



# Flow-R

Fast and versatile software for run-out assessment of gravitational hazards

Terranum



# What is Flow-R?

Flow-R is software for rapid, reliable, and user-friendly modeling of natural hazard propagation. Flow-R allows rapid assessment of the propagation area based on several published empirical run-out models at local and regional scales.

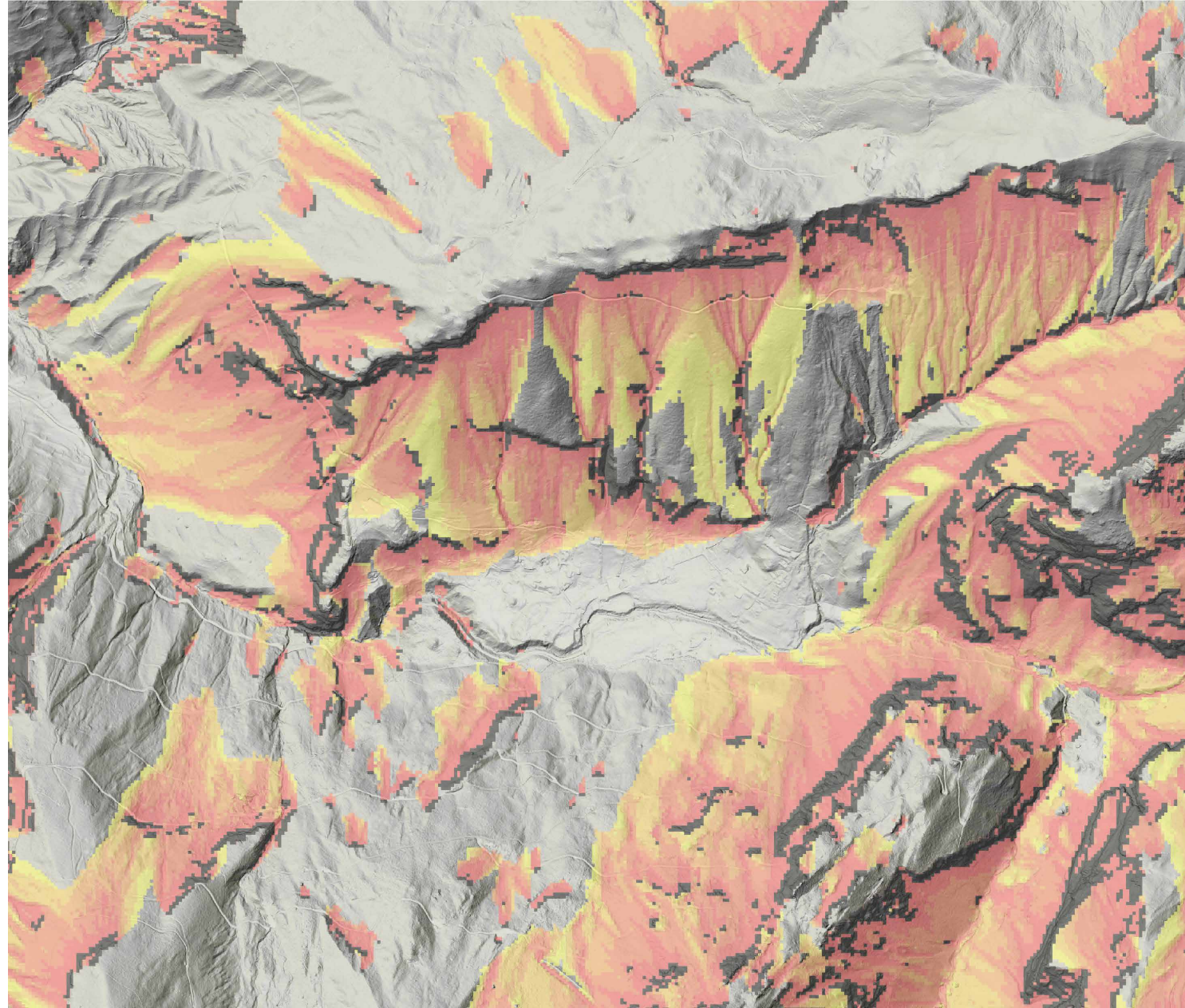
It is optimized for regional susceptibility mapping of gravitational hazards, such as :

- Debris flows
- Rockfalls
- Rock avalanches
- Shallow landslides
- Snow avalanches

Flow-R supports susceptibility mapping to depict areas prone to natural hazards. These maps are an essential tool for land-use planners to identify quickly and efficiently settlements, infrastructure, and communication networks potentially threatened by natural hazards.

[More online](#)

# Main features



> Rockfall reach susceptibility map

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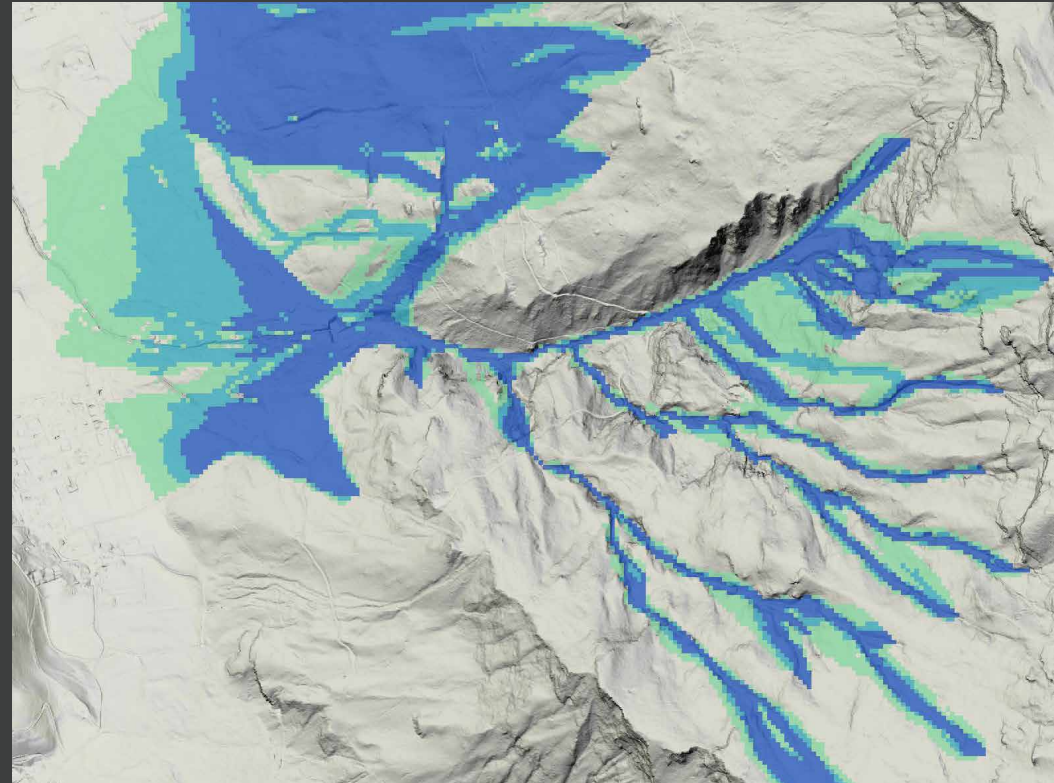
## 1. Probabilistic approach

Flow-R uses a probabilistic approach to model the propagation of gravitational hazards from user-defined source areas. It results in the total perimeter encompassing all possible propagations, which leads to susceptibility maps that are similar to the reach probability used in hazard mapping

## 2. Wide range of algorithms

Flow-R includes a wide range of algorithms for the lateral spreading of a mass movement coupled with several simple friction models that control the run-out distance of the flow.

› Debris-flow propagation areas resulting from different spreading and friction parameters.





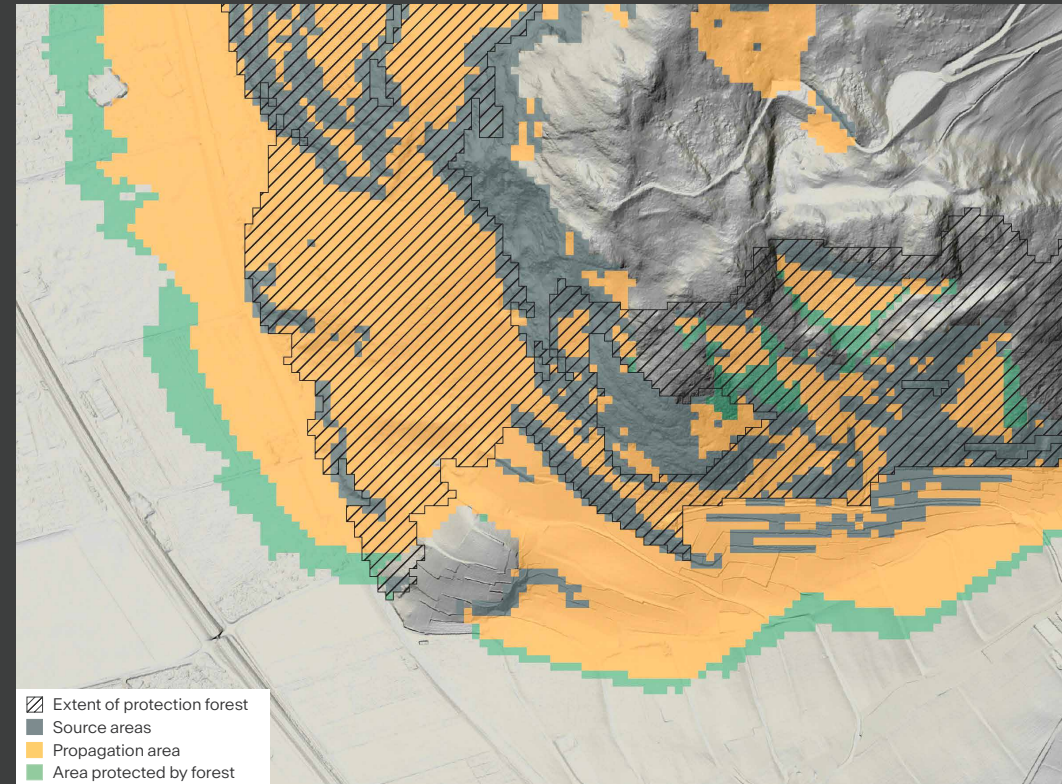
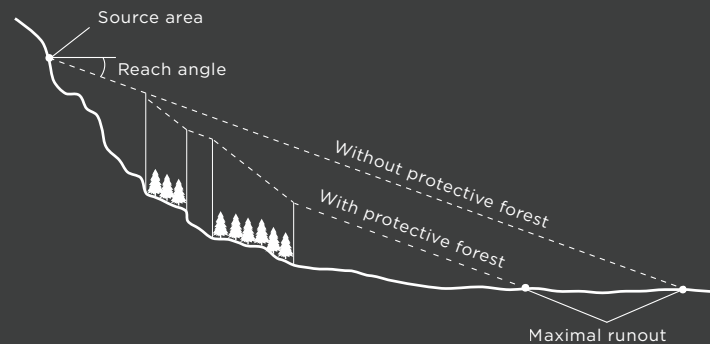
# Main features

## 3. Realistic propagations

Up to date with recent academic research, Flow-R has demonstrated the capability to model reliable and realistic propagations for different gravitational hazards at various scales.

## 4. Effect of protection forest & mitigation measures

The protective effect of forests or other mitigation measures can be assessed using a spatially-variable travel angle.



^ Rockfalls : effect of protection forest.

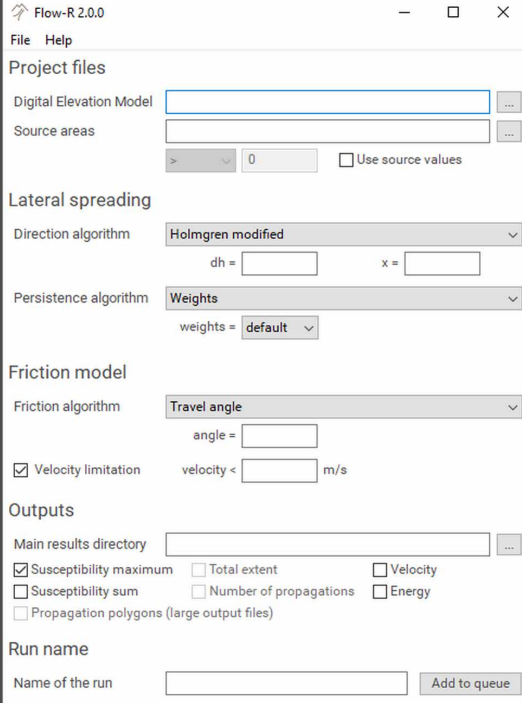
# Main features

## 5. Flexible input data

The choice of inputs and algorithms is open to the user, making Flow-R adaptable to various applications and available datasets. Required input data include a Digital Elevation Model and a raster file with source areas prepared in any GIS software. Flow-R supports all common types of raster files.

## 6. Data export

The generated output files are saved as raster files or shapefiles for further treatment with any standard GIS tool.

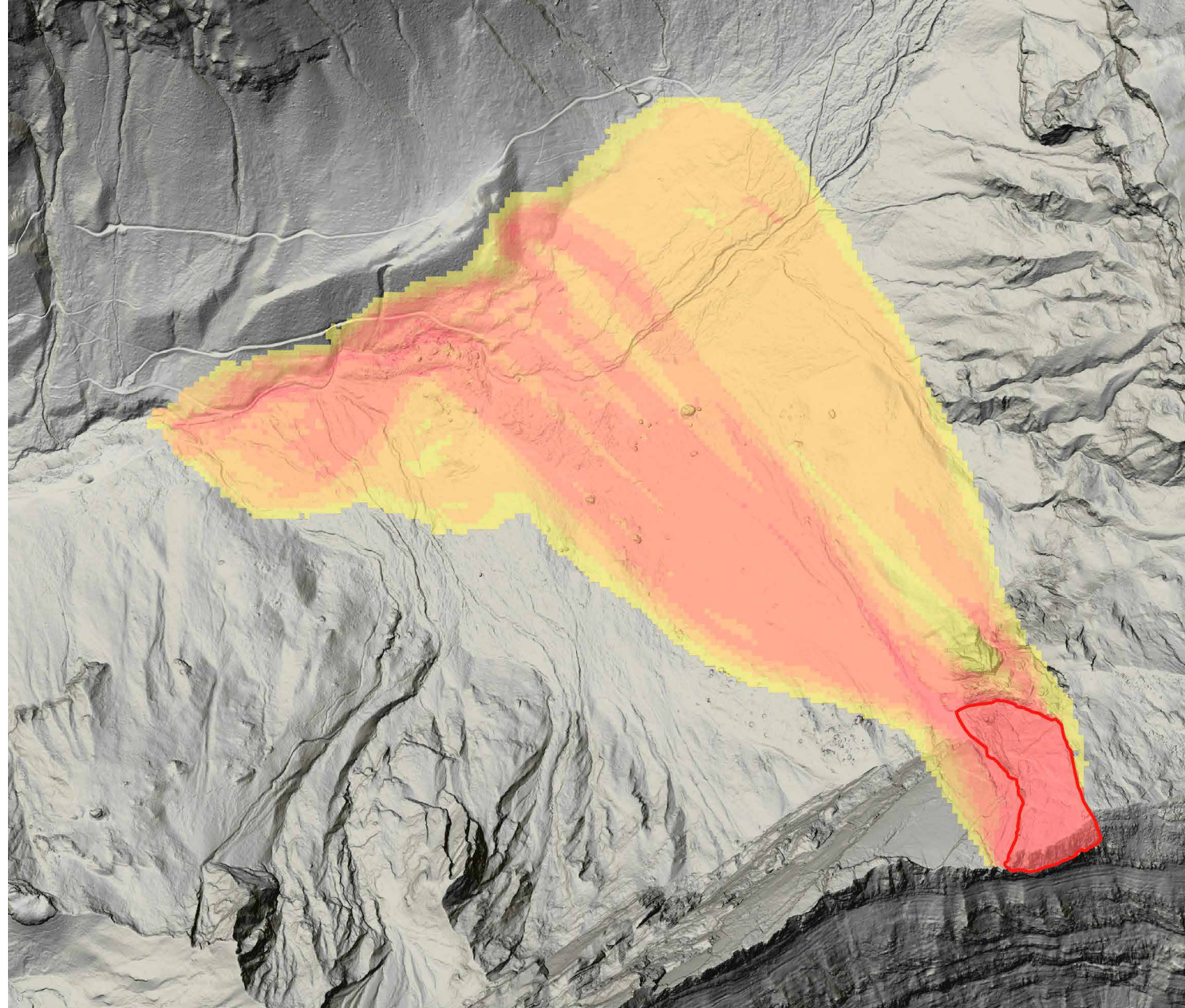


The screenshot displays the Flow-R 2.0.0 software interface with the following sections and options:

- Project files:** Includes input fields for "Digital Elevation Model" and "Source areas", each with a browse button (...). A dropdown menu shows "0" and a checkbox for "Use source values".
- Lateral spreading:** Features a "Direction algorithm" dropdown set to "Holmgren modified", with input fields for "dh =" and "x =". The "Persistence algorithm" dropdown is set to "Weights", with a "weights =" dropdown set to "default".
- Friction model:** Includes a "Friction algorithm" dropdown set to "Travel angle" and an "angle =" input field. A checked "Velocity limitation" checkbox is followed by a "velocity <" input field and the unit "m/s".
- Outputs:** Contains a "Main results directory" input field with a browse button (...). Below are several checkboxes: "Susceptibility maximum" (checked), "Susceptibility sum", "Propagation polygons (large output files)", "Total extent", "Number of propagations", "Velocity", and "Energy".
- Run name:** Includes a "Name of the run" input field and an "Add to queue" button.



# Technical specifications



> Rock avalanche reach susceptibility map

# Technical specifications

## A. Versatile software for run-out assessment of gravitational hazards at regional scale

- Debris flows
- Rockfalls
- Shallow landslides
- Snow avalanches
- Rock avalanches

## B. Wide range of implemented algorithms

- Control of the lateral spreading of a mass movement with various direction algorithms
- Assessment of the runout distance using simple frictional models
- Persistence functions reproducing the inertia of a mass flow
- An algorithm for rock avalanches allows ascending the opposite side of the slope

## C. Optimized algorithms for large study areas

- Computationally efficient: about 45× faster than previous versions (Flow-R 1)
- Multi-threaded processing
- Efficient memory handling that facilitates working with unrestricted spatial extents

## D. Flexible input data

- Flow-R requires only a Digital Elevation Model and user-defined source areas as input files
- Flow-R supports all common raster file types
- Automatic regriding of the source areas in case of differences in raster cell size
- Simple data importation and model setup
- Optional raster file providing the travel angles to account for protection forest and other mitigation measures.



# Technical specifications

## E. Created output files

- Results are exported as raster files in GeoTIFF format or as polygons in shapefile
- Optional compression of output raster files
- Output data include :
  - Susceptibility maximum: The maximum of susceptibility values from all propagations passing through a given cell
  - Susceptibility sum: The sum of susceptibility values from all propagations passing through a given cell
  - Total extent: The overall extent of all propagations
  - Number of propagations: The total number of propagations passing through a given cell
  - Velocity : The maximum of the velocity values from all propagations passing through a given cell
  - Energy: The maximum of the energy values from all propagations passing through a given cell for a unitary mass of 1 kg
  - Propagation polygons: Polygon of the propagation extent of each source cell

## F. Graphical user interface

- Easy configuration of model runs
- All parameters in a single window

## G. Multiple runs

- A queue system allows multiple consecutive runs
- An unlimited number of runs in the queue for the Flow-R Pro version (limited to three runs in the Lite and Trial versions)
- Possible to abort, pause or resume runs

## H. Complete documentation

- Help file
- Scientific article with the complete description of the Flow-R model: Horton P., Jaboyedoff M., et al.: *Flow-R, a model for susceptibility mapping of debris flows and other gravitational hazards at a regional scale*. NHESS 13, 869-885, 2013

Flow-R version 2  
available now

Trial

Buy

# Contact

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