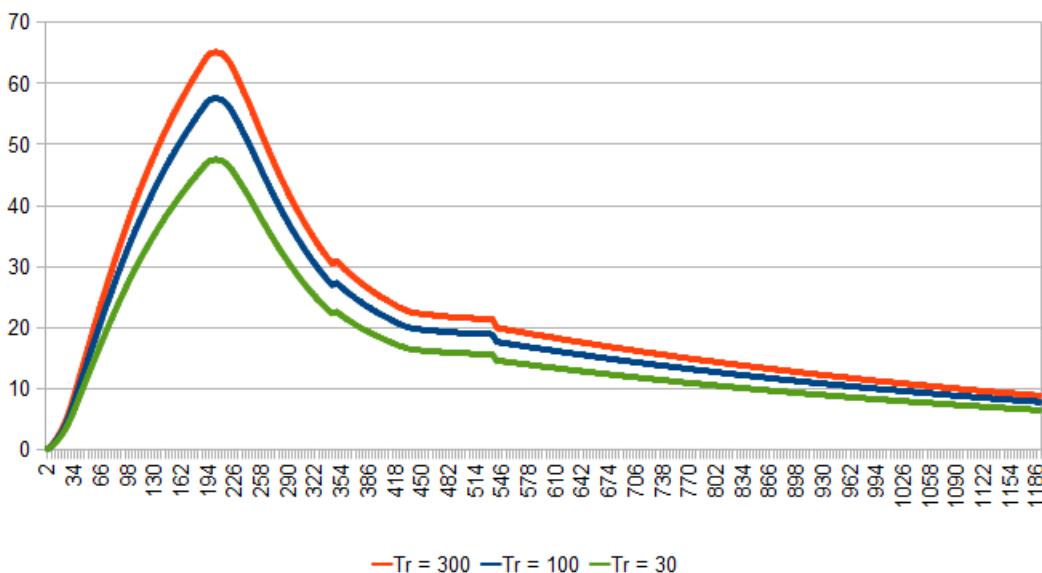


20.7
15.3
10.0
4.6
-0.8

The Hortonmachine: hydro-geomorphology

Evaluation of the maximum discharge for a given precipitation
(works also with statistical information rainfall Intensity-Duration
Curves)

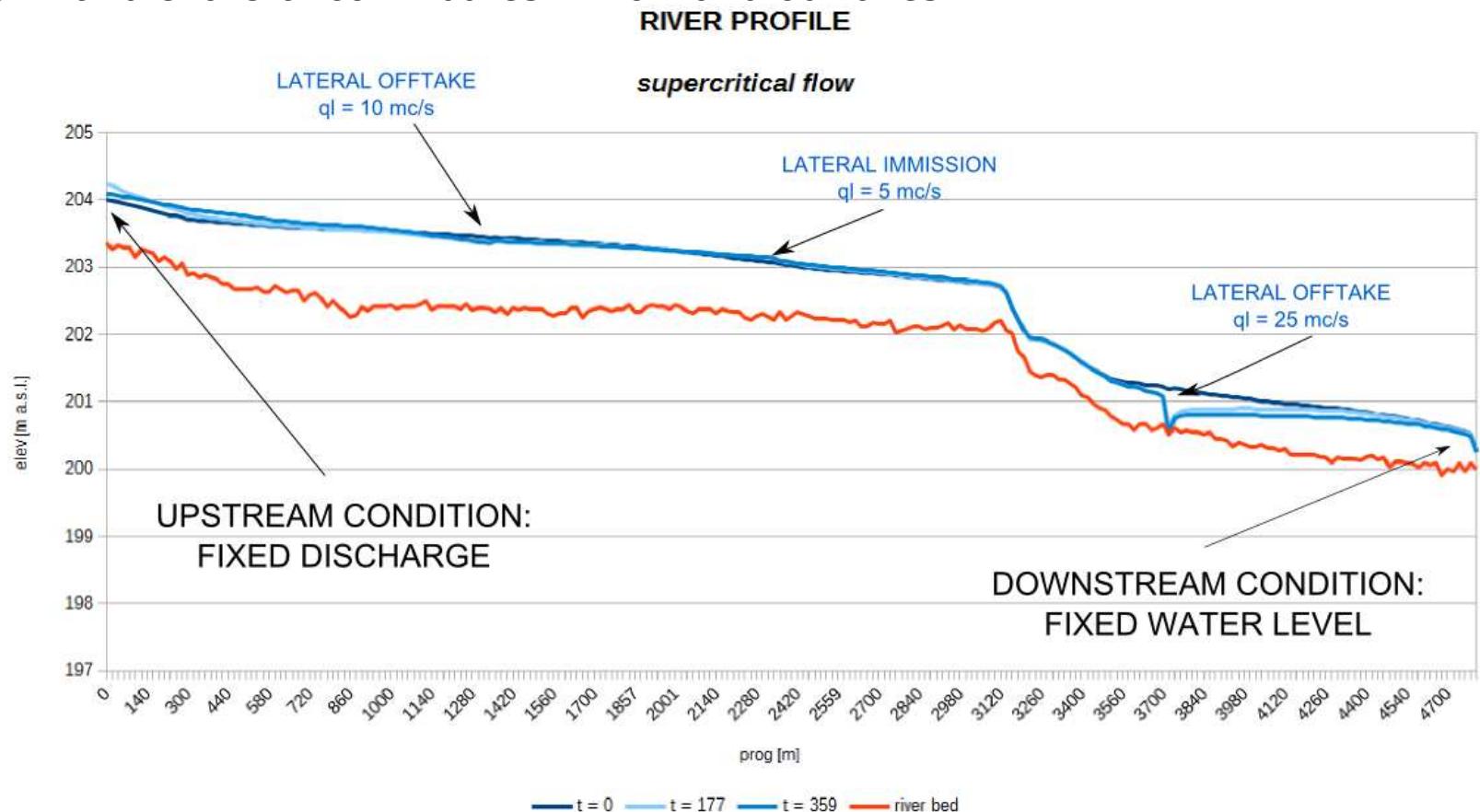
Peakflow



The Hortonmachine: hydro-geomorphology

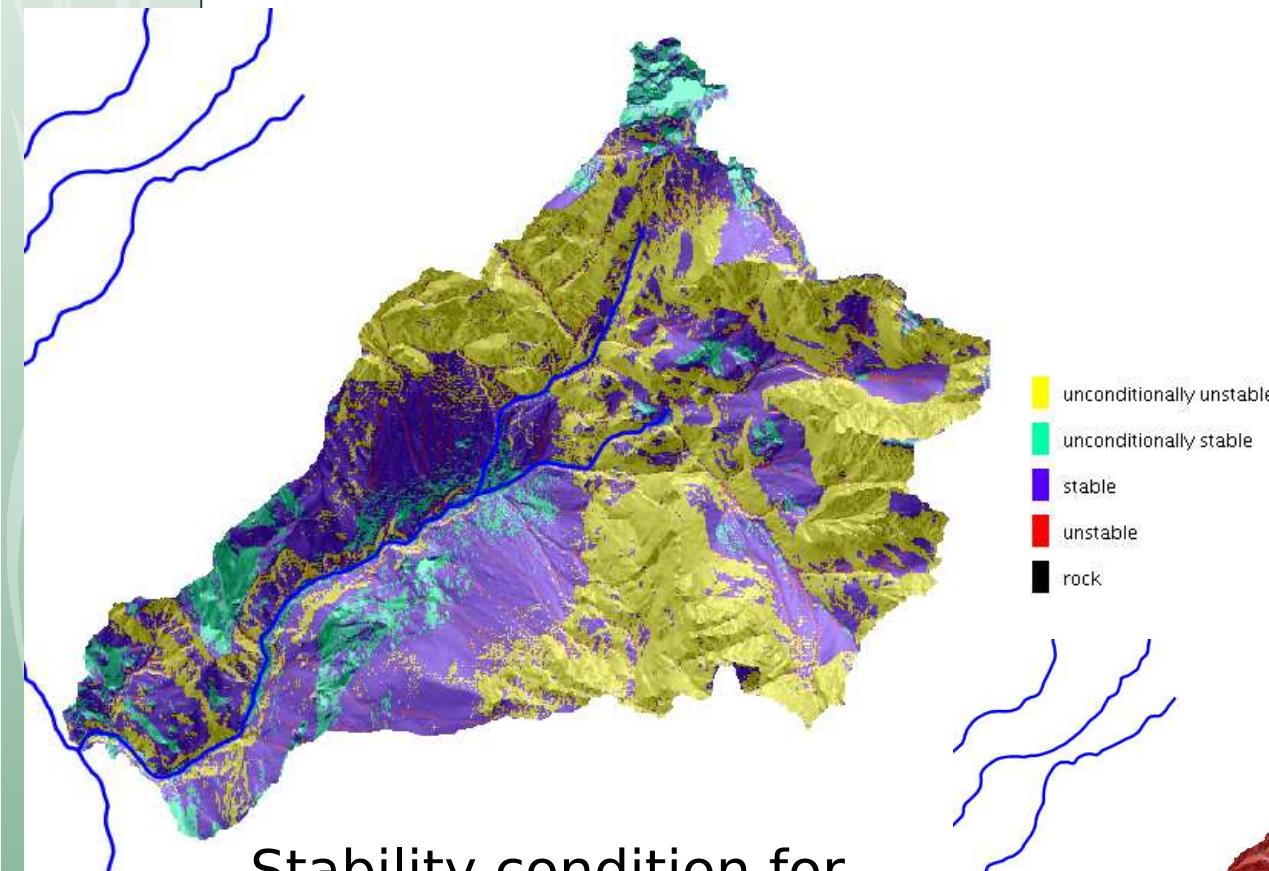
Simplified 1D hydraulic model:

- based on Saint Venant equations
- GIS based: input and output are GIS layers
- calculates the water depth and velocity for each section
- can handle lateral contributes: inflow and outtakes

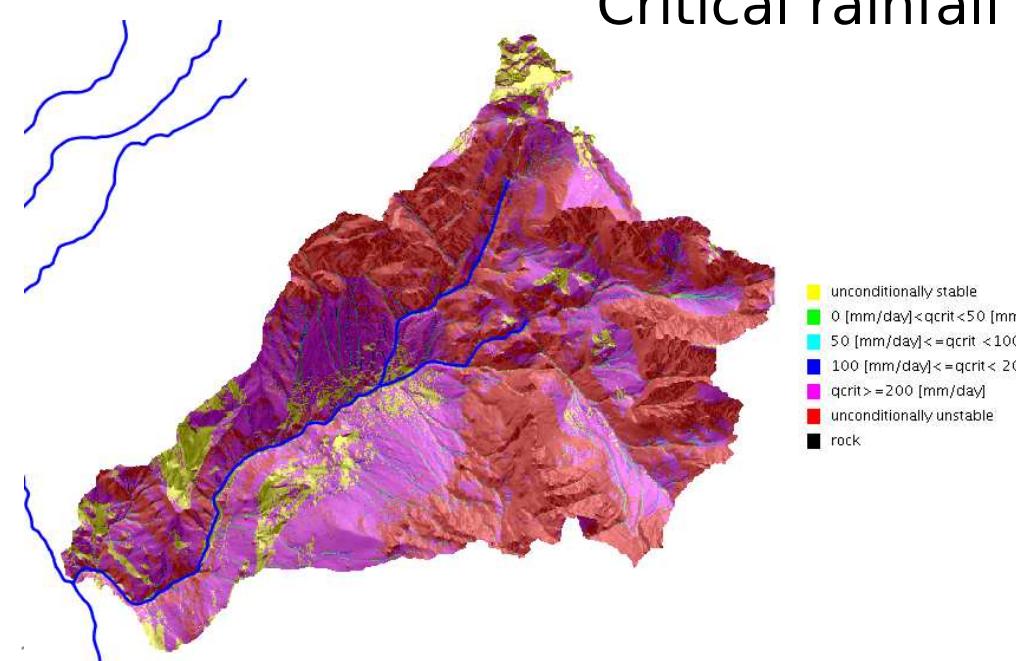


Data preparation for the **Hecras** hydraulic software for channels.

Evaluation of the hillslope stability: **Shalstab**



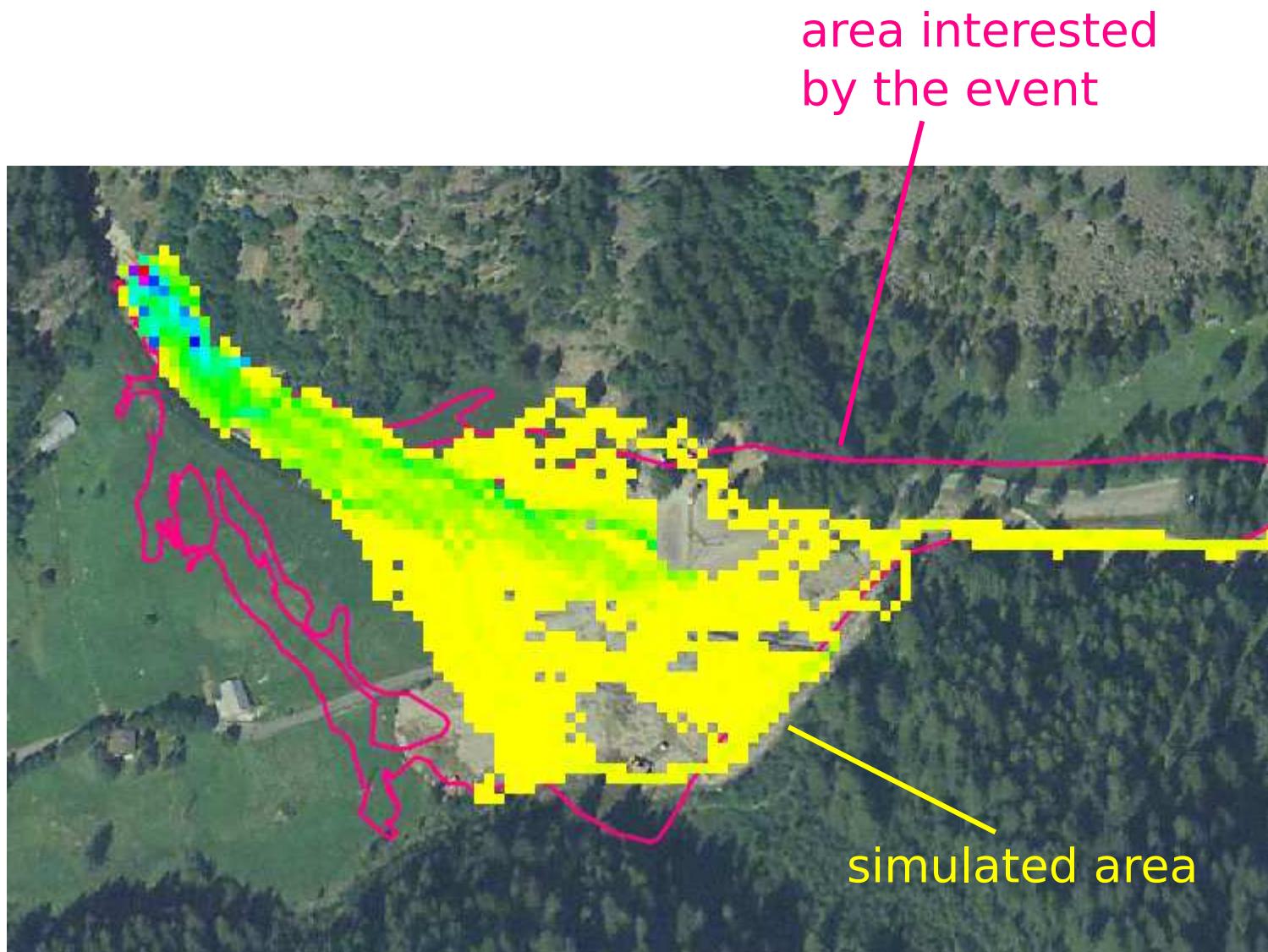
Stability condition for
the given precipitation

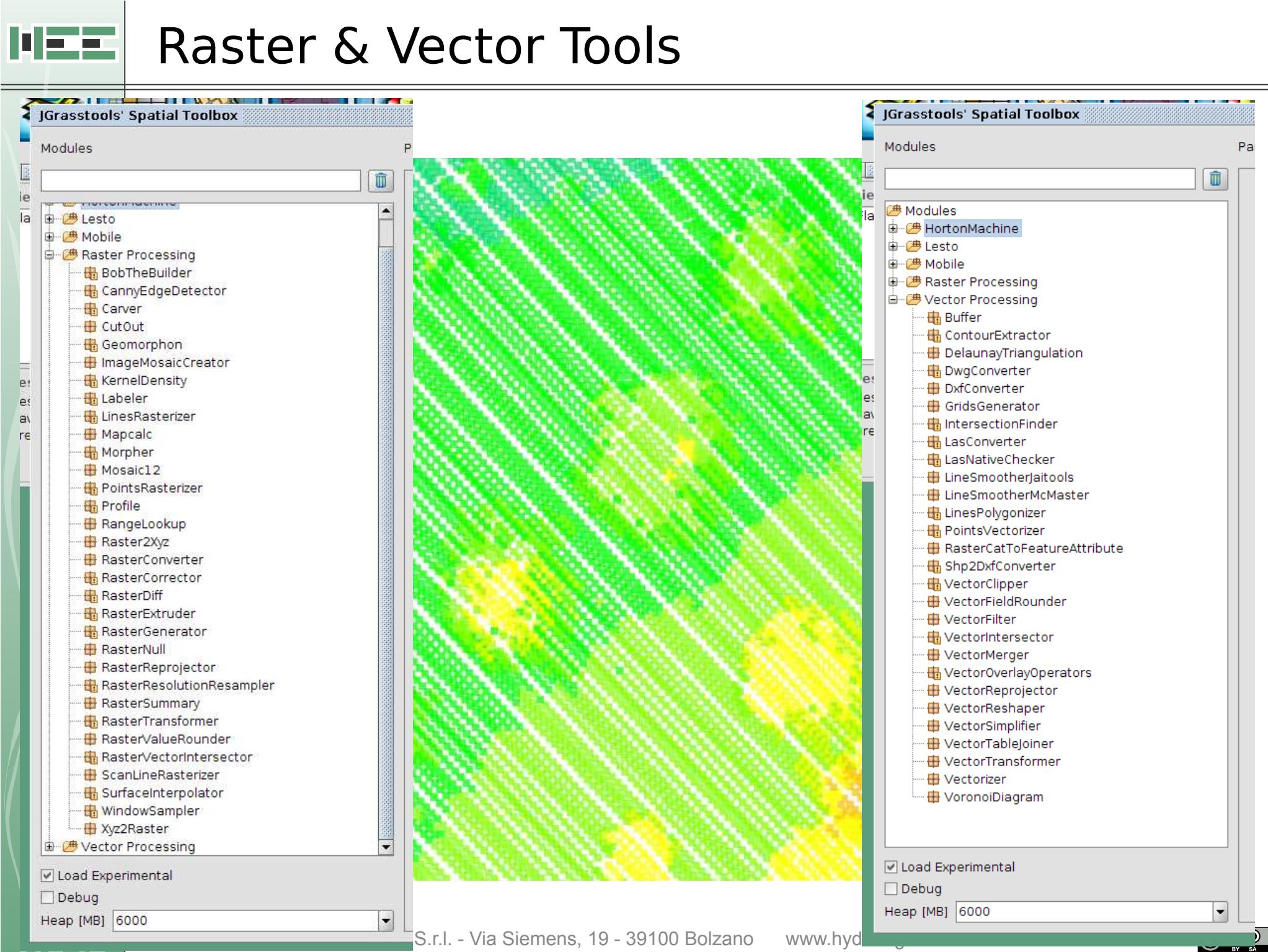


Critical rainfall

The Hortonmachine: hydro-geomorphology

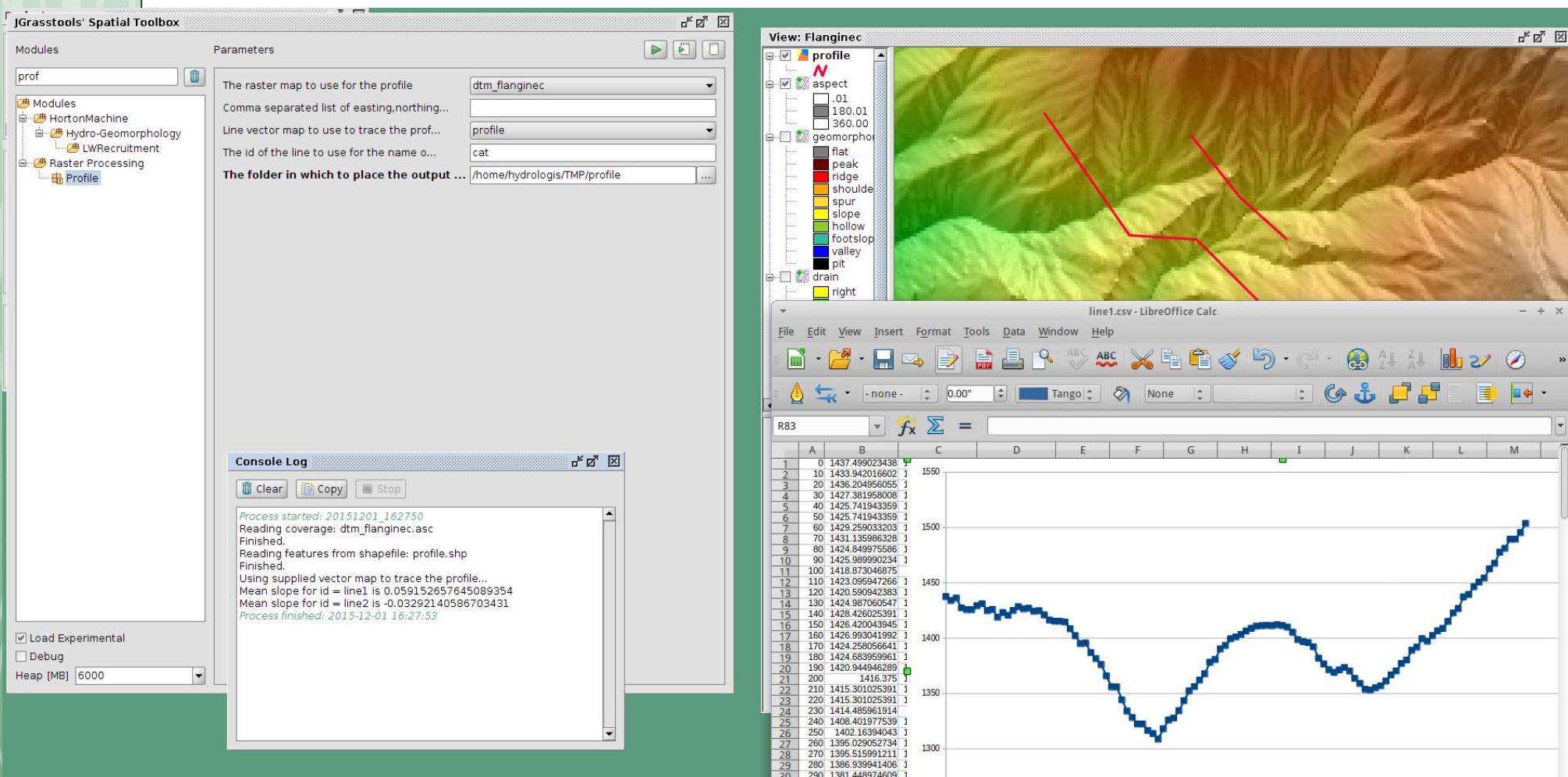
DebrisFlow: triggering, propagation in network, final propagation





Raster & Vector Tools

Extraction of shapefile **profiles** over the elevation model





Raster & Vector Tools

JGrasstools' Spatial Toolbox

Modules

- Lesto
- Mobile
- Raster Processing
 - BobTheBuilder
 - CannyEdgeDetector
 - Carver
 - CutOut
 - Geomorphon
 - ImageMosaicCreator
 - KernelDensity
 - Labeler
 - LinesRasterizer
 - Mapcalc
 - Morpher
 - Mosaic12
 - PointsRasterizer

Parameters

The input raster: dtm_flanginec

The vector map containing the polygonal ...

The vector map containing the points tha...

The maximum radius to use for interpolat... 2

The field of the elevations map that con... elev

Switch that defines if the module should...

Switch that defines if the module should...

Switch that defines if the module should...

The modified raster map.

Load Experimental

Debug

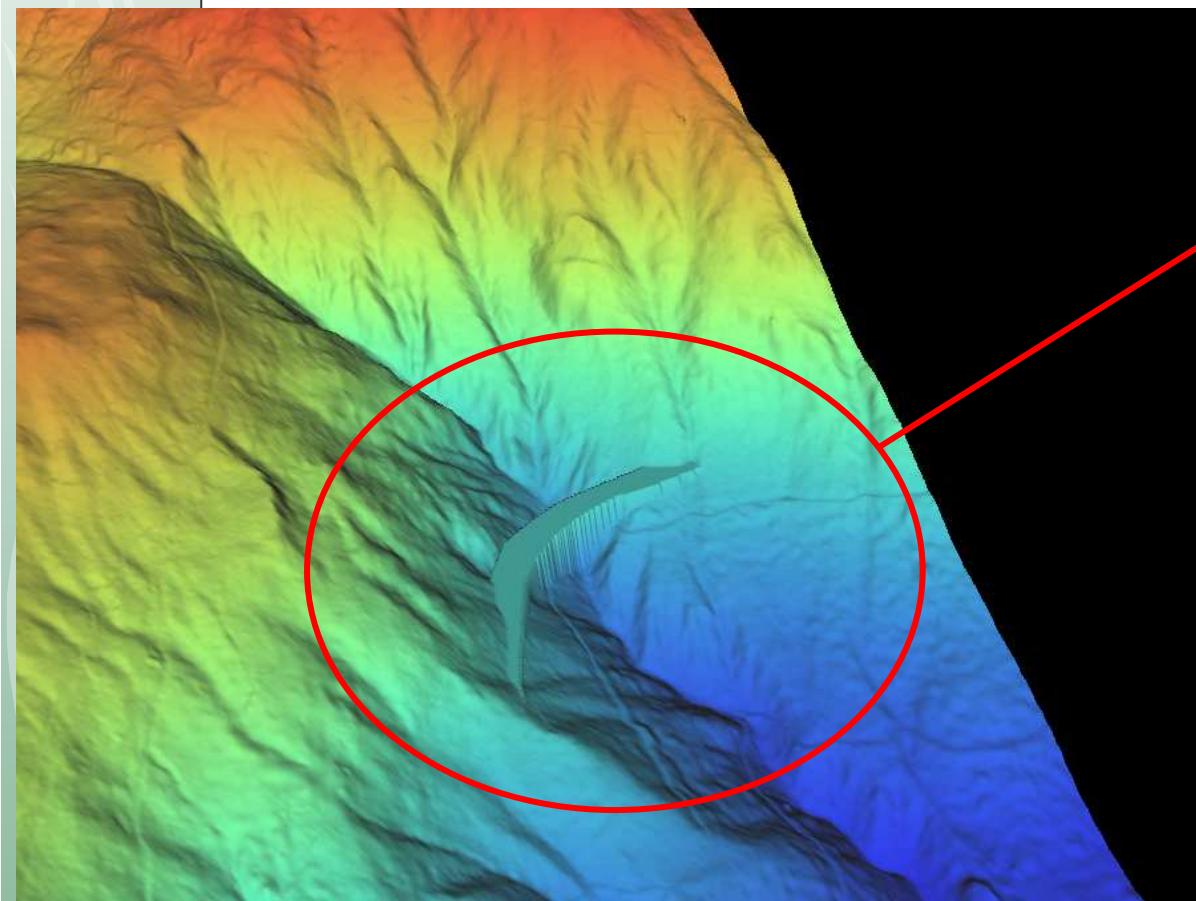
Heap [MB] 6000

Bob the Builder

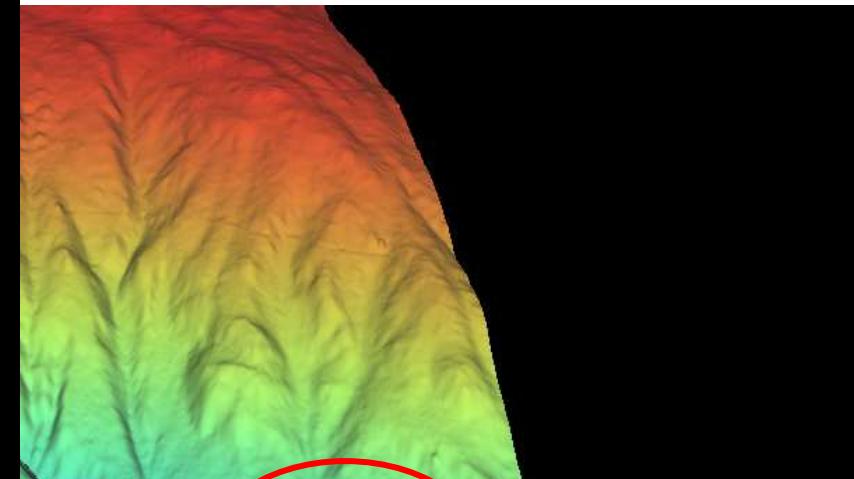
Modelling of artifacts
in the elevation model



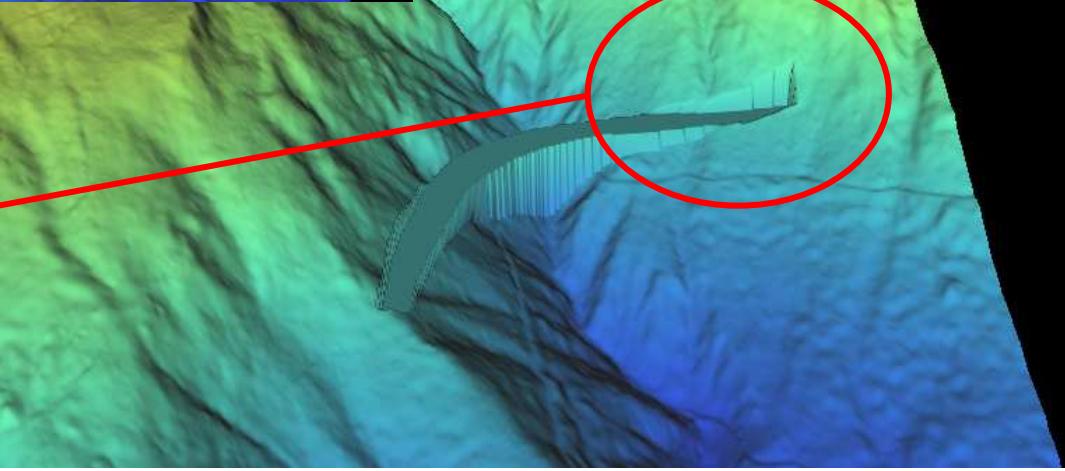
Raster & Vector Tools



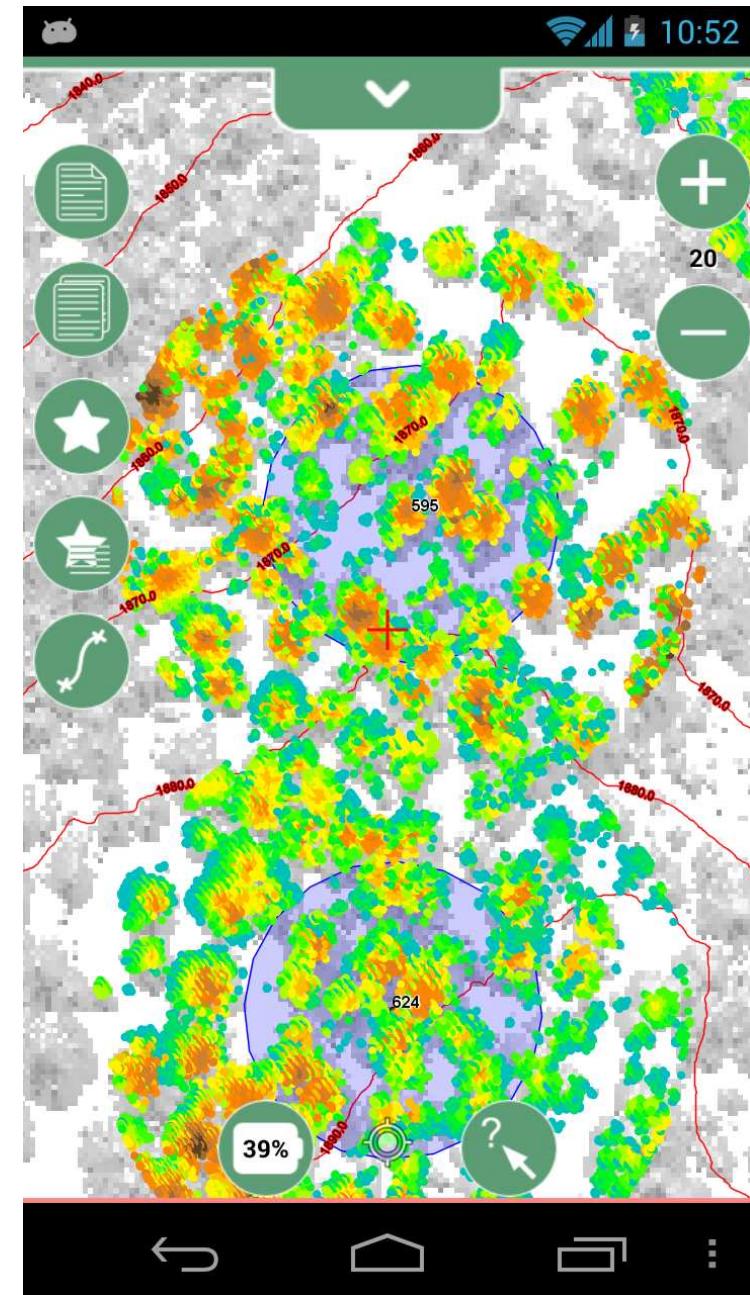
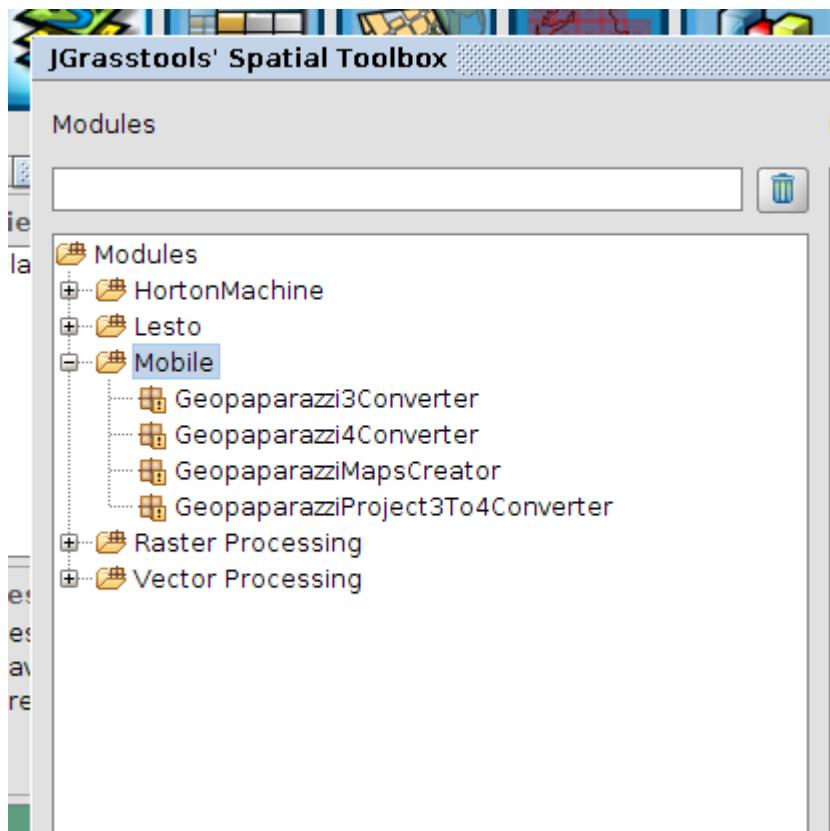
Bob the builder
result



with
erosion



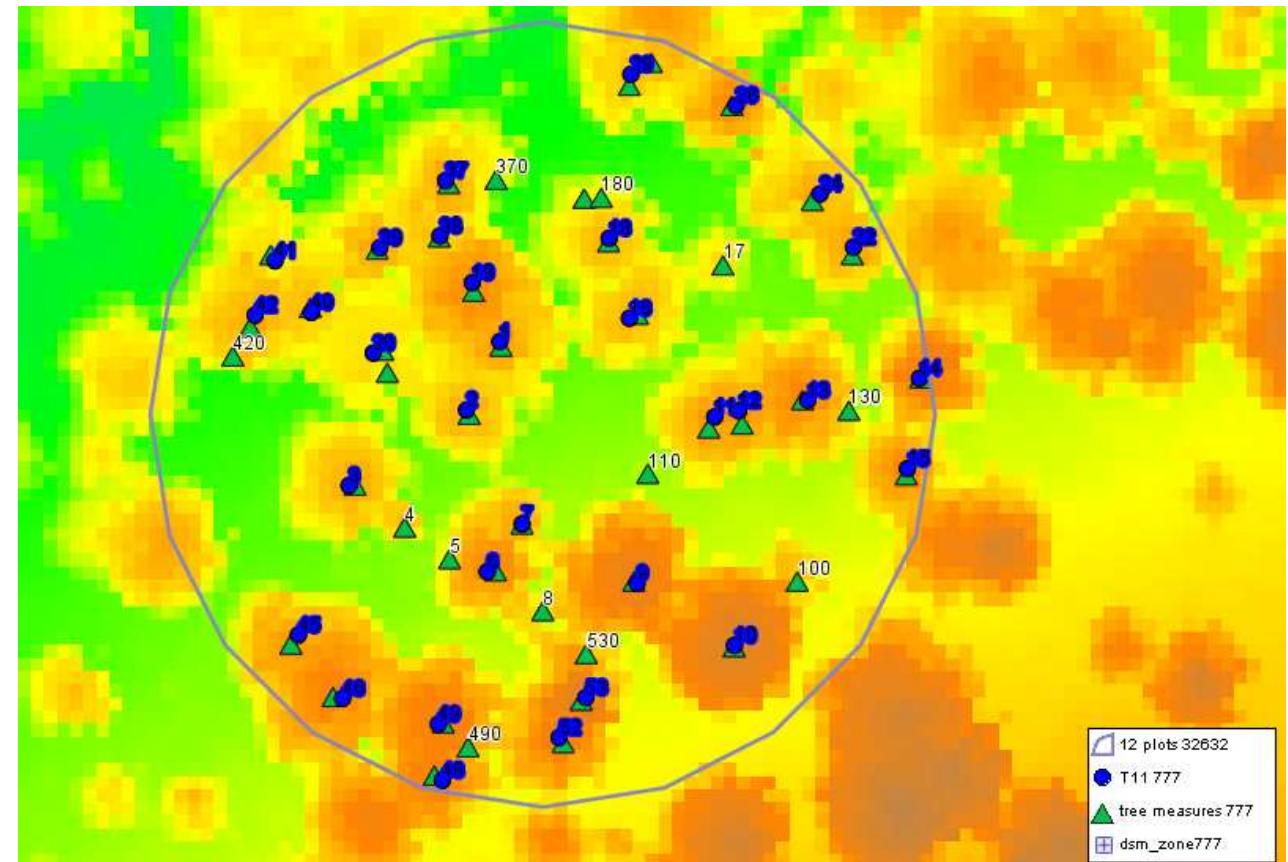
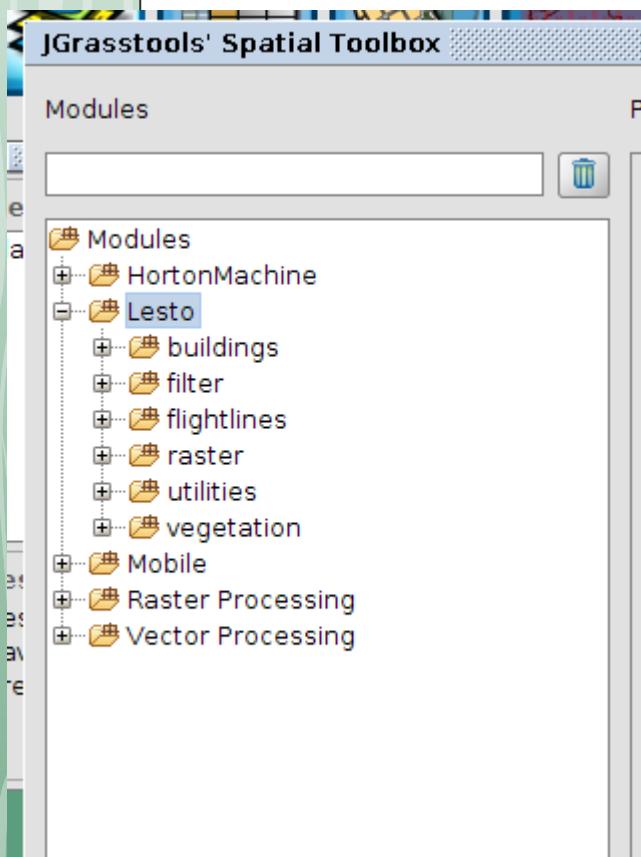
Prepare data and evaluate
data from/to **Geopaparazzi***



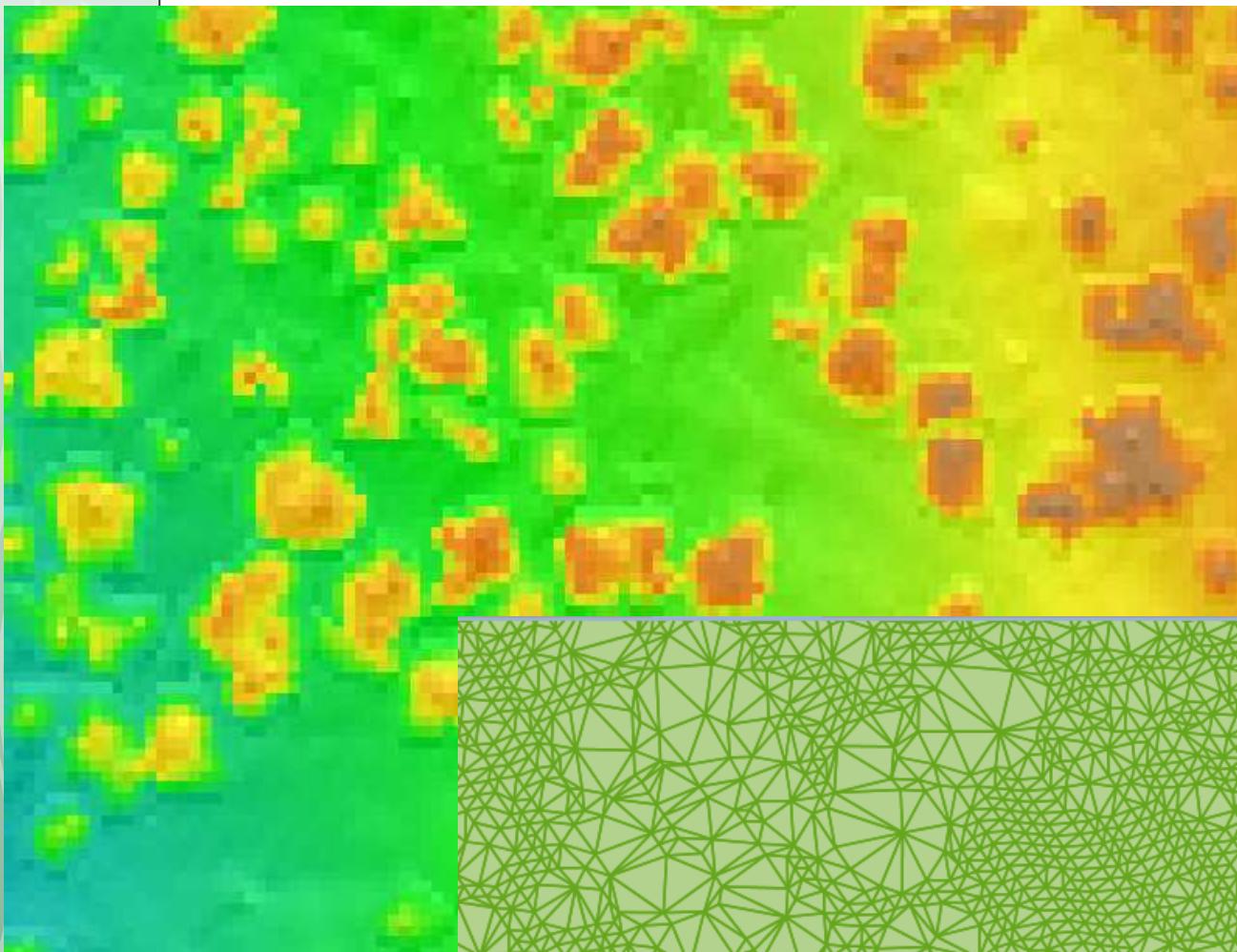
* <http://www.geopaparazzi.eu>

LESTO

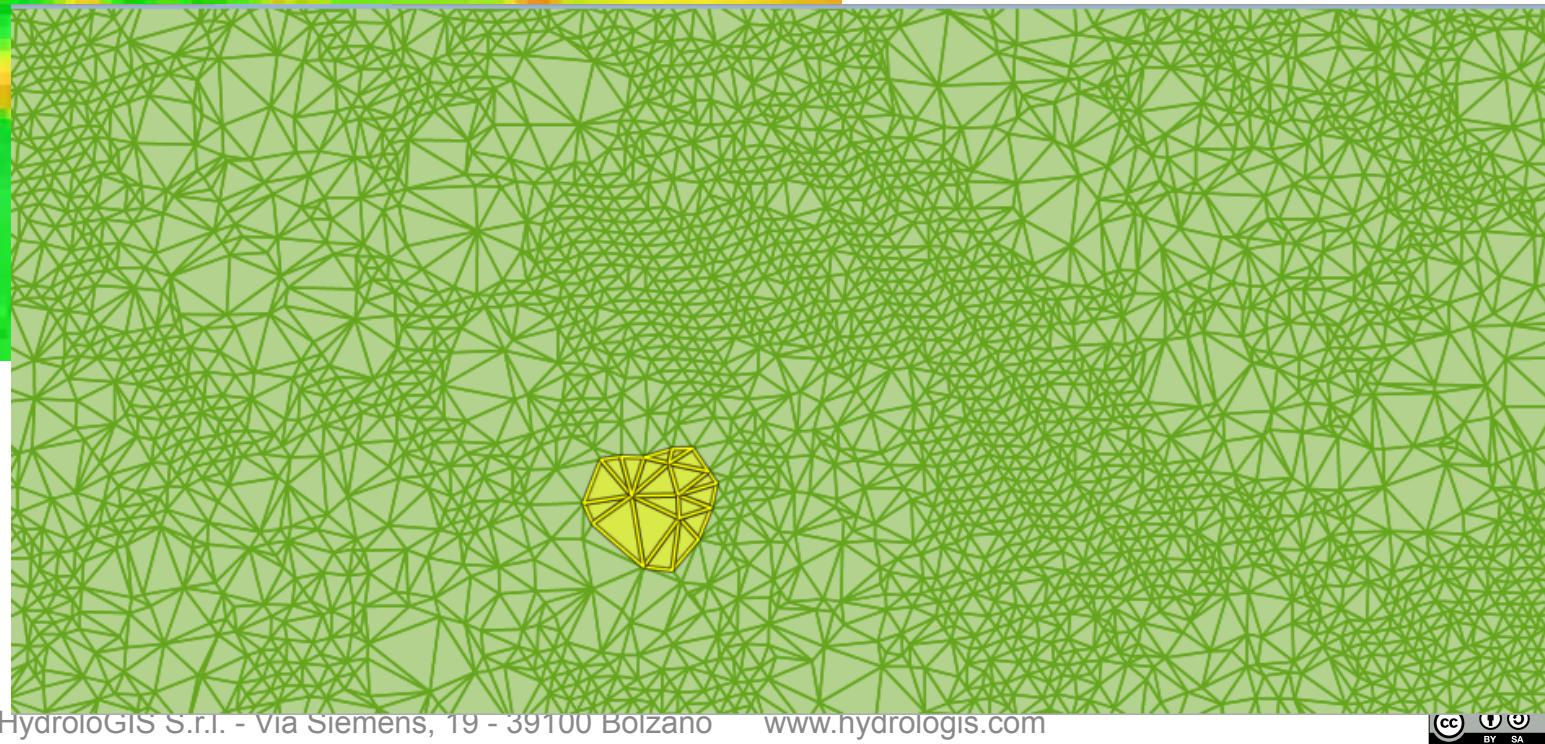
LiDAR Empowered Sciences Toolbox Opensource



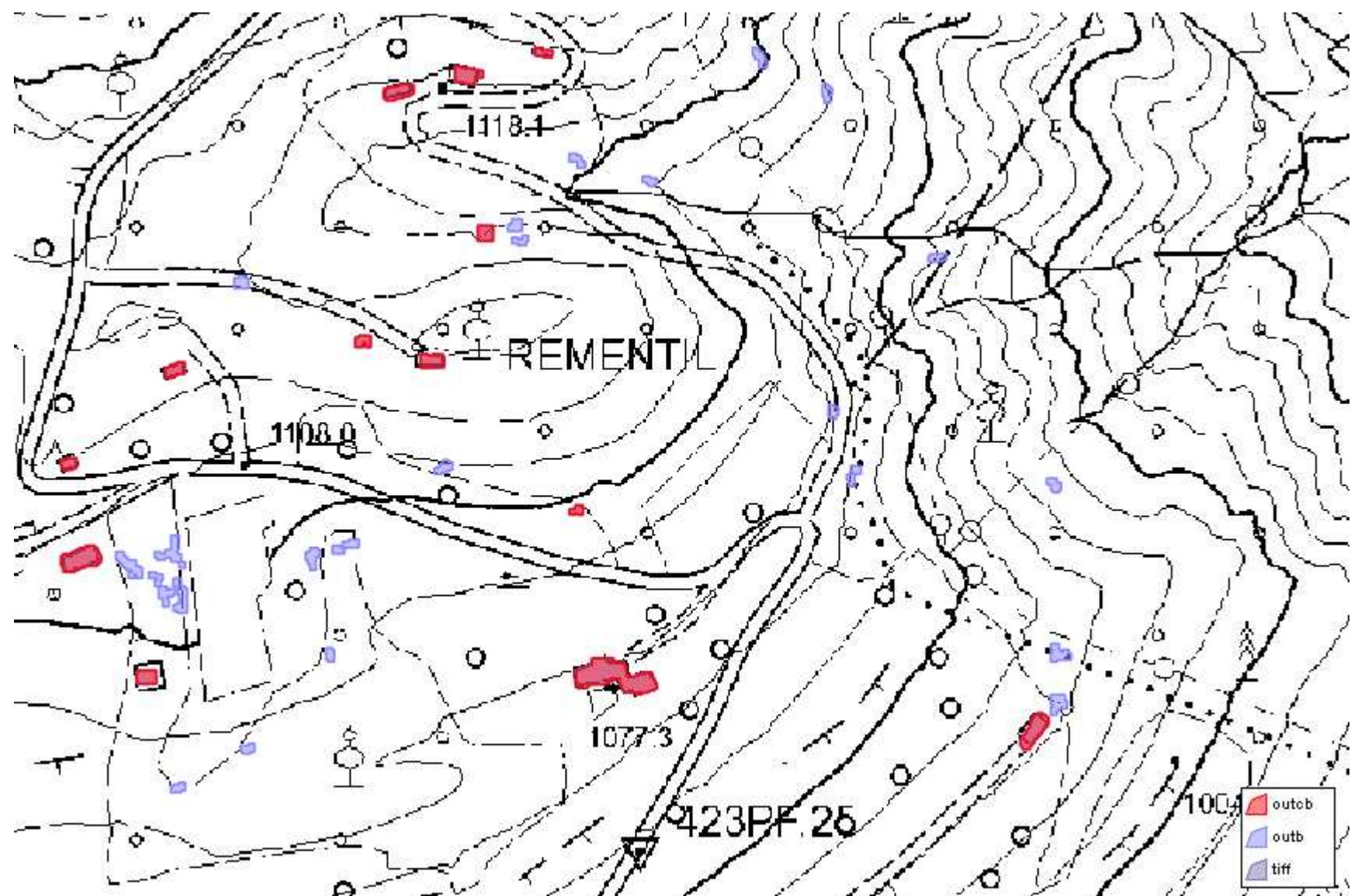
Developed in collaboration with the Free University of Bolzano. The toolbox is initially mainly dedicated to forestry analysis.



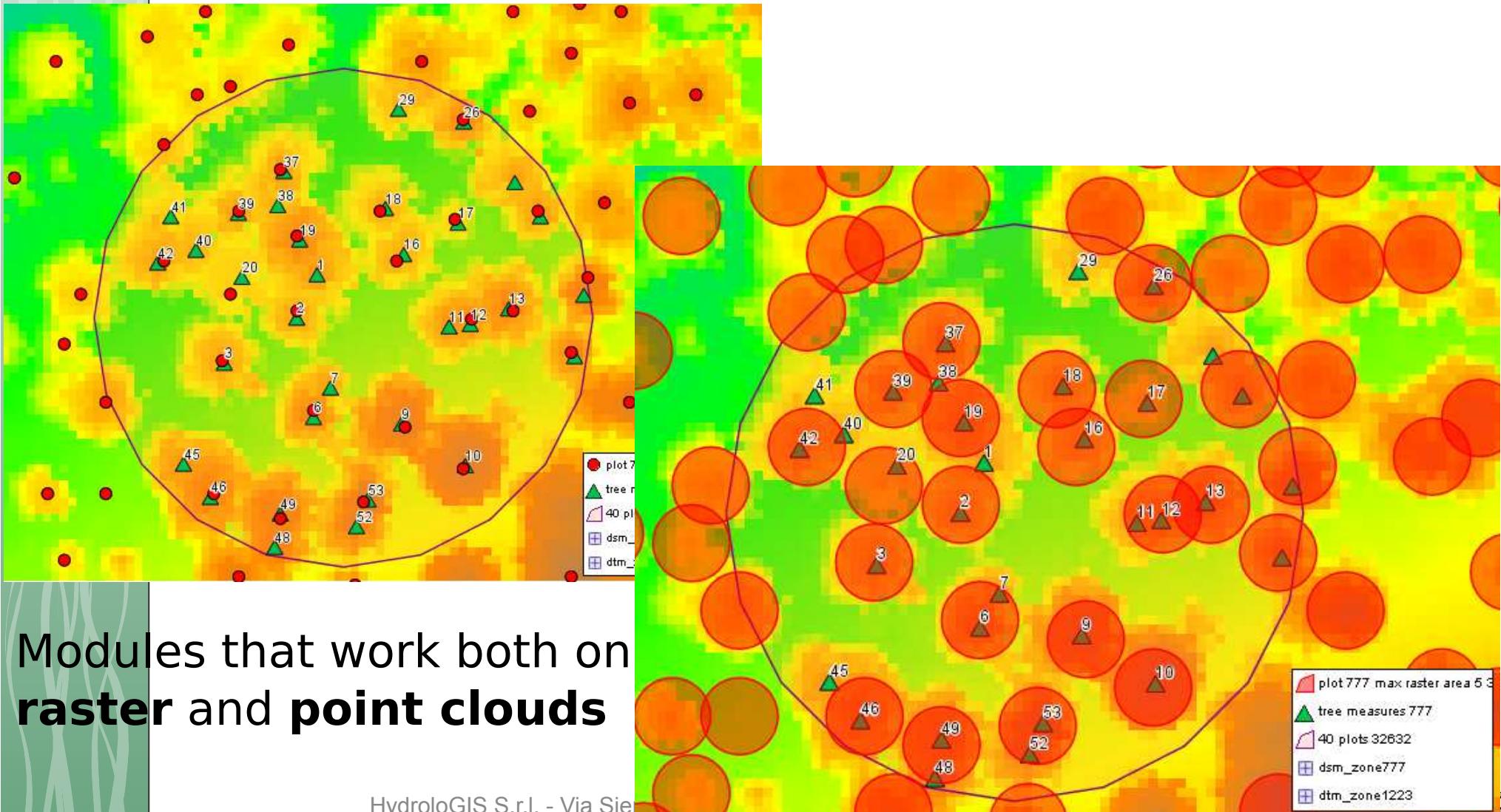
Adaptive tin,
generation of DTM
from LiDAR datasets



Extraction of buildings from LiDAR datasets



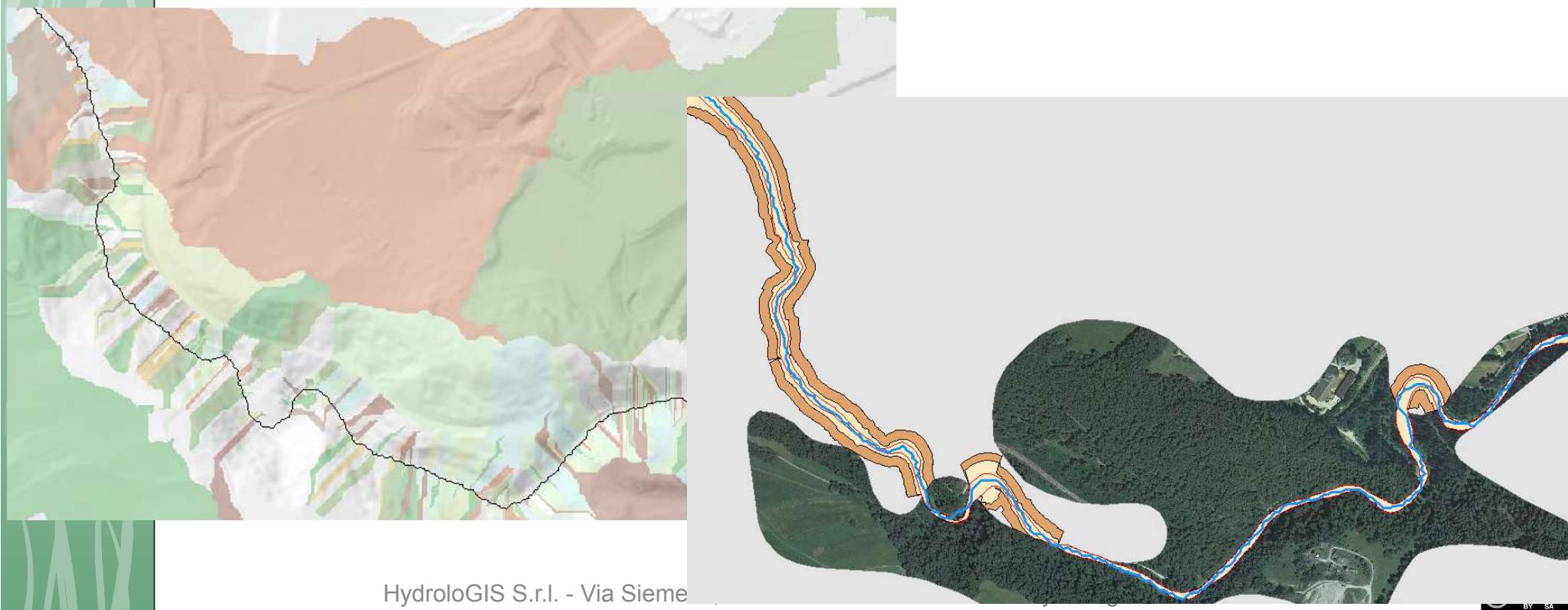
Vegetation: individual tree crown approaches are followed, aimed to detect position and main characteristics of each single tree.



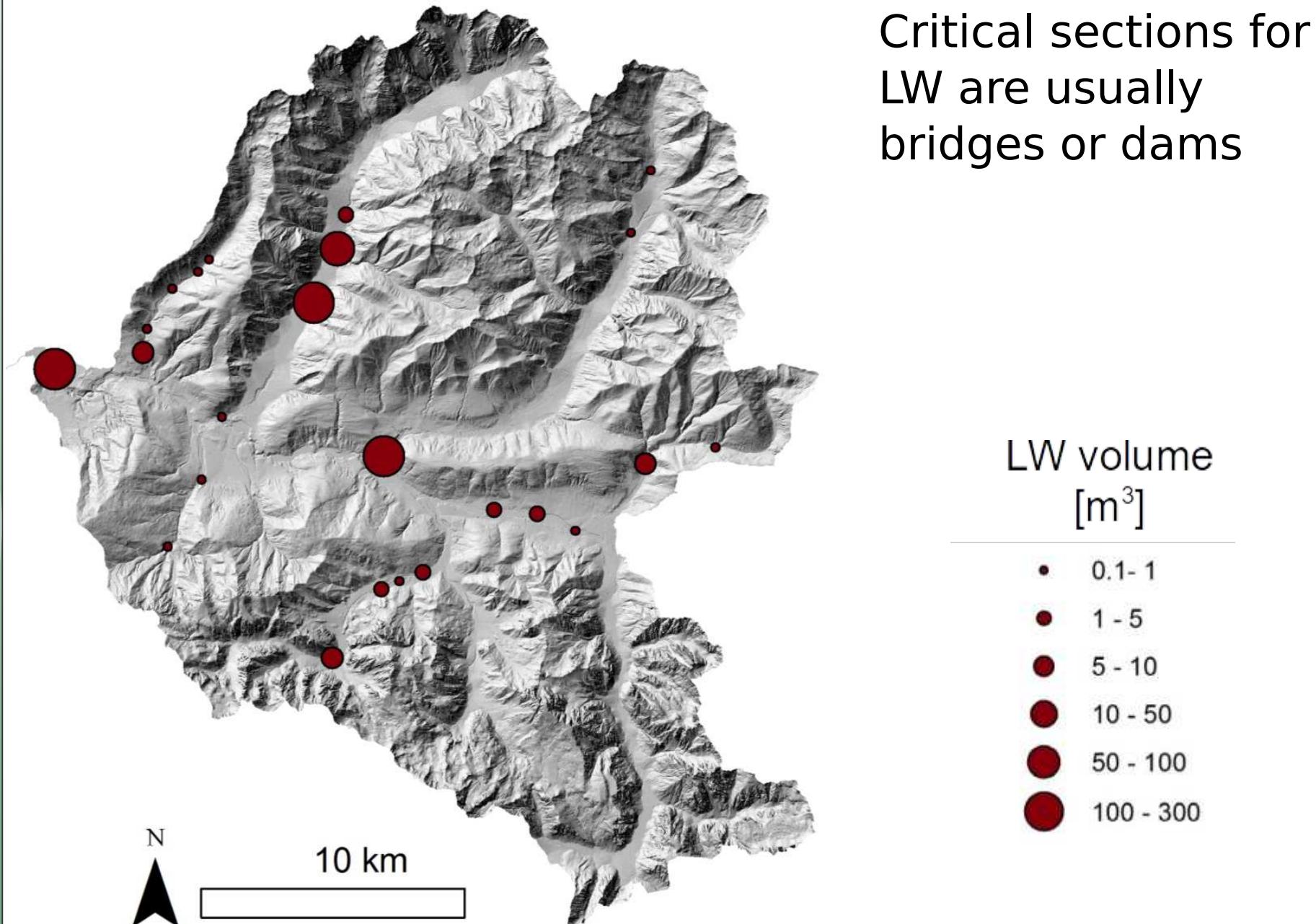
Large Wood contribution during floods

Developed during the Google Summer of Code 2014.

- GIS-based tool for predicting the magnitude of LW transport during flood events at any given section within a river basin (Lucía et al, 2014)
- two main processes related to wood debris:
 - * LW recruitment from hillslopes
 - * LW transport/propagation along the network



Large Wood contribution during floods



Questions?

Homepage: <http://www.jgrasstools.org>

Need help? **Join the Mailinglist.**
<http://groups.google.com/group/jgrasstools>

Useful links:

<http://jgrasstechtips.blogspot.it>

<http://www.slideshare.net/search/slideshow?q=jgrasstools>